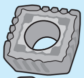
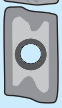
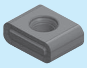
Milling

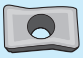
M1~M228

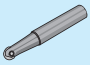
M





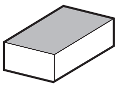
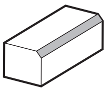
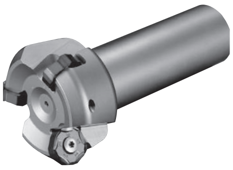


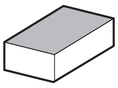
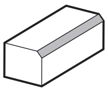
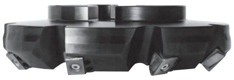


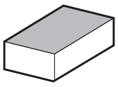
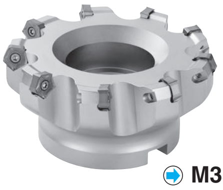


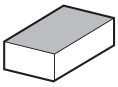
Product Lineup

Lead Angle 45˚/24˚/ 20˚ / 15˚

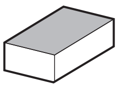
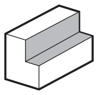
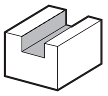
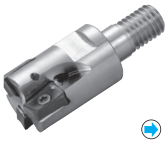
Lead Angle	Applications / Shape	Facing	Chamfering
			
45°	**MFPN45**  ➡ **M30**	●10-edge pentagonal inserts Double-sided pentagonal insert Economical with 10-edge insert ●Low cutting force with helical cutting-edge design ●Dual cutting edge design (High toughness)	
	MFPN45  ➡ **M31**	●10-edge pentagonal inserts Double-sided pentagonal insert Economical with 10-edge insert ●Low cutting force with helical cutting-edge design ●Dual cutting edge design (High toughness) ●With ø32 cylindrical shank	

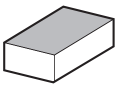
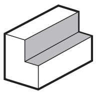
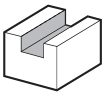
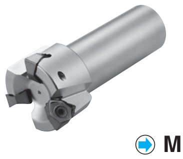
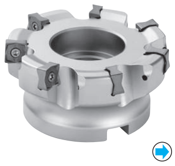
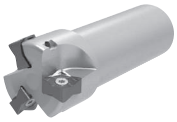
Lead Angle	Applications / Shape	Facing	Chamfering
			
45°	**MFLN45**  ➡ **M40**	●For heavy milling ●Tough 4-edge vertical inserts ●For large depths of cut and high feed rates ●Max. ap 12mm	
	MOF45  ➡ **M50**	●Octagonal insert with 8-edge insert ●Insert sizes are available in 05 and 07 types ●Silver Coating	

Lead Angle	Applications / Shape	Facing
		
24°	**MFPN66**  ➡ **M35**	●Double-sided 10-edge insert ●Cutting edge angle 66˚ ●Reduces chattering with low cutting force design
	MFPN66  ➡ **M36**	●Double-sided 10-edge insert ●Cutting edge angle 66˚ ●Reduces chattering with low cutting force design ●With ø32,ø40 cylindrical shank
15°	**MSRS15**  ➡ **M52**	●For heavy milling ●Max. ap 12mm ●Chip evacuation per unit time is increased

Lead Angle	Applications / Shape	Facing
		
20°	**MFLN70**  ➡ **M41**	●For heavy milling ●Tough 4-edge vertical inserts ●For large depths of cut and high feed rates ●Max. ap 17mm
	MFK  ➡ **M46**	●High efficiency multi-edge cutter for cast iron ●10-edge pentagonal inserts Economical double-sided 10-edge insert ●Low cutting force with helical cutting-edge design Improved surface finish, minimizing chattering and prevented burr formation ●Dual cutting edge design (High toughness)
	MFK-SF  ➡ **M47**	●Cutter for cast iron with adjustable cutting edge height ●High speed and high precision machining of cast iron by combining ceramic insert and CBN wiper insert

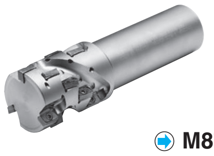
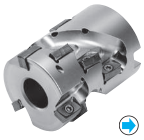
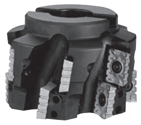
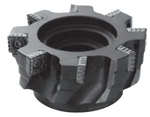
Lead Angle 0°/2° (Double-sided Insert)

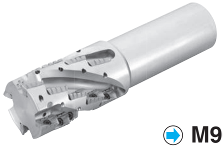
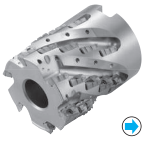
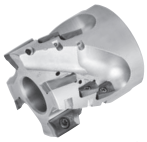
Lead Angle	Applications Shape	Facing	Shouldering	Slotting
				
0°	**MEW End Mill**  ➡ **M56**	● Economical double-sided 4-edge insert ● Obtuse edge increases cutting edge toughness ● Smooth surface wall with low cutting force and reduced chattering		
	MEW Face Mill  ➡ **M57**			
	MEW Head (Modular type)  ➡ **M58**			

Lead Angle	Applications Shape	Facing	Shouldering	Slotting
				
0°	**MFWN Face Mill**  ➡ **M102**	● Economical double-sided 6-edge insert ● Superior fracture resistance with thick edge design ● "Large slant edge" design reduces shock when cutting edge enters the workpiece ● Low cutting force and reduce chattering ● End mills have ø32 cylindrical shank		
	MFWN End Mill  ➡ **M103**			
	MFWN Mini Face Mill  ➡ **M107**	● Can be used up to 5mm D.O.C. ● Good cost performance ● Economical double-sided 6-edge insert ● Superior fracture resistance with thick edge design ● "Large slant edge" design reduces shock when cutting edge enters the workpiece ● Low cutting force and reduce chattering ● End mills have ø25,ø32 cylindrical shank		
	MFWN Mini End Mill  ➡ **M108**			
2°	**MFSN88 Face Mill**  ➡ **M111**	● Economical double-sided 8-edge insert ● Reduces chattering with low cutting force design ● Contribute to cost-cutting for Shoulder Roughing ● End mills have ø32,ø40 cylindrical shank		
	MFSN88 End Mill  ➡ **M112**			

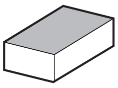
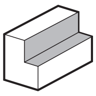
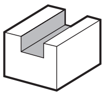
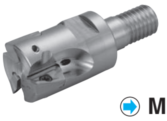
Product Lineup

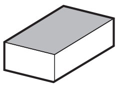
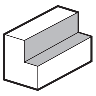
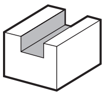
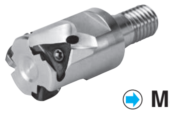
Lead Angle 0° (Heavy Milling)

Lead Angle	Applications Shape	Facing	Shouldering	Slotting
0°(Long Cutting Edge)	**MEWH**  → M87	●Low cutting force and sharp cutting performance ●Excellent surface finish quality ●Economical double-sided 4-edge insert ●High quality and stable machining with heavy milling		
	MEWH Shell Mill  → M88	●MEWH Shell Mill		
	MSR  → M124	●Low cutting force and restrain chattering with notched insert ●Chipbreaker design with specialized notches improves chip evacuation ●Chipbreaker achieves stabilized machining for heavy milling		
	MSR-BT50  → M125	●Highly rigid BT50 Arbor integrated for MSR		
	MFLN90  → M116	●For heavy milling ●Tough 4-edge vertical inserts ●For large depths of cut and high feed rates ●Max. ap 20mm ●Chamfered corner type available Prevents chattering and insert fracturing		
	MSRS90  → M120	●High efficiency, low cutting force and stable machining without chatter ●Various expansive possibilities with combining neutral insert and custom-ordered cutter		

Lead Angle	Applications Shape	Facing	Shouldering	Slotting
0°(Long Cutting Edge)	**MECH**  → M90	●Notched insert improves higher productivity		
	MECH Shell Mill  → M91	●MECH Shell Mill		
	MECH-BT50 **MECH-BT50SA**  → M91	●Highly rigid BT50 Arbor integrated for MECH ●Head exchangeable type is available (MECH-BT50SA)		
	MECHT  → M99	●Excellent chattering resistance and good chip control with special design for titanium alloys ●End mills have ø32 cylindrical shank		

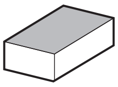
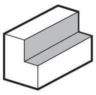
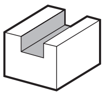
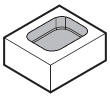
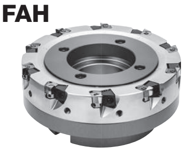
Lead Angle 0°

Lead Angle	Shape	Applications		
		Facing	Shouldering	Slotting
				
0°	**MEC End Mill**  ➡ M64	●Good squareness ●Low cutting force ●The silver coating prevents chip wear on the tool body ●With coolant hole (Over ø16)		
	MEC Face Mill  ➡ M66	●The twisted cutting edge improves cutting performance ●Smooth surface of shoulder wall ●Good squareness ●The silver coating prevents chip wear on the tool body ●With coolant hole		
	MEC Head (Modular type)  ➡ M67	●Good squareness ●Low cutting force ●The silver coating prevents chip wear on the tool body ●With coolant hole (Over ø16)		
	MECX End Mill  ➡ M74	●Good squareness ●Small size insert with multi-edge specification ●Low cutting force ●The silver coating prevents chip wear on the tool body ●With coolant hole		
	MECX Face Mill  ➡ M75	●Efficient machining with small diameter cutter that holds multiple inserts ●Recommended for small machines : low cutting force and high strength design ●The silver coating prevents chip wear on the tool body ●With coolant hole		
	MTP90  ➡ M129	●Medium to roughing of steel / cast iron ●For small machines and M/C		

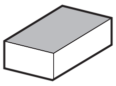
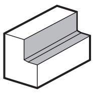
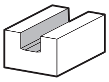
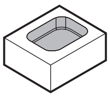
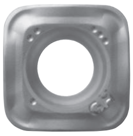
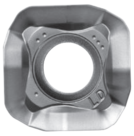
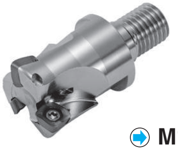
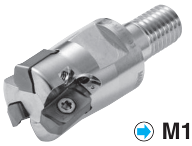
Lead Angle	Shape	Applications		
		Facing	Shouldering	Slotting
				
0°	**MEV End Mill**  ➡ M80	●Newly developed vertical triangle inserts with 3 cutting edges ●Economical 3-edge insert ●The MEV can perform a wide variety of machining processes		
	MEV Face Mill  ➡ M81			
	MEV Head (Modular type)  ➡ M82			
	DMC  ➡ M130	●For small milling machine and M/C		
	DMC-H  ➡ M132	●High Rake ●For small milling machine and M/C		
	DMC-SX  ➡ M131	●For small milling machine and M/C		

Product Lineup

Lead Angle 0° (For Aluminum Alloys)

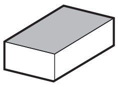
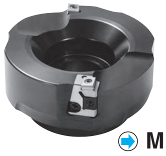
Lead Angle	Applications Shape	Facing	Shouldering	Slotting	Pocketing
					
0°	**MFAH**  ➡ **M134**	●High efficiency milling cutter for finishing aluminum alloys ●Light-weight hybrid body with internal coolant available / Steel body ●Adjustable cutting edge height ●3 Different cutting edge design			
	MEAS End Mill  ➡ **M144**	●High efficiency end mill for aluminum alloys ●Excellent scatter prevention to ensure stable ●Applicable to a wide range of application			
	MEAS Face Mill  ➡ **M144**	●High efficiency milling cutter for finishing aluminum alloys ●Excellent scatter prevention to ensure stable			

High Feed Cutter

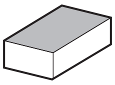
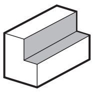
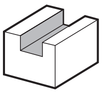
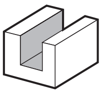
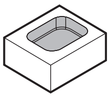
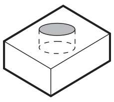
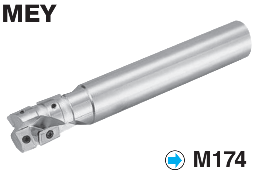
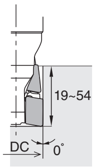
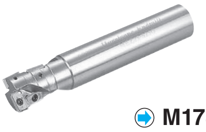
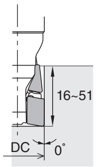
Applications / Shape	Facing	Shouldering	Slotting	Pocketing	Cutting Dia. DC
					ø8 ø16 ø25 ø32 ø40 ø50 ø80 ø160
MFH Harrier Face Mill  M150	●Various applications with 4 types of inserts  GM type (General purpose)  GH type (Tough Edge)  LD type (Large D.O.C.) MAX. ap=5mm  FL type (With Wiper Edge) Applicable for both roughing and finishing ●3D convex cutting edge reduces shock of biting workpiece ●Multi-functional cutter for ramping, helical milling vertical milling (plunging) etc. (GM type / GH type)				(SOMT10 type) ø50 ø80 ø50 ø160 (SOMT14 type)
MFH Harrier End Mill  M152					(SOMT10 type) ø25 ø40 (SOMT14 type) ø50 ø80
MFH Harrier Head (Modular type)  M154					(SOMT10 type) ø25 ø40
MFH Mini Face Mill  M159	●Economical double-sided 4-edge insert  GM type (General purpose)  GH type (Tough Edge) ●High efficiency and high feed machining at small dia. machining and small machining center				ø40 ø50
MFH Mini End Mill  M158					ø16 ø32
MFH Mini Head (Modular type)  M159					ø16 ø32
MFH Micro End Mill  M164	●Micro Dia. cutter for high feed machining ●High efficiency machining with low cutting force and reduced chattering  GM type (General purpose)				ø8 ø16
MFH Micro Head (Modular type)  M165					ø8 ø16

Product Lineup

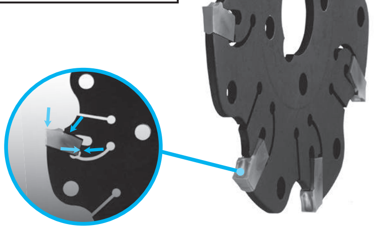
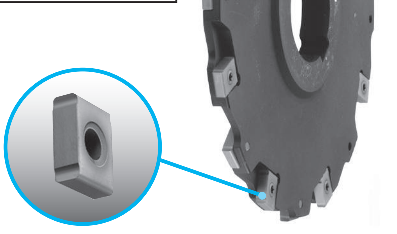
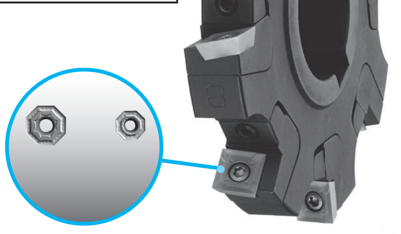
Cutter for Finishing

Lead Angle	Applications / Shape	Facing
		
0°	**MFF**  ➡ **M172**	●Cutter body design provides excellent reliability ●Molded Wiper Insert for High-Quality Surface Finish ●Easy-to-adjust Cutting Edge

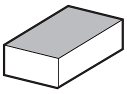
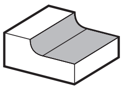
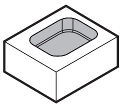
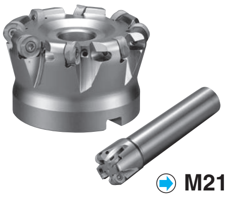
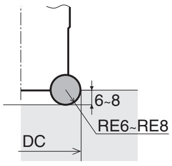
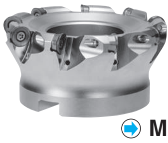
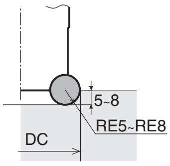
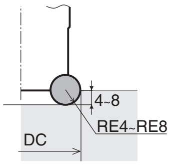
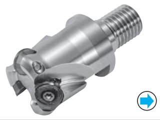
Multi-Function Machining End Mill

Applications / Shape	Facing	Shouldering	Slotting	Deep Slotting	Pocketing	Drilling	Lead Angle and Max. ap	Cutting Dia. DC
								ø16 ø25 ø50
MEY  ➡ **M174**	●Multi-function machining (Drilling / Ramping / Shouldering / Grooving) ●High efficiency mold machining ●Low cutting force, Good chip evacuation		●Full 2-insert structure and high stability ●Good chip control when Ramping		●Cutting diameters that are larger than the shank diameters enables wall shouldering ●The silver coating prevents chip wear on the tool body		 	ø16 ø50
MEZ-G  ➡ **M178**	●Multi-function machining (Drilling / Ramping / Shouldering / Grooving) ●High efficiency mold machining ●Low cutting force, Good chip evacuation		●The silver coating prevents chip wear on the tool body ●The clearance groove prevents chip welding				 	ø16 ø49

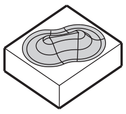
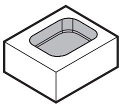
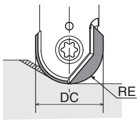
Slot Mill MST

MSTA ➡ **M182**	**MSTB** ➡ **M186**	**MSTC** ➡ **M191**
		
●Self-clamping type ●Remove insert with appropriate wrench	●Easy screw on tangential clamped insert	●Adjustable slotting width due to unique cam adjustment structure

Radius

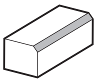
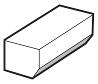
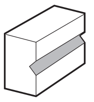
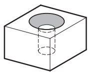
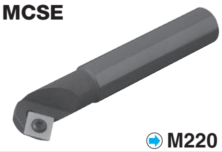
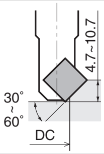
Applications / Shape	Facing	Shouldering	Pocketing	Lead Angle and Max. ap	Cutting Dia. DC
					ø12 ø16 ø32 ø40 ø50 ø63 ø80 ø100 ø125
MRW Face Mill **End Mill**  **M210**	●High efficiency radius cutter with double-sided insert ●Combine sharpness and cutting edge strength (A.R. Max. +12˚) ●Prevent insert rotation during machining with flat lock structure ●Wide application range from steel to heat-resistant alloys			 	ø32 ø125
MRX Face Mill  **M215**	●Low cutting force and high performance radius cutter ●Low cutting force with helical cutting-edge design (A.R. Max. +10˚) ●Prevent insert rotation during machining with flat lock structure ●Wide application from facing, grooving, pocketing to plunging ●Wide application range from steel to heat-resistant alloys			 	ø40 ø125
MRX End Mill  **M216**				 	ø16 ø63
MRX Head **(Modular type)**  **M217**					ø16 ø40

Ball-nose End Mill

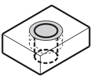
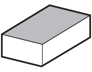
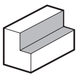
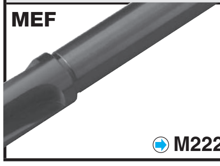
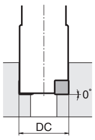
Applications / Shape	Contouring / Profiling	Pocketing	Lead Angle and Max. ap	Cutting Dia. DC
				ø8 ø25 ø50 ø80
MRF  **M206**	●For high quality mold finishing ●High R-accuracy (Insert's R-accuracy: ±0.01mm or under) ●The bushing ensures insert installation accuracy		 	ø8 ø25
MRFW  **M206**	●Carbide shank ●For high quality mold finishing ●High R-accuracy (Insert's R-accuracy: ±0.01mm or under) ●The bushing ensures insert installation accuracy ●Superior to anti vibration, and stable machining is possible with long overhang length without chattering			ø8 ø12

Product Lineup

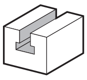
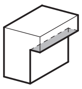
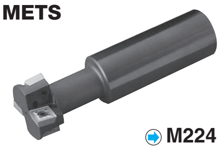
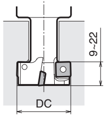
Chamfering

Applications Shape	Chamfering	Back Chamfering	V Shape Slotting	Countersinking	Lead Angle and Max. ap
					
MCSE  ➡ **M220**	●For 30˚, 45˚, 60˚ Chamfering ●Economical 4-edge insert ●Available back chamfering				

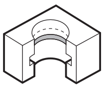
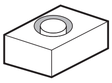
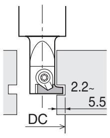
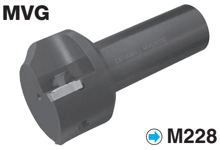
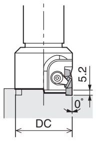
Bolt Countersinking

Applications Shape	Bolt Countersinking	Facing	Shouldering	Lead Angle and Max. ap
				
MEF  ➡ **M222**	●Countersink for hexagon socket bolt (M6 ~ M30) ●Economical 4-edge insert			

T-Slotting

Applications Shape	T-Slotting	Back side milling	Lead Angle and Max. ap
			
METS  ➡ **M224**	●T-Slotting ●Recommended for high feed machining with 2 flute design ●Economical 4-edge insert		

Grooving

Applications Shape	Internal Grooving	Ring Grooving	Lead Angle and Max. ap
			
MGI  ➡ **M226**	●Edge Width 1.0 ~ 4.0mm ●Grooving for M/C		
MVG  ➡ **M228**		●Cutting Dia. ø30 ~ø75 ●Edge Width 4.0 ~ 4.9mm ●O-Ring Grooving (G Series)	

Milling Inserts Identification System

Symbol	Shape
H	Hexagon
O	Octagon
P	Pentagon
S	Square
T	Triangle
C	80° Rhombic
D	55° Rhombic
E	75° Rhombic
F	50° Rhombic
M	86° Rhombic
V	35° Rhombic
W	Trigon
L	Rectangle
A	85° Parallelogram
B	82° Parallelogram
K	55° Parallelogram
R	Round

Shown angle stands for acute angle for rhombic and parallelogram inserts.

(1) Shape

Symbol	Relief Angle
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Other angles

(2) Relief Angle

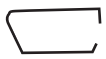
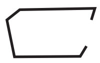
Symbol (Class)	Tolerance (mm)		
	Corner Height	Thickness	I.C. Size
A	±0.005	±0.025	±0.025
F			±0.013
C	±0.013		±0.025
H			±0.013
E	±0.025		±0.025
G		±0.13	
J	±0.005	±0.025	±0.05~±0.15
K*	±0.013		
L*	±0.025		
M*	±0.08~±0.18	±0.13	
N*		±0.025	
U*	±0.13~±0.38	±0.13	±0.08~±0.25

Insert's periphery is as fired.
* Tolerance difference is depending on insert size.

(3) Tolerance

Symbol	Shape
W	 No chipbreaker, with hole
T	 Single-sided chipbreaker, with hole
F	 Double-sided chipbreakers, without hole
N	 No chipbreaker, without hole
R	 Single-sided chipbreaker, without hole
M	 Single-sided chipbreaker, with hole
A	 No chipbreaker, with hole

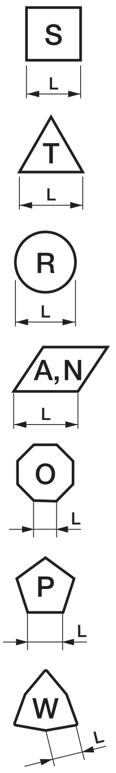
(4) Chipbreaker / Hole

Symbol	Shape
F	 Sharp Edge
E	 R-honed
T	 Chamfered
S	 Chamfered + R-honed

(9) Edge Preparation

S	E	K	N	12	03	A	F	T	N	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

(5) Edge Length

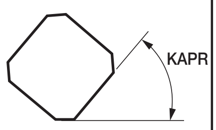


(6) Thickness

Symbol	Thickness (mm)
02	2.38
03	3.18
T3	3.97
04	4.76
05	5.56
06	6.35

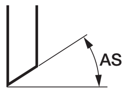
(7) Cutting Edge Angle

Symbol	Cutting Edge Angle
A	45°
D	60°
E	75°
F	85°
H	87°
P	90°
X	65°



(8) Relief Angle

Symbol	Relief Angle
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
R	10°
S	14°
T	22°
U	23°



(10) Hand of Tool

Symbol	Hand of Tool
R	Right-hand
L	Left-hand
N	Neutral

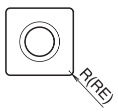
(11) Manufacturer's Option

Chipbreaker, etc.

In case of indicating corner-R(RE) at (7) and (8)

(7) (8) Corner-R(RE)(mm)

04	0.4
08	0.8
12	1.2
16	1.6
20	2.0

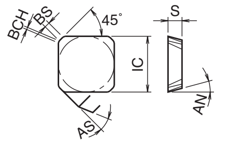
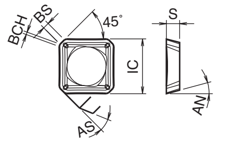
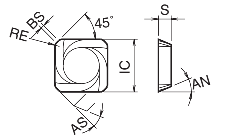
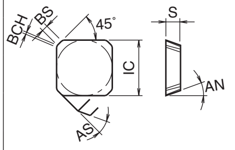
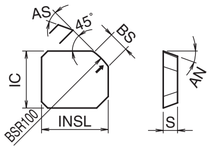
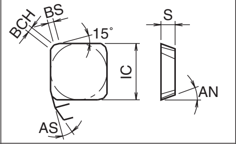
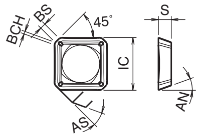
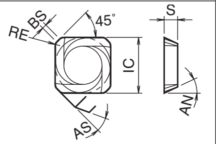
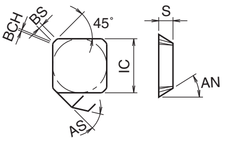
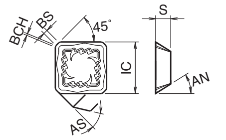


Milling Inserts

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

P	Carbon Steel / Alloy Steel		■				★		
	Mold Steel		■				★		
M	Stainless Steel						★		
K	Gray Cast Iron							★	☆
	Nodular Cast Iron							★	
N	Non-ferrous Metals								★
S	Heat-resistant Alloys						★		
	Titanium Alloys							★	☆
H	Hard Materials						☐		

Insert Handed Insert shows Right-hand	Description	Dimension (mm)					Angle		Cermet		CVD Coated Carbide		MN	MEGACOAT		Carbide	See Page for Applicable Toolholders
		IC	S	BCH RE	BS	INSL	AN	AS	TN60	TN100M	CA6535	CA420M	PR1535	PR1225	PR1210	KW10	
 	**SDKN 1203AUTN**	12.70	3.18	0.5	1.2	-	15°	23°		●				●	●		-
	1203AUFN															●	
	SDKN 1504AUTN	15.875	4.76							●				●			
 	**SDKR 1203AUEN-S**	12.70	3.18	0.5	1.7	-	15°	23°		●				●			-
 	**SDMR 1203AUER-H**	12.70	3.18	R1.0	0.8	-	15°	23°						●			
 	**SEEN 1203AFTN**	12.70	3.18	0.5	1.4	-	20°	25°		●							-
	SEKN 1203AFTN									●				●	●		
	1203AFFN															●	
	SEKN 1204AFTN		4.76											●			
	SEKN 1504AFTN	15.875												●			
  Wiper Insert (1-edge)	**SEEN 1203AFTR-W**	12.70	3.18	-	3.5	14.56	20°	25°		●							-
	1203AFFR-W															●	
 	**SEKN 1203EFTR**	12.70	3.18	1.2	1.4	-	20°	25°		●							-
 	**SEKR 1203AFEN-S**	12.70	3.18	0.5	1.7	-	20°	25°		●				●			-
 	**SEMR 1203AFER-H**	12.70	3.18	R1.0	1.0	-	20°	25°						●			
 	**SOKN 13T3AXTN**	13.494	3.97	0.5	1.1	-	27°	32°		▲				▲	▲		-
	13T3AXFN															▲	
 	**SOKR 13T3AXEN-J**	13.494	3.97	0.5	1.1	-	27°	32°		▲				▲		▲	

* MN indicates MEGACOAT NANO.

Inserts are sold in 10 piece boxes

SEEN-W (TN100M/KW10) Inserts are sold in 5 piece boxes

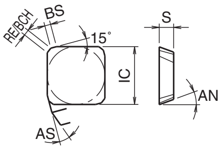
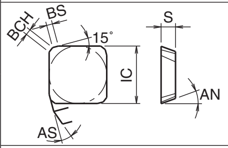
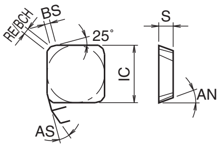
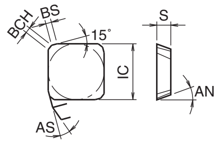
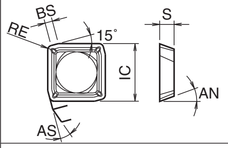
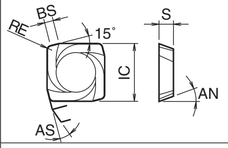
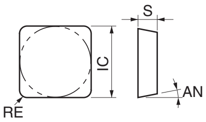
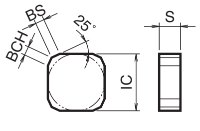
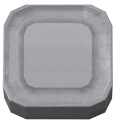
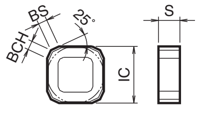
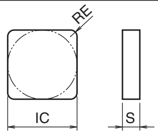
● : Std. Item
▲ : To be replaced by a new product

Milling Inserts

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

P	Carbon Steel / Alloy Steel		■				★		
	Mold Steel		■				★		
M	Stainless Steel						★		
K	Gray Cast Iron				★			☆	☆
	Nodular Cast Iron				★			☆	
N	Non-ferrous Metals								★
S	Heat-resistant Alloys						★		
	Titanium Alloys							★	☆
H	Hard Materials						☐		

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Angle		Cermet		CVD Coated Carbide		MN	MEGACOAT		Carbide	See Page for Applicable Toolholders
			IC	S	BCH	BS	RE	AN	AS	TN60	TN100M	CA6535	CA420M	PR1535	PR1225	PR1210	KW10	
		**SPCN 1203EDTR**	12.70	3.18	-	2.0	1.0	11°	15°		●							-
		SPKN 1203EDTR									●				●			
					1.0		-									●		
		1203EDTL			-		1.0				●							
		1203EDER			1.0	1.6	-						●					
		1203EDFR															●	
		SPKN 1504EDTR	15.875	4.76		2.2					●				●	●		
		1504EDFR															●	
		**SPEN 1203EEER**	12.70	3.18	1.0	1.4	-	11°	20°				●					-
		1203EESR														●		
		**SPCN 1203XPTR**	12.70	3.18	-	2.0	1.0	11°	11°		●							-
		SPKN 1203XPTR									●							
		1203XPFR			1.0		-										●	
		SPKN 1504XETR	15.875	4.76					20°		●							
		**SPCN 1904EETR1**	19.05	4.76	0.7	1.2	-	11°	20°		●							-
		**SPKR 1203EDER-S**	12.70	3.18	-	2.0	1.0	11°	15°		●				●			-
		**SPMR 1203EDER-H**	12.70	3.18	-	2.0	1.0	11°	15°						●			
		**SPMN 120308**	12.70	3.18	-	-	0.8	11°	-	●	●							-
		120312					1.2			●	●							
		SPMN 120408		4.76			0.8						●			●		
		120412					1.2						●					
		SPGN 090304	9.525	3.18			0.4										●	
		090308					0.8										●	
		SPGN 120304	12.70				0.4										●	
		120308					0.8										●	
		**SNCN 1204XNTN**	12.70	4.76	2.0	2.0	-	-	-		●							-
		SNKN 1204XNTN									●							
		**SNMF 1204XNTN**	12.70	4.76	2.0	2.0	-	-	-		●							-
		**SNMN 120408**	12.70	4.76	-	-	0.8	-	-							●		-
		120412					1.2						●			●		
		120424					2.4						●					

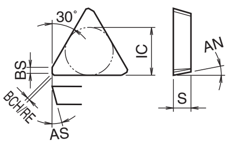
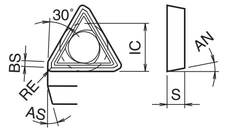
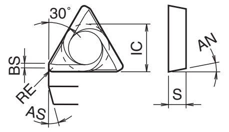
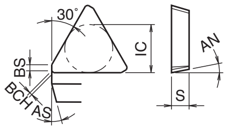
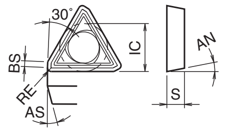
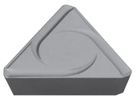
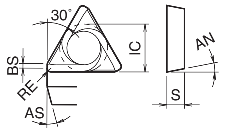
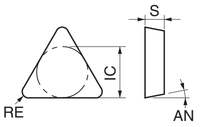
* MN indicates MEGACOAT NANO.

● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts

Classification of usage			TN60	TN100M	CA6535	CA420M	PR1535	PR1225	PR1210	KW10
★ : Roughing / 1st Choice ☆ : Roughing / 2nd Choice ■ : Finishing / 1st Choice ☐ : Finishing / 2nd Choice (In case hardness is 45HRC or under)	P	Carbon Steel / Alloy Steel		■				★		
		Mold Steel		■				★		
	M	Stainless Steel						★		
	K	Gray Cast Iron							★	☆
		Nodular Cast Iron							★	
	N	Non-ferrous Metals								★
	S	Heat-resistant Alloys						★		
		Titanium Alloys							★	☆
	H	Hard Materials						☐		

Insert Handed Insert shows Right-hand		Description		Dimension (mm)					Angle		Cermet		CVD Coated Carbide		MN	MEGACOAT		Carbide	See Page for Applicable Toolholders
				IC	S	BCH	BS	RE	AN	AS	TN60	TN100M	CA6535	CA420M	PR1535	PR1225	PR1210	KW10	
		**TEKN**	**1603PTTR**	9.525	3.18	-	1.0	0.8	20°	22°		●				●			-
						0.7	1.4	-									●		
			1603PTFR															●	
		TEEN	**2204PTTR**	12.70	4.76	-		1.0				●							
		TEKN	**2204PTTR**									●				●			
						0.7		-									●		
			2204PTFR															●	
		**TEKR**	**2204PTER-S**	12.70	4.76	-	1.4	1.0	20°	22°		●				●			-
		**TEMR**	**1603PTER-H**	9.525	3.18	-	1.2	0.8	20°	22°						●			-
		TEMR	**2204PTER-H**	12.70	4.76	-	1.4	1.0								●			
		**TPKN**	**1603PDTR**	9.525	3.18	0.7	1.2	-	11°	15°		●				●	●		-
			1603PDFR															●	
		TPKN	**2204PDTR**	12.70	4.76	0.7	1.6					●				●	●		**M129**
			2204PDFR															●	
		**TPKR**	**2204PDER-S**	12.70	4.76	-	1.4	1.0	11°	15°		●				●			
		**TPMR**	**1603PDER-H**	9.525	3.18	-	1.2	0.8	11°	15°						●			-
		TPMR	**2204PDER-H**	12.70	4.76	-	1.4	1.0								●			**M129**
		**TPMN**	**110304**	6.35	3.18	-	-	0.4	11°	-								●	-
			110308					0.8										●	
			160304	9.525				0.4				●						●	
			160308					0.8				●						●	
			160312					1.2				●							
			220408	12.70	4.76			0.8				●							
		TPGN	**090202**	5.56	2.38			0.2										●	
			090204					0.4			●							●	
			090208					0.8			●								
			110302	6.35	3.18			0.2										●	
			110304					0.4			●							●	
			110308					0.8			●							●	
			160304	9.525				0.4			●							●	
			160308					0.8			●							●	

* MN indicates MEGACOAT NANO.

Cutting Range	Chipbreaker		Features
Finishing - Roughing	S		S chipbreaker is for general-purpose cutter. Low cutting force is possible with 13˚ chipbreaker rake angle. Recommended for various ap with 3-step chipbreaker design.
Medium - Roughing	H		H chipbreaker is for general-purpose cutter. The chipbreaker's smooth rake face enables smooth chip evacuation. 25˚ rake angle chipbreaker provides 20% less cutting force than non-chipbreaker type.

● : Std. Item

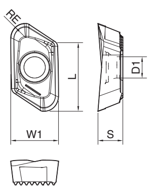
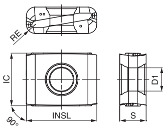
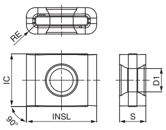
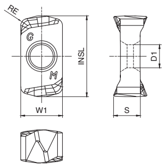
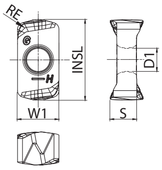
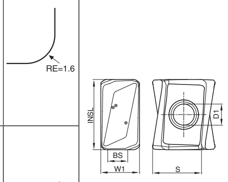
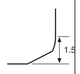
Inserts are
sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice

		PV60M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	PDL025	GW25
P	Carbon Steel / Alloy Steel	■			☆	★						
	Mold Steel	■			☆	★						
M Stainless Steel	Austenitic related				★	☆						
	Martensitic related		★		☆							
	Precipitation Hardening				★							
K	Gray Cast Iron						★					
	Nodular Cast Iron						★					
N	Non-ferrous Metals										★	☆
S	Heat-resistant Alloys		★		☆							
	Titanium Alloys				★							
H	Hard Materials									★		

Insert Handed Insert shows Right-hand		Description		Dimension (mm) W1 IC	S	D1	L INSL	BS	RE	MN Cermet PV60M	CVD Coated Carbide CA6535	CA420M	MEGACOAT (PVD Coated Carbide) PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	DLC Coated Carbide PDL025	Carbide GW25	See Page for Applicable Toolholders
 Non-ferrous Metals (Single-sided / 2-edge)		KCGT	130504FR-AL	9.9	5.1	4.4	14.1	-	0.4										●		M144 M145
			130508FR-AL				13.9		0.8										●		
			130512FR-AL				13.8		1.2										●		
			130516FR-AL				13.3		1.6										●		
			130520FR-AL						2.0										●		
			130524FR-AL						2.4										●		
			130530FR-AL						3.0										●		
			130532FR-AL				12.8		3.2										●		
			130540FR-AL						4.0										●		
			130550FR-AL						5.0										●		
NEW  For steel and stainless steel (Low cutting force)		LNGX	120916R-TT	9.525	6.35	4.2	12.7	-	1.6	MTO				MTO							M172
NEW  For Cast Iron		LNGX	120916	9.525	6.35	4.2	12.7	-	1.6	MTO				MTO							M172
 General purpose		LOGU	030310ER-GM	6.2	3.96	3.45	11.9	-	1.0		●		●	●	●						M158 M159
NEW  Tough Edge		LOGU	030310ER-GH	6.2	3.96	3.45	11.9	-	1.0				●	●	●			●			M158 M159
NEW  Corner-R		LOGU	221616ER-GM	12.5	16.6	6.8	22.8	6.3	1.6				●	●							M40 M41 M116
NEW  Corner Chamfer		LOGU	2216PAER-GM	12.5	16.9	6.8	22.8	4.8	-				●	●							M116

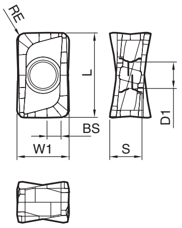
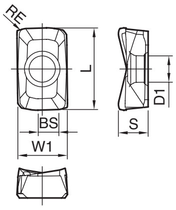
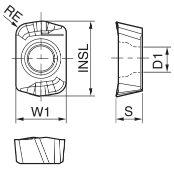
MN Cermet : MEGACOAT NANO Cermet

● : Std. Item
MTO : Made to order

Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage			TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	PDL025	GW25
★ : Roughing / 1st Choice ☆ : Roughing / 2nd Choice ■ : Finishing / 1st Choice ☐ : Finishing / 2nd Choice	P	Carbon Steel / Alloy Steel				☆	★						
		Mold Steel				☆	★						
	M Stainless Steel	Austenitic related				★	☆						
		Martensitic related		★		☆							
		Precipitation Hardening				★							
	K	Gray Cast Iron						★					
		Nodular Cast Iron						★					
	N	Non-ferrous Metals										★	☆
	S	Heat-resistant Alloys		★		☆							
		Titanium Alloys				★							
	H	Hard Materials									★		

Insert	Handed Insert shows Right-hand	Description		Dimension (mm)						Cermet	CVD Coated Carbide		MEGACOAT (PVD Coated Carbide)						DLC Coated Carbide	Carbide	See Page for Applicable Toolholders
				W1	S	D1	L INSL	BS	RE	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	PDL025	GW25	
 General purpose		**LOMU**	**100404ER-GM**	6.6	4.0	3.4	10.9	2.1	0.4		●		●	●	●						**M56 M57 M58 M87 M88**
			100408ER-GM					1.7	0.8		●		●	●	●						
			100412ER-GM					1.3	1.2		●		●	●	●						
			100416ER-GM					1.0	1.6		●		●	●	●						
			100420ER-GM					1.0	2.0		●		●	●	●						
		LOMU	**150504ER-GM**	9.2	5.6	4.8	15.7	2.2	0.4		●		●	●	●						
			150508ER-GM					1.8	0.8		●		●	●	●						
			150510ER-GM					1.6	1.0					●							
			150512ER-GM					1.4	1.2		●		●	●	●						
			150516ER-GM					1.0	1.6		●		●	●	●						
			150520ER-GM					0.6	2.0		●		●	●	●						
 Low cutting force		**LOMU**	**100408ER-SM**	6.6	4.0	3.4	10.9	1.7	0.8		●		●	●	●						
		LOMU	**150508ER-SM**	9.2	5.6	4.8	15.7	1.8	0.8		●		●	●	●						
 Tough Edge (For Heavy Milling)		**LOMU**	**100408ER-GH**	6.6	4.0	3.4	10.9	1.7	0.8		●		●	●	●			●			
		LOMU	**150508ER-GH**	9.2	5.6	4.8	15.7	1.8	0.8		●		●	●	●			●			
 Non-ferrous Metals (Single-sided / 2-edge)		**LOGT**	**100408FR-AM**	6.8	4.0	3.6	11.2	2.8	0.8										●	●	
		LOGT	**150508FR-AM**	8.9	5.6	4.9	15.9	2.9	0.8										●	●	
 General purpose		**LPGT**	**010210ER-GM**	4.19	2.19	2.1	6.26	-	1.0		●		●	●							**M164 M165**

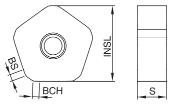
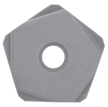
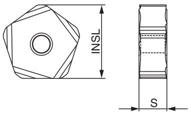
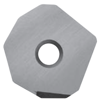
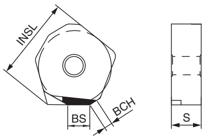
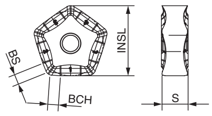
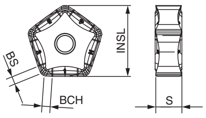
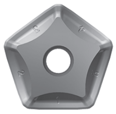
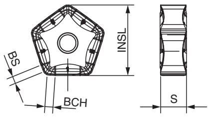
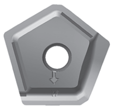
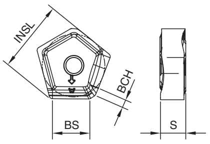
Inserts are sold in 10 piece boxes

● : Std. Item

Milling Inserts (With Hole)

Classification of usage			TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	KBN475
	P	Carbon Steel / Alloy Steel											
		Mold Steel											
	M Stainless Steel	Austenitic related											
		Martensitic related											
		Precipitation Hardening											
	K	Gray Cast Iron			★			☆			★	☆	
		Nodular Cast Iron			★			☆			☆	★	
	N	Non-ferrous Metals											
	S	Heat-resistant Alloys											
		Titanium Alloys											
	H	Hard Materials											

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Cermet	CVD Coated Carbide		MEGACOAT (PVD Coated Carbide)					Silicon Nitride Ceramic	CVD Coated Silicon Nitride Ceramic	CBN	See Page for Applicable Toolholders
			INSL	S	D1	BCH	BS	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	KBN475	
 High speed machining		**PNEA 1106XNTN-T01020**	16.94	6.5	-	1.5	1.5									●	●		M46 M47
 High speed machining (With Chipbreaker)		**PNEG 1106XNTR-T00515**	17.07	6.35	-	-	-									●	●		
 Wiper Insert (2-edge)		**PNEG 1106XNTR-T01015W**	18.06	6.5	-	1.7	4.8											●	
 Surface-Finish Oriented		**PNEG 1106XNEN-GL**	17.18	6.35	-	2.6	2.6			●		●	●						
 General purpose		**PNMG 1106XNEN-GM**	17.23			2.0	2.0			●		●	●						
 Tough Edge		**PNMG 1106XNEN-GH**								●		●	●						
 Wiper Insert (2-edge)		**PNEG 1106XNER-W**	18.02				10.0			●		●	●						

● : Std. Item

Inserts are sold in 10 piece boxes

PNEG1106XNER-W Inserts are sold in 5 piece boxes

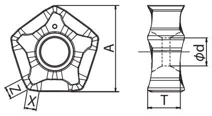
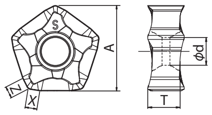
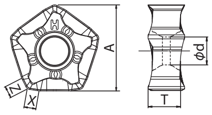
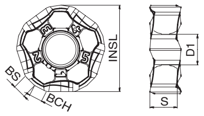
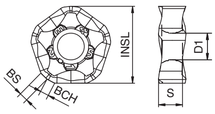
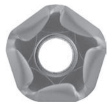
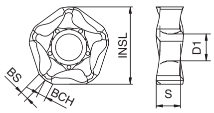
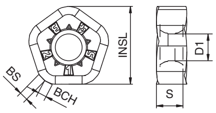
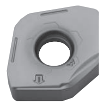
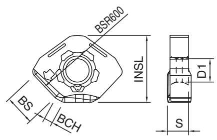
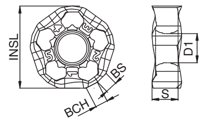
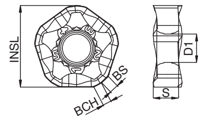
PNEG1106XNTR-T01015W Inserts are sold in 1 piece boxes

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice

		TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S
P	Carbon Steel / Alloy Steel	■				☆	★		☆		
	Mold Steel	■				☆	★		☆		
M Stainless Steel	Austenitic related					★	☆		☆		
	Martensitic related			★		☆					
	Precipitation Hardening					★					
K	Gray Cast Iron							★		☆	
	Nodular Cast Iron							★		☆	
N	Non-ferrous Metals										
S	Heat-resistant Alloys			★		☆			☆		
	Titanium Alloys					★				☆	
H	Hard Materials										★

Insert		Description	Dimension (mm)					Cermet		CVD Coated Carbide		MEGACOAT (PVD Coated Carbide)						See Page for Applicable Toolholders
			INSL	S	D1	BCH	BS	TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	
 General purpose		**PNMU 0905XNER-GM**	14.6	5.56	4.7	2.0	2.0	●				●	●	●				M35 M36
 Low cutting force		**PNMU 0905XNER-SM**										●	●	●				
 Tough Edge (For Heavy Milling)		**PNMU 0905XNER-GH**										●	●	●			●	
 Surface-Finish Oriented (Precision Class)		**PNEU 1205ANER-GL**	17.51	5.56	6.2	2.7	2.7	●		●		●	●	●	●	●		M30 M31
 General purpose		**PNMU 1205ANER-GM**	17.88			2.0	2.0	●		●		●	●	●	●	●		
 Low cutting force		**PNMU 1205ANER-SM**								●		●	●	●	●	●		
 Tough Edge (For Heavy Milling)		**PNMU 1205ANER-GH**	17.98	6.17						●		●	●	●	●	●	●	
 Wiper Insert (2-edge)		**PNEU 1205ANER-W**	17.85	5.56		2.3	8.1	●	●	●		●	●	●				
 Surface-Finish Oriented (Precision Class)		**PNEU 1205ANEL-GL**	17.51			2.7	2.7	●		●		●	●	●				M30
 General purpose		**PNMU 1205ANEL-GM**	17.88			2.0	2.0	●		●		●	●	●				

Inserts are sold in 10 piece boxes

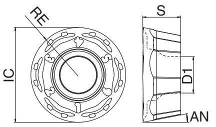
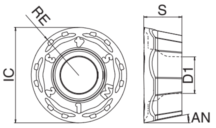
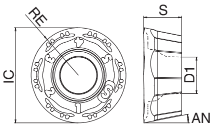
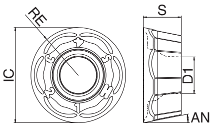
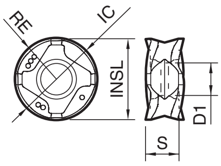
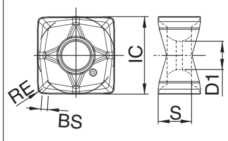
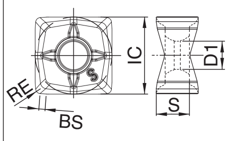
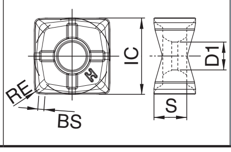
PNEU1205ANER-W Inserts are sold in 5 piece boxes

● : Std. Item

Milling Inserts (With Hole)

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice

Classification of usage			TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S
P	Carbon Steel / Alloy Steel		■				☆	★				
	Mold Steel		■				☆	★				
M Stainless Steel	Austenitic related						★	☆				
	Martensitic related				★		☆					
	Precipitation Hardening						★					
K	Gray Cast Iron								★			
	Nodular Cast Iron								★			
N	Non-ferrous Metals											
S	Heat-resistant Alloys				★		☆					
	Titanium Alloys						★					
H	Hard Materials											★

Insert		Description		Dimension (mm)						Angle	Cermet		CVD Coated Carbide		MEGACOAT (PVD Coated Carbide)						See Page for Applicable Toolholders
Handed Insert shows Right-hand				IC	S	D1	INSL	BS	RE	AN	TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	
 General purpose (G Class)		RDGT	0803M0ER-GM	8	3.18	3.0	-	-	4	15°			●		●	●	●				M216 M217
		RPGT	10T3M0ER-GM	10	3.97	3.5			5	11°			●		●	●	●				M215
			1204M0ER-GM	12	4.76	4.6			6				●		●	●	●				M216
			1605M0ER-GM	16	5.56	5.8			8				●		●	●	●				M217
 General purpose (M Class)		RDMT	0803M0ER-GM	8	3.18	3.0			4	15°			●		●	●	●				M216 M217
		RPMT	10T3M0ER-GM	10	3.97	3.5			5	11°			●		●	●	●				M215
			1204M0ER-GM	12	4.76	4.6			6				●		●	●	●				M216
			1605M0ER-GM	16	5.56	5.8			8				●		●	●	●				M217
 Stainless Steel / Low cutting force		RDGT	0803M0ER-SM	8	3.18	3.0			4	15°			●		●	●					M216 M217
		RPGT	10T3M0ER-SM	10	3.97	3.5			5	11°			●		●	●					M215
			1204M0ER-SM	12	4.76	4.6			6				●		●	●					M216
			1605M0ER-SM	16	5.56	5.8			8				●		●	●					M217
 Tough Edge (For Heavy Milling)		RDMT	0803M0EN-GH	8	3.18	3.0			4	15°			●		●	●	●				M216 M217
		RPMT	10T3M0EN-GH	10	3.97	3.5			5	11°			●		●	●	●				M215
			1204M0EN-GH	12	4.76	4.6			6				●		●	●	●				M216
			1605M0EN-GH	16	5.56	5.8			8				●		●	●	●				M217
 General purpose		ROMU	1204M0ER-GM	12	4.75	4.6	11.8	-	6	-			●		●	●	●				M210 M211
			1605M0ER-GM	16	5.48	6.2	15.8		8				●		●	●	●				
 Low cutting force		ROMU	1204M0ER-SM	12	4.75	4.6	11.8		6				●		●	●					
			1605M0ER-SM	16	5.48	6.2	15.8		8				●		●	●					
 Tough Edge (For Heavy Milling)		ROMU	1204M0ER-GH	12	4.75	4.6	11.8		6				●		●	●	●				
			1605M0ER-GH	16	5.48	6.2	15.8		8				●		●	●	●				
 General purpose		SNMU	130508EN-GM	13	5.51	4.7	-	1.0	0.8	-	●				●	●	●				M111 M112
 Low cutting force		SNMU	130508EN-SM												●	●	●				
 Tough Edge (For Heavy Milling)		SNMU	130508EN-GH												●	●	●			●	

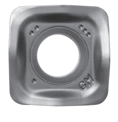
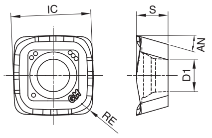
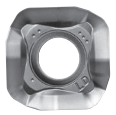
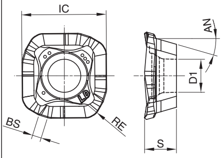
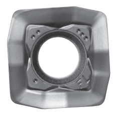
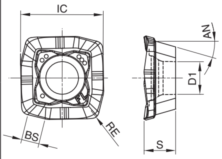
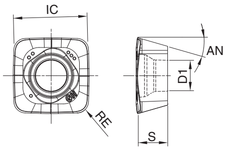
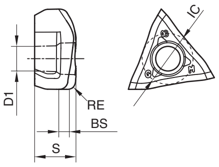
● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts

Milling Inserts (With Hole)

Classification of usage			TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	PDL025	GW25
★ : Roughing / 1st Choice	P	Carbon Steel / Alloy Steel	■				☆	★						
☆ : Roughing / 2nd Choice		Mold Steel	■				☆	★						
■ : Finishing / 1st Choice	M Stainless Steel	Austenitic related					★	☆						
☐ : Finishing / 2nd Choice		Martensitic related			★		☆							
		Precipitation Hardening					★							
	K	Gray Cast Iron							★					
		Nodular Cast Iron							★					
	N	Non-ferrous Metals											★	☆
	S	Heat-resistant Alloys			★		☆							
		Titanium Alloys					★							
	H	Hard Materials										★		

Insert		Description	Dimension (mm)					Angle	Cermet		CVD Coated Carbide		MEGACOAT (PVD Coated Carbide)						DLC Coated Carbide	Carbide	See Page for Applicable Toolholders
Handed Insert shows Right-hand			IC	S	D1	BS	RE	AN	TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	PDL025	GW25	
 General purpose		SOMT 100420ER-GM	10.30	4.58	4.6	-	2.0	16°			●		●	●	●						M150 M152 M154
		140520ER-GM	14.14	5.56	5.8						●		●	●	●						M150 M153
 Large D.O.C.		SOMT 100420ER-LD	10.45	4.58	4.6	0.9	2.0	16°			●		●	●	●						M150 M152 M154
		140520ER-LD	14.76	5.56	5.8	1.6					●		●	●	●						M150 M153
 With Wiper Edge		SOMT 100420ER-FL	10.44	4.58	4.6	1.4	2.0	16°			●		●	●	●						M150 M152 M154
		140514ER-FL	14.57	5.56	5.8	3.1	1.4				●		●	●	●						M150 M153
NEW  Tough Edge		SOMT 100420ER-GH	10.43	4.57	4.55	-	2.0	16°					●	●	●			●			M150 M152 M154
		140520ER-GH	14.17	5.56	5.8	-							●	●	●			●			M150 M153
NEW  General purpose		TOMT 060504ER-GM	7.2	5.7	3.4	1.9	0.4	-			●		●	●	●						M80 M81 M82
		060508ER-GM				1.5	0.8				●		●	●	●						
NEW  Low cutting force		TOMT 060508ER-SM	7.2	5.7	3.4	1.5	0.8	-			●		●	●							

● : Std. Item

Inserts are
sold in 10 piece boxes

M

Milling

Insert

Lead Angle 45°~20°

Lead Angle 15°

Lead Angle 0°/2°

High Feed Cutter

Cutter for Finishing

Multi-Function

Slot Mill

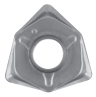
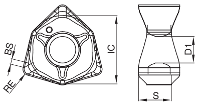
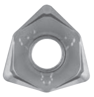
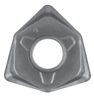
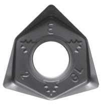
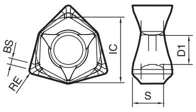
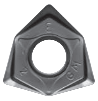
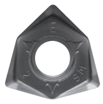
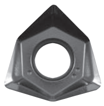
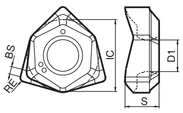
Ball-nose Radius

Others

Milling Inserts (With Hole)

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
□ : Finishing / 2nd Choice

Classification of usage														
P	Carbon Steel / Alloy Steel	■				☆	★						
	Mold Steel	■				☆	★						
M Stainless Steel	Austenitic related					★	☆						
	Martensitic related			★		☆							
	Precipitation Hardening					★							
K	Gray Cast Iron							★					
	Nodular Cast Iron							★					
N	Non-ferrous Metals											★	☆
S	Heat-resistant Alloys			★		☆							
	Titanium Alloys					★							
H	Hard Materials										★		

Insert		Description	Dimension (mm)					Angle	Cermet		CVD Coated Carbide		MEGACOAT (PVD Coated Carbide)						DLC Coated Carbide	Carbide	See Page for Applicable Toolholders
Handed Insert shows Right-hand			IC	S	D1	BS	RE	AN	TN620M	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	PR015S	PDL025	GW25	
NEW  General purpose		WNMU 050408EN-GM	8.8	4.2	3.4	0.7	0.8	-					●	●	●						M107 M108
NEW  Low cutting force		WNMU 050408EN-SM											●	●	●						
NEW  Tough Edge		WNMU 050408EN-GH											●	●	●			●			
 Surface-Finish Oriented (Precision Class)		WNEU 080608EN-GL	14.02	6.65	6.2	1.5	0.8	-	●		●		●	●	●						M102 M103
 General purpose		WNMU 080604EN-GM				1.7	0.4		●		●		●	●	●						
		080608EN-GM				1.3	0.8		●		●		●	●	●						
 Low cutting force		WNMU 080608EN-SM									●		●	●	●						
 Tough Edge (For Heavy Milling)		WNMU 080608EN-GH									●		●	●	●			●			
 Non-ferrous Metals (Single-sided / 3-edge)		WNGT 080608FN-AM				1.5													●	●	

● : Std. Item

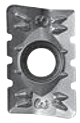
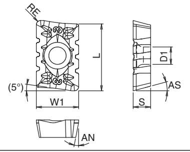
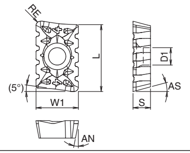
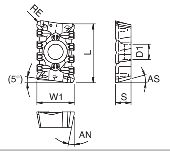
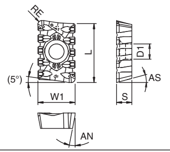
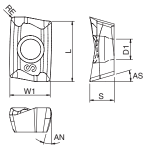
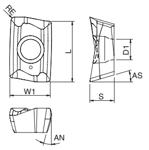
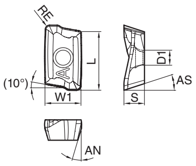
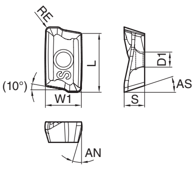
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
□ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PDL025	GW25
P	Carbon Steel / Alloy Steel			☆	★	★			
	Mold Steel			☆	★	★			
M Stainless Steel	Austenitic related			★	☆	☆			
	Martensitic related		★	☆					
	Precipitation Hardening			★					
K	Gray Cast Iron						★		
	Nodular Cast Iron						★		
N	Non-ferrous Metals							★	☆
S	Heat-resistant Alloys		★	☆	★	★			
	Titanium Alloys			★			★		☆
H	Hard Materials				□				

Insert Handed Insert shows Right-hand	Description	Dimension (mm)					Angle		Cermet	CVD Coated Carbide	MN	MEGACOAT			DLC Coated Carbide	Carbide	See Page for Applicable Toolholders
		W1	S	D1	L	RE	AN	AS	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PDL025	GW25	
  3-Notched	APMT 250608ER-NB3	15.875	6.35	6.5	25	0.8	11°	15°					●	●			M124 M125
	250616ER-NB3					1.6							●	●			
	250640ER-NB3					4.0							●				
	APMT 250616EL-NB3					1.6							●				-
  4-Notched	APMT 250608ER-NB4	15.875	6.35	6.5	25	0.8	11°	15°					●	●			M124 M125
	250616ER-NB4					1.6							●	●			
	250640ER-NB4					4.0							●				
	APMT 250616EL-NB4					1.6							●				-
  3-Notched / Low cutting force	APMT 250616ER-NB3P	15.875	6.35	6.5	25	1.6	11°	15°					●	●			M124 M125
  4-Notched / Low Cutting Force	APMT 250616ER-NB4P	15.875	6.35	6.5	25	1.6	11°	15°					●	●			
  Stainless Steel / Low cutting force	BDMT 070302ER-JS	4.6	2.6	2.3	6.7	0.2	15°	16°		●	●	●					M74 M75
	070304ER-JS					0.4				●	●	●					
	070308ER-JS					0.8				●	●	●					
  	BDMT 070302ER-JT	4.6	2.6	2.3	6.7	0.2	15°	16°		●	●	●		●			
	070304ER-JT					0.4				●	●	●		●			
	070308ER-JT					0.8				●	●	●		●			
  Non-ferrous Metals	BDGT 11T302FR-JA	6.7	3.8	2.8	11.0	0.2	13°	18°							●	●	M64 M65 M66 M67
	11T304FR-JA					0.4									●	●	
	11T308FR-JA					0.8									●	●	
	BDGT 170404FR-JA	9.6	4.9	4.4	17.0	0.4	13°	18°							●	●	M65 M66 M67
	170408FR-JA					0.8									●	●	
	170420FR-JA					2.0									●	●	
	170431FR-JA					3.1									●	●	
  Stainless Steel / Low cutting force	BDMT 110302ER-JS	6.3	3.0	2.8	11.0	0.2	15°	18°		●	●	●					M64 M65
	110304ER-JS					0.4				●	●	●					
	110308ER-JS					0.8				●	●	●					
	BDMT 11T302ER-JS	6.7	3.8	2.8	11.0	0.2	13°	18°		●	●	●					M64 M65 M66 M67
	11T304ER-JS					0.4				●	●	●					
	11T308ER-JS					0.8				●	●	●					
	BDMT 170404ER-JS	9.6	4.9	4.4	17.0	0.4	13°	18°		●	●	●					M65 M66 M67
	170408ER-JS					0.8				●	●	●					

* MN indicates MEGACOAT NANO.

● : Std. Item

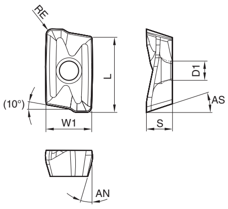
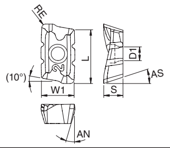
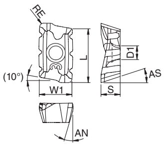
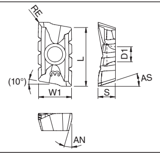
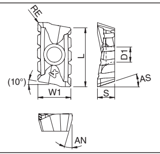
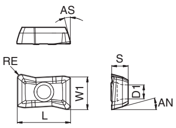
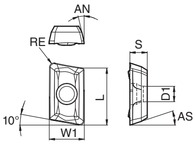
Inserts are
sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
□ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	GW25
P	Carbon Steel / Alloy Steel	■		☆	★	★		
	Mold Steel	■		☆	★	★		
M Stainless Steel	Austenitic related			★	☆	☆		
	Martensitic related		★	☆				
	Precipitation Hardening			★				
K	Gray Cast Iron						★	
	Nodular Cast Iron						★	
N	Non-ferrous Metals							
S	Heat-resistant Alloys		★	☆	★	★		
	Titanium Alloys			★			★	
H	Hard Materials				□			

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Angle		Cermet	CVD Coated Carbide	MN	MEGACOAT			Carbide	See Page for Applicable Toolholders
			W1	S	D1	L	RE	AN	AS	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	GW25	
		BDMT 110302ER-JT	6.3	3.0	2.8	11.0	0.2	15°	18°		●	●	●		●		M64 M65
		110304ER-JT					0.4				●	●	●		●		
		110308ER-JT					0.8				●	●	●		●		
		BDMT 11T302ER-JT	6.7	3.8	2.8	11.0	0.2	13°	18°			●	●		●		M64 M65 M66 M67
		11T304ER-JT					0.4			●	●	●	●		●		
		11T308ER-JT					0.8			●	●	●	●		●		
		11T312ER-JT					1.2				●	●	●		●		
		11T316ER-JT					1.6				●	●	●		●		
		11T320ER-JT					2.0				●	●	●		●		
		11T324ER-JT					2.4				●	●	●		●		
		11T331ER-JT					3.1				●	●	●		●		
		BDMT 170404ER-JT	9.6	4.9	4.4	17.0	0.4	13°	18°		●	●	●		●		M65 M66 M67
		170408ER-JT					0.8			●	●	●	●		●		
		170412ER-JT					1.2				●	●	●		●		
		170416ER-JT					1.6				●	●	●		●		
		170420ER-JT					2.0				●	●	●		●		
		170424ER-JT					2.4				●	●	●		●		
		170431ER-JT					3.1				●	●	●		●		
		170440ER-JT					4.0					●	●		●		
 2-Notched		BDMT 11T308ER-N2	6.7	3.8	2.8	11.0	0.8	13°	18°			●	●	●	●		M90 M91 M92 M93
 3-Notched		BDMT 11T308ER-N3	6.7	3.8	2.8	11.0	0.8	13°	18°			●	●	●	●		
 3-Notched		BDMT 170408ER-N3	9.6	4.9	4.4	17.0	0.8	13°	18°			●	●	●	●		
 4-Notched		BDMT 170408ER-N4	9.6	4.9	4.4	17.0	0.8	13°	18°			●	●	●	●		
		GOMT 08T208ER-D	5.21	2.78	2.3	8.7	0.8	17°	13°				●		●		M174
		100308ER-D	6.56	3.30	2.8	10.7							●		●		
		13T308ER-D	8.36	3.85	3.4	13.2							●		●		
		160408ER-D	10.03	4.76	4.4	16.7							●		●		
		JOMT 08T208ER-D	5.14	2.78	2.3	8.5	0.8	13°	17°				●		●		
		100308ER-D	6.41	3.18	2.8	10.2							●		●		
		13T308ER-D	8.07	3.70	3.4	13.2							●		●		
		160408ER-D	9.72	4.50	4.4	16.7							●		●		

* MN indicates MEGACOAT NANO.

● : Std. Item

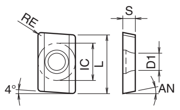
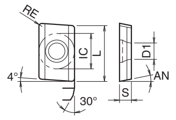
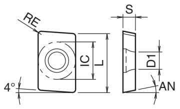
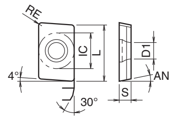
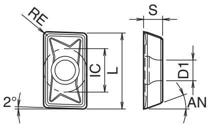
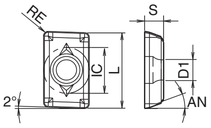
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	KW10
P	Carbon Steel / Alloy Steel	■			★			
	Mold Steel	■			★			
M	Stainless Steel				★			
K	Gray Cast Iron						★	☆
	Nodular Cast Iron						★	
N	Non-ferrous Metals							★
S	Heat-resistant Alloys				★			
	Titanium Alloys						★	☆
H	Hard Materials				☐			

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Angle	Cermet	CVD Coated Carbide	MN	MEGACOAT			Carbide	See Page for Applicable Toolholders
			IC	S	D1	L	RE	AN	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	KW10	
		**NDCT 090204TR**	6.35	2.38	2.8	9.5	0.4	15°	●							M130
		090204FR													●	
		NDCT 120208TR	7.94	2.38	3.4	12.7	0.8	15°	●							
		120208FR													●	
		NDCT 150308TR	9.525	3.18	4.5	15.0	0.8	15°	●							M131
		150308FR													●	
		**NDCT 150308TRX**	9.525	3.18	4.4	15.0	0.8	15°	●							M131 M132
		**NDCW 150302TR**	9.525	3.18	4.5	15.0	0.2	15°	●							M131
		150304TR					0.4		●							
		150308TR					0.8		●							
		150320TR					2.0		●							
		150330TR					3.0		●							
		150340TR					4.0		●							
		**NDCW 150308TRX**	9.525	3.18	4.4	15.0	0.8	15°	●							M131 M132
		150308FRX													●	
		**NDMT 080208ER-D**	5.086	2.38	2.2	8.5	0.8	15°	●			●		●	●	M178
		10T208ER-D	6.276	2.78	2.8	10.2			●			●		●	●	
		NEMT 120308ER-D	7.669	3.18	3.4	12.7	0.8	20°	●			●		●	●	
		16T308ER-D	9.254	3.97	4.4	16.2			●			●		●	●	
 Tough Edge		**NDMT 080208ER-DH**	5.086	2.38	2.2	8.5	0.8	15°	●			●		●	●	
		10T208ER-DH	6.276	2.78	2.8	10.2			●			●		●	●	
		NEMT 120308ER-DH	7.669	3.18	3.4	12.7	0.8	20°	●			●		●	●	
		16T308ER-DH	9.254	3.97	4.4	16.2			●			●		●	●	

* MN indicates MEGACOAT NANO.

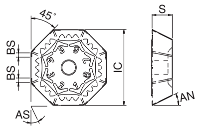
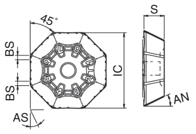
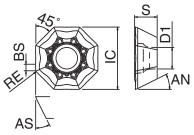
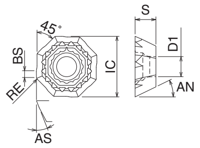
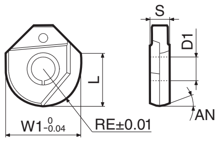
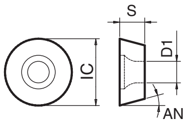
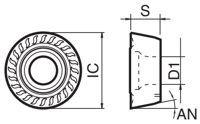
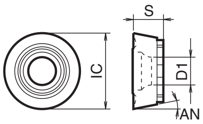
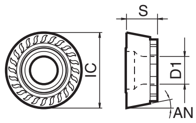
● : Std. Item

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR915	KW10
P	Carbon Steel / Alloy Steel	■			★	★			
	Mold Steel	■			★	★			
M	Stainless Steel				★	★			
K	Gray Cast Iron						★		☆
	Nodular Cast Iron						★		
N	Non-ferrous Metals								★
S	Heat-resistant Alloys				★	★			
	Titanium Alloys						★		☆
H	Hard Materials				☐	☐			

Insert	Description	Dimension (mm)					Angle		Cermet	CVD Coated Carbide	MN	MEGACOAT			PVD Coated Carbide	Carbide	See Page for Applicable Toolholders
Handed Insert shows Right-hand		IC L	S	D1	BS W1	RE	AN	AS	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR915	KW10	
 	**OFMR 070405EN-SH**	17.98	4.94	-	1.2	-	26°	26°				▲					-
 	**OFMR 070408EN-GT**	17.85	5.14	-	1.1	-						▲		▲			
 	**OFMT 050405EN-GT**	13.35	4.83	4.6	1.4	0.5	26°	26°				●		●			M50
	070408EN-GT	17.85	5.12	5.9	1.2	0.8						●		●			
 	**OFMT 050405ER-SH**	13.47	4.76	4.4	1.7	0.5	26°	22°				●		●			
	070405EN-SH	17.98	4.87	5.8	-			26°				●		●			
 	**RDFG 08FR**	6.6	2.1	3.1	8.0	4.0	15°	-							●		M206
	10FR	8.0	2.7	3.6	10.0	5.0									●		
	12FR	9.4	3.2	4.1	12.0	6.0									●		
	16FR	11.3	4.2	5.1	16.0	8.0	10°	-							●		
	20FR	14.1	5.2	6.1	20.0	10.0									●		
	25FR	15.5	6.2	6.1	25.0	12.5									●		
 	**RDHX 0702M0T**	7.0	2.39	2.8	-	-	15°	-					●				-
	1003M0T	10.0	3.18	3.8									●				
	12T3M0T	12.0	3.97										●				
  Tough Edge	**RDMT 08T2M0-H**	8.0	2.78	3.4	-	-	15°	-					●	●		●	-
  Low cutting force	**RPMT 10T3M0**	10.0	3.97	3.4	-	-	11°	-					●	●		●	-
	1204M0	12.0	4.76	4.4									●	●		●	
  Tough Edge	**RPMT 1204M0-H**	12.0	4.76	4.4	-	-	11°	-	●				●	●		●	
	1606M0-H	16.0	6.35	5.5					●				●	●		●	
	2006M0-H	20.0	6.35	6.5									●	●		●	

* MN indicates MEGACOAT NANO.

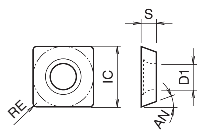
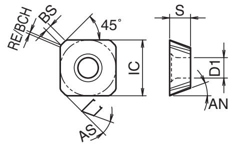
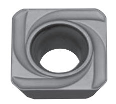
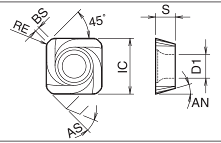
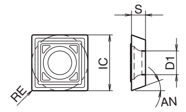
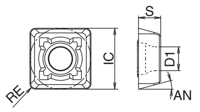
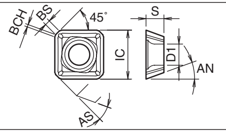
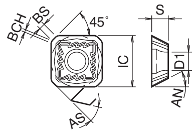
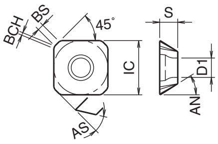
● : Std. Item
▲ : To be replaced by a new product

RDFG Inserts are sold in 2 piece boxes

Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage			TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	KW10
★ : Roughing / 1st Choice	P	Carbon Steel / Alloy Steel	■			★	★		
☆ : Roughing / 2nd Choice		Mold Steel	■			★	★		
■ : Finishing / 1st Choice	M	Stainless Steel				★	★		
□ : Finishing / 2nd Choice	K	Gray Cast Iron						★	☆
(In case hardness is 45HRC or under)		Nodular Cast Iron						★	
	N	Non-ferrous Metals							★
	S	Heat-resistant Alloys				★	★		
		Titanium Alloys						★	☆
	H	Hard Materials				□	□		

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Angle		Cermet	CVD Coated Carbide	MN	MEGACOAT			Carbide	See Page for Applicable Toolholders
			IC	S	D1	RE BCH	BS	AN	AS	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	KW10	
		SDKW 09T204TN	9.525	2.78	3.4	0.4	-	15°	-	●			●				M220
		09T204FN														●	
		SEKW 120304TN	12.70	3.18	5.5			20°		●			●				
		120304FN														●	
		120308TN				0.8				●			●				
		120308FN														●	
		SDKW 1204AESN	12.70	4.76	5.5	RE= 1.0	1.5	15°	20°				●				-
		1204AETN													●		
		SEKW 1204AFTN				BCH= 0.5	1.7	20°	25°				●		●		-
		SDMT 1204AESR-H	12.70	4.76	5.5	1.0	0.8	15°	20°				●				-
 Low cutting force		SDMT 09T204C	9.525	2.78	3.4	0.4	-	15°	-	●			●			●	M220
		SEMT 120304C	12.70	3.18	5.5	0.4	-	20°	-				●			●	
		SDMT 060304E-K	6.35	3.18	2.8	0.4	-	15°	-					●	●	●	M224
		080308E-K	8.00		3.4	0.8								●	●	●	
		120408E-K	12.70	4.76	4.4									●	●	●	
		SEKT 1204AFEN-S	12.70	4.76	5.5	0.5	1.7	20°	25°				●				-
		SOMT 0903AXEN-J	9.525	3.18	3.4	0.5	1.1	27°	32°	▲						▲	-
		SOMW 0903AXTN	9.525	3.18	3.4	0.5	1.1	27°	32°	▲							
		0903AXFN														▲	

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Inserts are sold in 10 piece boxes

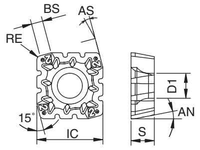
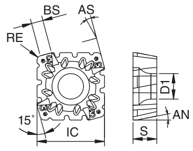
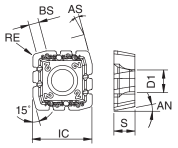
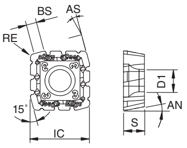
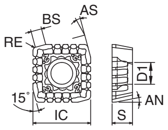
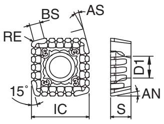
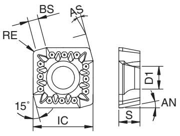
● : Std. Item
▲ : To be replaced by a new product

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	KW10
P	Carbon Steel / Alloy Steel				★	★		
	Mold Steel				★	★		
M	Stainless Steel				★	★		
K	Gray Cast Iron						★	
	Nodular Cast Iron						★	
N	Non-ferrous Metals							
S	Heat-resistant Alloys				★	★		
	Titanium Alloys						★	
H	Hard Materials				☐	☐		

Insert		Description	Dimension (mm)					Angle		Cermet	CVD Coated Carbide	MN	MEGACOAT			Carbide	See Page for Applicable Toolholders
Handed Insert shows Right-hand			IC	S	D1	RE	BS	AN	AS	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	KW10	
 2-Notched / General purpose		**SPMT 1806EDER-NB2**	18	6.35	6.8	1.2	3.1	11°	15°				●	●	●		**M52**
 3-Notched / General purpose		**SPMT 1806EDER-NB3**	18	6.35	6.8	1.2	3.1	11°	15°				●	●	●		
 2-Notched / Tough Edge		**SPMT 1806EDSR-NB2T**	18	6.35	6.8	1.2	3.1	11°	15°					●	●		**M52**
 3-Notched / Tough Edge		**SPMT 1806EDSR-NB3T**	18	6.35	6.8	1.2	3.1	11°	15°					●	●		**M52**
 4-Notched / Low cutting force		**SPMT 1806EDER-NB2P**	18	6.35	6.8	1.2	3.1	11°	15°				●	●	●		**M52**
 5-Notched / Low cutting force		**SPMT 1806EDER-NB3P**	18	6.35	6.8	1.2	3.1	11°	15°				●	●	●		
 Without notch		**SPMT 1806EDER-V**	18	6.35	6.8	1.2	3.1	11°	15°				●	●	●		

* MN indicates MEGACOAT NANO.

● : Std. Item

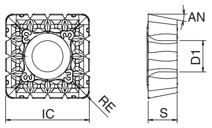
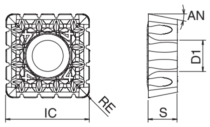
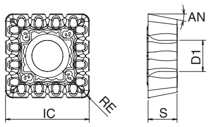
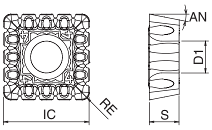
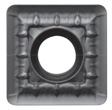
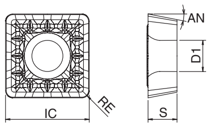
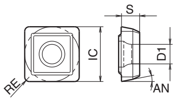
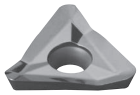
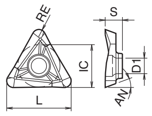
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
□ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

		TN100M	CA6535	PR1535	PR1525	PR1510	PR1225	PR1230	PR1210	KW10
P	Carbon Steel / Alloy Steel						★	★		
	Mold Steel						★	★		
M	Stainless Steel						★	★		
K	Gray Cast Iron								★	☆
	Nodular Cast Iron								★	
N	Non-ferrous Metals									★
S	Heat-resistant Alloys						★	★		
	Titanium Alloys								★	☆
H	Hard Materials						□	□		

Insert Handed Insert shows Right-hand		Description	Dimension (mm)						Angle	Cermet	CVD Coated Carbide	MEGACOAT NANO			MEGACOAT			Carbide	See Page for Applicable Toolholders
			IC	S	D1	L	BS	RE	AN	TN100M	CA6535	PR1535	PR1525	PR1510	PR1225	PR1230	PR1210	KW10	
 3-Notched		**SPMT 180616EN-NB3**	18	6.35	6.8	-	-	1.6	11°							●	●		M120
 4-Notched		**SPMT 180616EN-NB4**	18	6.35	6.8	-	-	1.6	11°							●	●		
 3-Notched / Low cutting force		**SPMT 180616EN-NB3P**	18	6.35	6.8	-	-	1.6	11°							●	●		
 4-Notched / Low cutting force		**SPMT 180616EN-NB4P**	18	6.35	6.8	-	-	1.6	11°							●	●		
 Without notch		**SPMT 180616EN-V**	18	6.35	6.8	-	-	1.6	11°							●	●		
		**SPMT 060204E-Z**	6.35	2.38	2.5	-	-	0.4	11°						●		●	●	M222
		060208E-Z						0.8							●		●	●	
		SPMT 090304E-Z	9.525	3.18	3.4	-	-	0.4	11°						●		●	●	
		090308E-Z						0.8							●		●	●	
		**TEMT 250624-AQ**	15.875	6.35	5.5	23.0	-	2.4	20°									▲	-

● : Std. Item
▲ : To be replaced by a new product

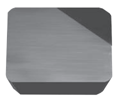
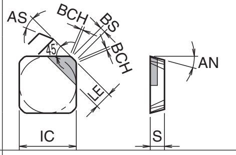
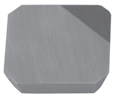
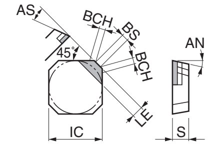
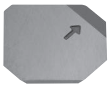
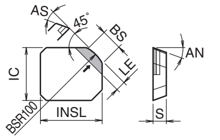
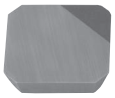
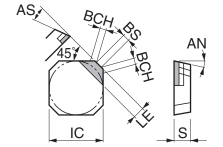
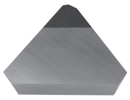
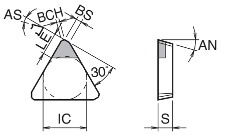
Inserts are
sold in 10 piece boxes

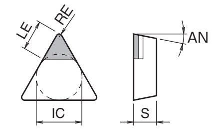
Milling Inserts (PCD)

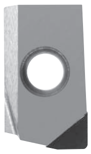
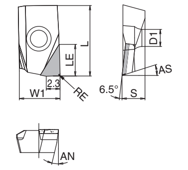
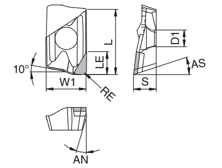
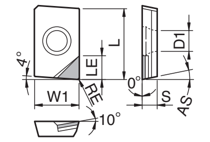
Classification of usage

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice

P	Carbon Steel / Alloy Steel				
	Mold Steel				
M	Stainless Steel				
K	Gray Cast Iron				
	Nodular Cast Iron				
N	Non-ferrous Metals	☐		■	
S	Heat-resistant Alloys				
	Titanium Alloys	☐		■	
H	Hard Materials				

Insert		Description	Dimension (mm)						Angle		PCD				See Page for Applicable Toolholders
Handed Insert shows Right-hand			IC	S	BCH	BS	LE	INSL	AN	AS	KPD001	KPD010	KPD230		
		**SDKN 1203AUFN-NE**	12.70	3.18	0.5	1.2	3.1	-	15°	23°	●				-
		1203AUFN					3.6				●	●			
		**SEEN 1203AFFN-NE**	12.70	3.18	0.5	1.4	3.0	-	20°	25°	●				-
		1203AFFN					3.5				●	●			
 Wiper Insert		**SEEN 1203AFFR-W**	12.50	3.18	-	3.5	1.7	14.56	20°	25°	●				-
		**SOKN 13T3AXFN-NE**	13.494	3.97	0.4	1.1	3.0	-	27°	32°			▲		-
		**TEEN 1603PTFR-NE**	9.525	3.18	0.6	1.4	4.1	-	20°	22°	●		●		-
		1603PTFR					4.7				●	●			
		TEKN 2204PTFR-NE	12.70	4.76	0.7	1.8	4.2	-	20°	22°	●		●		-
		2204PTFR					4.8				●	●			

Insert		Description	Dimension (mm)					Angle	PCD				See Page for Applicable Toolholders
			IC	S	RE	LE		AN	KPD001	KPD010	KPD230		
		**TPGN 110302**	6.35	3.18	0.2	3.9		11°	●	●			-
		110304			0.4	3.7			●	●			
		110308			0.8	3.4				●			

Insert		Description	Dimension (mm)						Angle		PCD				See Page for Applicable Toolholders
Handed Insert shows Right-hand			W1	S	D1	L	RE	LE	AN	AS	KPD001	KPD010	KPD230		
		**BDGT 11T302FR**	6.7	3.8	2.8	11.5	0.2	3.8	13°	18°	●		●		M64 M65 M66 M67
		11T304FR					0.4				●		●		
		11T308FR					0.8				●		●		
		BDGT 11T302FR-LE					0.2	5.2			●		●		
		11T304FR-LE					0.4				●		●		
		11T308FR-LE					0.8				●		●		
		**BDMT 11T302FR**	6.7	3.8	2.8	11.0	0.2	3.6	13°	18°	●		●		
		11T304FR					0.4				●		●		
		BDMT 170402FR	9.6	4.9	4.4	17.0	0.2	4.4	13°	18°	●		●		
		170404FR					0.4				●		●		
		**NDCW 150302FRX-NE**	9.525	3.18	4.4	15.0	0.2	5.1	-	15°	●		●		**M132**
		150302FRX						5.7			●	●			

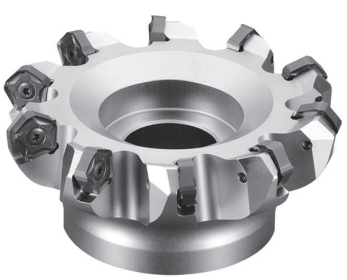
● : Std. Item
▲ : To be replaced by a new product

CBN & PCD Inserts are sold in 1 piece boxes

MFPN45

Facing Chamfering

MFPN45 Face Mill



Rake Angle	A.R.	R.R.	
	(max.)+10°	DC=63 : -10°	DC=100-315 : -6°
		DC=80 : -8°	

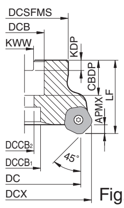


Fig. 1

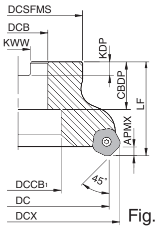


Fig. 2

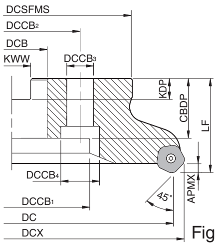


Fig. 3

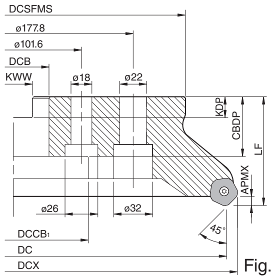


Fig. 4

Toolholder Dimensions

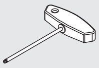
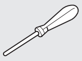
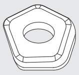
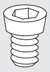
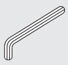
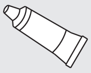
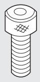
Description			Stock		No. of Inserts	Dimension (mm)												Drawing	Weight (kg)	Shim
			R	L		DC	DCX	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	DCCB3	DCCB4			
Metric	Coarse pitch	**MFPN 45063R-4T-M**	●		4	63	76	47	22	19	11	40	21	6.3	10.4	-	-	Fig. 1	0.5	Yes
		45080R-5T-M	●		5	80	93	60	27	22	13	50	24	7	12.4				1.1	
		45100R-6T-M	●		6	100	113	70	32	48	-		30	8	14.4			Fig. 2	1.4	
		45125R-7T-M	●		7	125	138	87	40	58		63	32	9	16.4				2.6	
		45160R-8T-M	●		8	160	173	102		68	66.7					14	20	Fig. 3	3.8	
		45200R-10T-M	●		10	200	213	142	60	110	101.6		40	14	25.7	18	26		6.4	
		45250R-12T-M	●		12	250	263												9.1	
		45315R-14T-M	MTO		14	315	328	220			-	80				-	-	Fig. 4	21.3	
	Fine pitch	**MFPN 45063R-5T-M**	●		5	63	76	47	22	19	11	40	21	6.3	10.4	-	-	Fig. 1	0.5	No
		45080R-6T-M	●		6	80	93	60	27	22	13	50	24	7	12.4				1.0	
		45100R-8T-M	●		8	100	113	70	32	48	-		30	8	14.4			Fig. 2	1.4	
		45125R-10T-M	●		10	125	138	87	40	58		63	32	9	16.4				2.5	
		45160R-12T-M	●		12	160	173	102		68	66.7					14	20	Fig. 3	3.8	
		45200R-14T-M	●		14	200	213	142	60	110	101.6		40	14	25.7	18	26		6.5	
		45250R-16T-M	●		16	250	263												9.1	
		45315R-18T-M	MTO		18	315	328	220			-	80				-	-	Fig. 4	21.7	
	Extra fine pitch	**MFPN 45063R-6T-M**	●		6	63	76	47	22	19	11	40	21	6.3	10.4	-	-	Fig. 1	0.5	No
		45080R-8T-M	●		8	80	93	60	27	22	13	50	24	7	12.4				1.1	
		45100R-10T-M	●		10	100	113	70	32	48	-		30	8	14.4			Fig. 2	1.3	
		45125R-13T-M	●		13	125	138	87	40	58		63	32	9	16.4				2.6	
Bore Dia. Inch spec	Coarse pitch	**MFPN 45080R/L-5T**	●	●	5	80	93	60	25.4	22	13	50	27	6	9.5	-	-	Fig. 1	1.1	Yes
		45100R/L-6T	●	●	6	100	113	70	31.75	48	-		32	8	12.7			Fig. 2	1.4	
		45125R/L-7T	●	●	7	125	138	87	38.1	58		63	36	10	15.9				2.6	
		45160R/L-8T	●	●	8	160	173	102	50.8	72			38	11	19.1				4.0	
		45200R-10T	●		10	200	213	142	47.625	110	101.6		40	14	25.4	18	26	Fig. 3	6.7	
		45250R-12T	●		12	250	263												9.4	
		45315R-14T	MTO		14	315	328	220			-	80				-	-	Fig. 4	21.2	
	Fine pitch	**MFPN 45080R-6T**	●		6	80	93	60	25.4	22	13	50	27	6	9.5	-	-	Fig. 1	1.1	No
		45100R-8T	●		8	100	113	70	31.75	48	-		32	8	12.7			Fig. 2	1.4	
		45125R-10T	●		10	125	138	87	38.1	58		63	36	10	15.9				2.7	
		45160R-12T	●		12	160	173	102	50.8	72			38	11	19.1				4.0	
		45200R-14T	●		14	200	213	142	47.625	110	101.6		40	14	25.4	18	26	Fig. 3	6.9	
		45250R-16T	●		16	250	263												9.6	
		45315R-18T	MTO		18	315	328	220			-	80				-	-	Fig. 4	21.5	
	Extra fine pitch	**MFPN 45080R-8T**	●		8	80	93	60	25.4	22	13	50	27	6	9.5	-	-	Fig. 1	1.1	No
		45100R-10T	●		10	100	113	70	31.75	48	-		32	8	12.7			Fig. 2	1.3	
		45125R-13T	●		13	125	138	87	38.1	58		63	36	10	15.9				2.7	
		45160R-16T	●		16	160	173	102	50.8	72			38	11	19.1				4.0	
		45200R-18T	●		18	200	213	142	47.625	110	101.6		40	14	25.4	18	26	Fig. 3	6.9	
		45250R-20T	●		20	250	263												9.6	

* APMX : 6 mm (GM, SM, GH Chipbreakers), 5 mm (GL Chipbreaker), 3 mm (W Chipbreaker)

Recommended Cutting Conditions ➡ M32

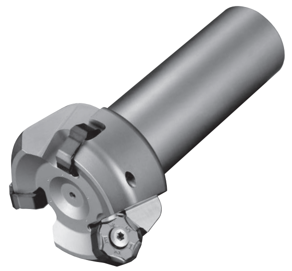
● : Std. Item
MTO : Made to order

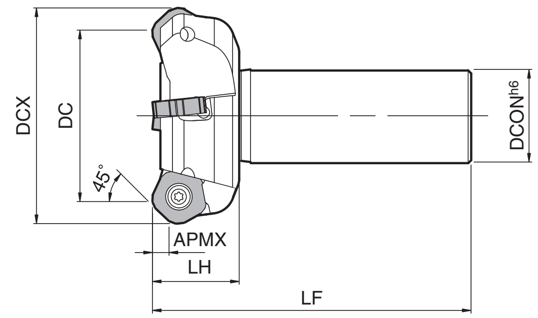
Spare Parts (common to Metric / Inch spec)

	Description	Spare Parts Clamp Screw	Wrench TTW	Wrench DTM	Shim	Shim Screw	Wrench	Anti-seize Compound	Mounting bolt
									
Coarse pitch	**MFPN 45063R-4T-M**	SB-50140TR	TTW-15	-	MFPN-45	SPW-7050	LW-5	P-37	HH10X30
	MFPN 45080R/L-5T(-M)								HH12X35
	MFPN 45100R/L-6T(-M) ~ 45315R-14T(-M)	for Insert Clamp Tightening torque 4.2N·m				for Shim Clamp Tightening torque 6.0N·m			-
Fine pitch	**MFPN 45063R-5T-M**	SB-50140TR	TTW-15	-	-	-	-	P-37	HH10X30
	MFPN 45080R-6T(-M)								HH12X35
	MFPN 45100R-8T(-M) ~ 45315R-18T(-M)	for Insert Clamp Tightening torque 4.2N·m							-
Extra fine pitch	**MFPN 45063R-6T-M**	SB-40140TRN	-	DTM-15	-	-	-	P-37	HH10X30
	MFPN 45080R-8T(-M)								HH12X35
	MFPN 45100R-10T(-M) ~ 45250R-20T		for Insert Clamp Tightening torque 3.5N·m						-

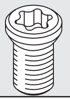
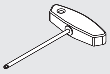
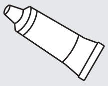
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

MFPN45 with cylindrical shank





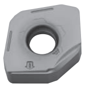
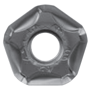
Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts		
				DC	DCX	DCON	LF	LH	*APMX	A.R. (MAX.)	R.R.	Clamp Screw 	Wrench 	Anti-seize Compound 
MFPN	**45050R-S32-3T**	●	3	50	63	32	110	30	6 (5)	+ 10°	- 12°	SB-50140TR	TTW-15	P-37
	45063R-S32-4T	●	4	63	76						- 10°	Tightening torque 4.2N·m		
	45080R-S32-5T	●	5	80	93						- 8°			

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

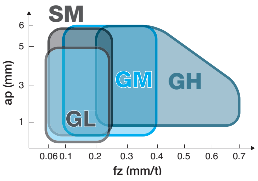
* APMX : 6 mm (GM, SM, GH Chipbreakers), 5 mm (GL Chipbreaker), 3 mm (W Chipbreaker)

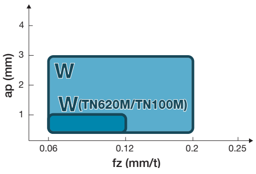
Applicable Inserts (Common to face mill and end mill)

Description	Applicable Inserts ➡ M18						
							
MFPN 45...R-...	PNMU 1205ANER-GM	PNMU 1205ANER-SM	PNMU 1205ANER-GH	PNEU 1205ANER-GL	PNEU 1205ANER-W	-	-
MFPN 45...L-...	-	-	-	-	-	PNMU 1205ANEL-GM	PNEU 1205ANEL-GL

Recommended Cutting Conditions ➡ **M32**

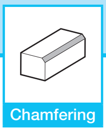
Applicable Chipbreaker Range





● : Std. Item

MFPN45



● Cutter type and chipbreaker selection

Milling Purpose	Cutter Type			Chipbreaker				
	Coarse pitch	Fine pitch	Extra fine pitch	GM	SM	GH	GL	W
General milling for steel and alloy steel		●		●				
Steel and alloy steel (at chattering due to low rigidity machine or poor clamping power)	●				●			
Productivity oriented (Running cost decrease) (ap=4mm or Over, fz=0.35mm/t or Over)	●					●		
Surface finish oriented	●	●					●	
General milling of stainless steel		●			●			
Stainless steel (to prevent chattering due to low rigidity machine or poor clamping power)	●				●			
Cast iron (for processing efficiency improvement)			●	●				
Cast iron (ap=4mm or Over, fz=0.35mm/t or Over)	●					●		
Improved Surface Finish in High Efficiency Milling		●	●					●

● How to use wiper insert

1) Please use one wiper insert on one cutter.

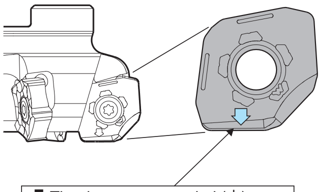
(If you use 2 inserts or more on one cutter, the workpiece surface may be muddy white.)

2) Combination of Wiper Insert with Other Chipbreakers

Chipbreaker / Combination	GM	SM	W
Recommended Combination	●		●
Recommended Combination		●	●

The combinations of GH+W and GL+W are not recommended.

● How to attach wiper inserts on MFPN cutter



⬇ The down arrow symbol (↓) indicates wiper cutting edge.

⬇ When attaching inserts, make sure that the arrow symbol points downward.

3) For checking the protrusion amount of the wiper insert, use tool presetter. (Appropriate protrusion : 0.1mm)

◆ Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t) ( ) : TN620M	Recommended Insert Grades (Cutting Speed Vc: m/min)					
			Cermet	MEGACOAT (PVD Coated Carbide)				CVD Coated Carbide
			TN620M	PR1535	PR1525 (PR1225)	PR1510 (PR1210)	PR015S	CA6535
GM	Carbon Steel	0.1~**0.2**~0.4 (0.06~**0.12**~0.20)	★ 200~**250**~300	☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.1~**0.2**~0.4 (0.06~**0.12**~0.20)	★ 180~**220**~250	☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel	0.1~**0.2**~0.35 (0.06~**0.08**~0.15)	★ 150~**180**~220	☆ 80~**140**~180	★ 80~**140**~180	-	-	-
	Stainless Steel (Austenitic related)	0.1~**0.2**~0.4	-	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.1~**0.2**~0.4	-	☆ 150~**200**~250	-	-	-	☆ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.1~**0.2**~0.3	-	★ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.1~**0.2**~0.4	-	-	-	★ 120~**180**~250	-	-
	Nodular Cast Iron	0.1~**0.2**~0.35	-	-	-	★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.1~**0.12**~0.2	-	☆ 20~**30**~50	-	-	-	★ 20~**30**~50
SM *1GL	Carbon Steel	0.06~**0.12**~0.25 (0.06~**0.10**~0.15)	★ 200~**250**~300	☆ 120~**180**~250	☆ 120~**180**~250	-	-	-
	Alloy Steel	0.06~**0.12**~0.25 (0.06~**0.10**~0.15)	★ 180~**220**~250	☆ 100~**160**~220	☆ 100~**160**~220	-	-	-
	Mold Steel	0.06~**0.1**~0.2 (0.06~**0.08**~0.12)	★ 150~**180**~220	☆ 80~**140**~180	☆ 80~**140**~180	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.12**~0.25	-	★ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.12**~0.25	-	☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.06~**0.12**~0.25	-	☆ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.06~**0.12**~0.25	-	-	-	☆ 120~**180**~250	-	-
	Nodular Cast Iron	0.06~**0.1**~0.2	-	-	-	☆ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.06~**0.1**~0.15	-	☆ 20~**30**~50	-	-	-	☆ 20~**30**~50
	Titanium Alloys	0.06~**0.08**~0.15	-	★ 40~**60**~80	-	-	-	-
*2GH	Carbon Steel	0.2~**0.4**~0.7	-	☆ 120~**180**~250	☆ 120~**180**~250	-	-	-
	Alloy Steel	0.2~**0.4**~0.6	-	☆ 100~**160**~220	☆ 100~**160**~220	-	-	-
	Mold Steel	0.2~**0.35**~0.5	-	☆ 80~**140**~180	☆ 80~**140**~180	-	-	-
	Stainless Steel (Austenitic related)	0.2~**0.3**~0.4	-	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.2~**0.3**~0.4	-	☆ 150~**200**~250	-	-	-	☆ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.2~**0.3**~0.4	-	☆ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.2~**0.4**~0.7	-	-	-	☆ 120~**180**~250	-	-
	Nodular Cast Iron	0.2~**0.35**~0.5	-	-	-	☆ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.2~**0.3**~0.4	-	☆ 20~**30**~50	-	-	-	☆ 20~**30**~50
	Hard Materials (60HRC or less)	0.05~**0.1**~0.2	-	-	-	-	★ 50~**80**~100	-

★ : 1st Recommendation ☆ : 2nd Recommendation

· The bold-faced number indicates a center value of recommended cutting condition.
Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

· Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

*1. GL Chipbreaker is recommended for Surface finish oriented milling.

*2. GH Chipbreaker : Fine pitch ⇒ fz≤0.4 (mm/t)
Extra fine pitch ⇒ Not recommended

● Applicable chipbreaker

Cutter Type	Chipbreaker		
	GM	SM (GL)	GH
Coarse pitch (with shim)	✓	✓	✓
Fine pitch (without shim)	✓	✓	△ (Feed rate is recommended fz=0.4mm/t or under)
Extra fine pitch (without shim)	✓	✓	Not recommended

Precautions for use (How to mount an insert)

1. Be sure to remove dust and chips from the insert mounting pocket.
2. After applying anti-seize compound on portion of taper and thread, while pressing the insert against the constraint surfaces, put the screw into the hole of the insert and tighten the screw with appropriate torque. (Ref. to Fig. 1 and Fig. 2)
   Recommended tightening torque : The torque for coarse pitch (using M5 screw) is 4.2 N·m
   The torque for extra fine pitch (using M4 screw) is 3.5 N·m.
3. After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the toolholder and between the insert side surfaces and the constraint surface of the toolholder.
4. To change the cutting edge of the insert, turn the insert counterclockwise. (Fig. 3)
   Insert corner identification number is stamped on the top surface of insert. (Fig. 4) To protect the wiper edge, use the corners of insert in the sequence of corner numbers.

Fig. 1

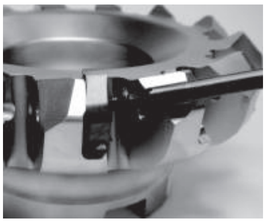


Fig. 2

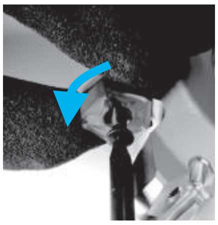


Fig. 3

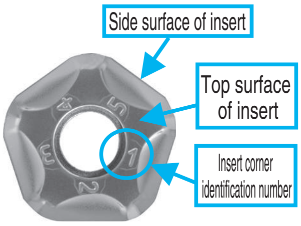


Fig. 4 (Right-hand insert)

How to replace a shim (for coarse pitch)

1. Be sure to remove dust and chips from the insert mounting pocket.
2. The shim must be mounted in the proper direction. While aligning the surface of the shim with the mark on it to the corresponding constraint surface (ref. to Fig. 5) and lightly pressing the shim toward the constraint surface, insert the screw into the hole of the shim and tighten it (ref. to Fig. 6).
   When tightening the screw, make sure that the screw is vertical to the bearing surface. Recommended tightening torque is 6.0 N·m.
3. After tightening the screw, make sure that there is no clearance between the shim seat surface and the bearing surface. If there is any clearance, remove the insert and mount it again according to the above steps.

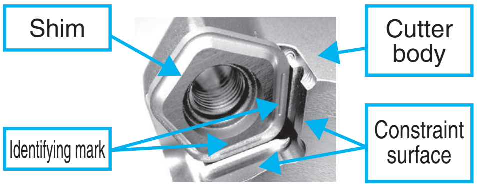


Fig. 5

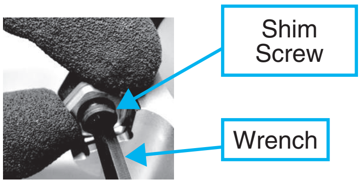


Fig. 6

Cutting Edge Angle 66˚, High Efficiency Cutter

MFPN66

Economical Double-sided 10-edge Insert Reduces Chattering with Low Cutting Force Design

Reduces Cutting Costs when Machining Auto Parts and Other General Purpose Machining Applications

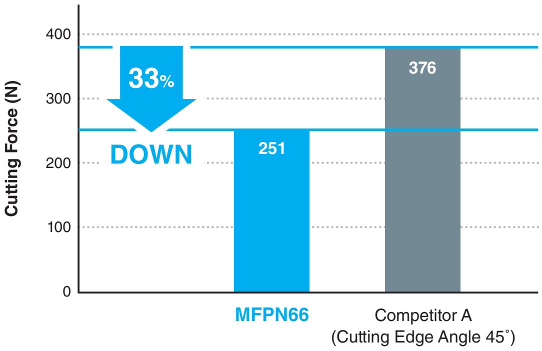
1 Economical Double-sided 10-edge Insert
Applicable to various machining applications with wide size range from ø32

Cost reduction in various applications from general parts to automotive parts machining

2 Reduces Chattering with Low Cutting Force Design
Available for Application from Small ap to Medium ap

Suppresses Vibration for Excellent Surface Finish with 66˚ Cutting Edge Angle

Cutting Force Comparison (Internal evaluation)



Cutting force is thrust force

Cutting Conditions : Vc = 200 m/min, ap = 3 mm, fz = 0.15 mm/t
Cutter Dia. ø63 Workpiece Material : S50C

Surface Finish (Machining with Workpiece Overhang Length of 80mm)

Excellent Surface Finish with Low Workpiece Clamping Rigidity

Cutting Conditions : Vc = 200 m/min, ap = 0.5 mm, fz = 0.2 mm/t
Cutter Dia. ø63 Workpiece Material : S50C

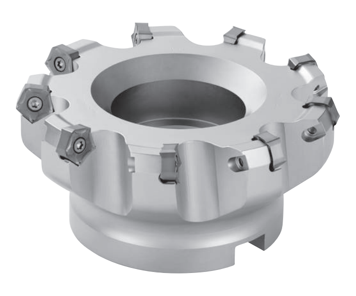
3 Extended Tool Life by MEGACOAT NANO Technology
Insert Lineup Also Contains Cermet Grade for Better Surface Finish

1st Recommendation (General purpose)
GM Chipbreaker

Tough Edge
GH Chipbreaker

For Stainless Steel
SM Chipbreaker

MFPN66 Face Mill



Rake Angle	A.R.	R.R.	
	max.+12°	DC=50 : -9°	DC=80 : -7°
		DC=63 : -8°	DC=100-160 : -6°

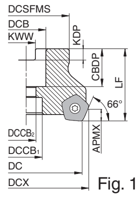


Fig. 1

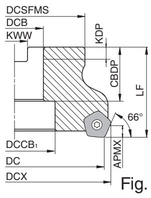


Fig. 2

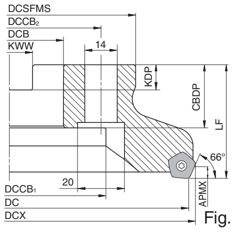


Fig. 3

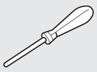
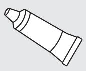
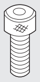
Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)										Drawing	Weight (kg)	Shim
					DC	DCX	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW			
Metric	Fine pitch	MFPN 66050R-4T-M-G	●	4	50	58	48	22	18	11	40	21	6.3	10.4	Fig. 1	0.3	No
		66063R-5T-M-G	●	5	63	71										0.5	
		66080R-6T-M-G	●	6	80	88	70	27	20	13	50	24	7	12.4		1.2	
		66100R-7T-M-G	●	7	100	107	78	32	45	-		30	8	14.4	Fig. 2	1.6	
		66125R-9T-M-G	●	9	125	132	89	40	55		63	33	9	16.4		2.8	
		66160R-11T-M-G	●	11	160	167									Fig. 3	3.8	
	Extra fine pitch	MFPN 66050R-5T-M-G	●	5	50	58	48	22	18	11	40	21	6.3	10.4	Fig. 1	0.4	No
		66063R-7T-M-G	●	7	63	71										0.5	
		66080R-9T-M-G	●	9	80	88	70	27	20	13	50	24	7	12.4		1.2	
		66100R-11T-M-G	●	11	100	107	78	32	45	-		30	8	14.4	Fig. 2	1.6	
		66125R-13T-M-G	●	13	125	132	89	40	55		63	33	9	16.4		3	
		66160R-15T-M-G	●	15	160	167									Fig. 3	4	
Bore Dia. Inch spec	Fine pitch	MFPN 66080R-6T-G	●	6	80	88	70	25.4	20	13	50	27	6	9.5	Fig. 1	1.2	No
		66100R-7T-G	●	7	100	107	78	31.75	45	-		34	8	12.7	Fig. 2	1.7	
		66125R-9T-G	●	9	125	132	89	38.1	55		63	38	10	15.9		2.9	
		66160R-11T-G	●	11	160	167	110	50.8	72				11	19.1		4.5	
	Extra fine pitch	MFPN 66080R-9T-G	●	9	80	88	70	25.4	20	13	50	27	6	9.5	Fig. 1	1.2	No
		66100R-11T-G	●	11	100	107	78	31.75	45	-		34	8	12.7	Fig. 2	1.7	
		66125R-13T-G	●	13	125	132	89	38.1	55		63	38	10	15.9		3	
		66160R-15T-G	●	15	160	167	110	50.8	72				11	19.1		4.8	

*APMX : 5mm (GM (Coated Carbide), SM, GH Chipbreaker), 3mm (GM (Cermet))

Applicable Inserts ➔ M36

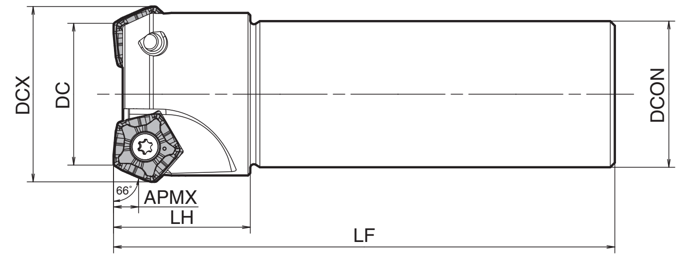
Spare Parts (common to Metric / Inch spec)

Description		Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
					
Fine pitch	MFPN 66050R-4T-M-G	SB-4090TRP	DTPM-15 Recommended tightening torque for Insert Clamp 3.5N·m	P-37	HH10X30
	66063R-5T-M-G				HH10X30
	66080R-6T(-M)-G				HH12X35
	66100R-7T(-M)-G				-
	66125R-9T(-M)-G				
	66160R-11T(-M)-G				
Extra fine pitch	MFPN 66050R-5T-M-G	SB-4090TRP	DTPM-15 Recommended tightening torque for Insert Clamp 3.5N·m	P-37	HH10X30
	66063R-7T-M-G				HH10X30
	66080R-9T(-M)-G				HH12X35
	66100R-11T(-M)-G				-
	66125R-13T(-M)-G				
	66160R-15T(-M)-G				

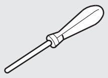
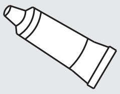
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

MFPN66 End Mill



Toolholder Dimensions

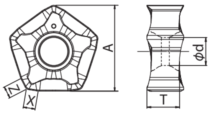
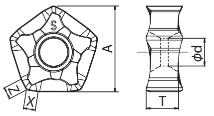
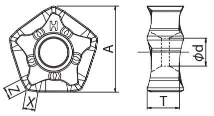
Description		Stock	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts		
												Clamp Screw	Wrench	Anti-seize Compound
				DC	DCX	DCON	LF	LH	*APMX	A.R. (MAX.)	R.R.			
MFPN	**66032R-S32-2T-G**	●	2	32	39.5	32	110	30	5	+12°	-14°	SB-4090TRP	DTPM-15	P-37
	66040R-S32-3T-G	●	3	40	47.5						-12°	Tightening Torque 3.5N·m		

*APMX : 5mm (GM (Coated Carbide), SM, GH Chipbreaker), 3mm (GM (Cermet))

Applicable Inserts

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice

Classification of usage		TN620M	PR1535	PR1525	PR1510	PR015S
P	Carbon Steel / Alloy Steel	■	☆	★		
	Mold Steel	■	☆	★		
M	Stainless Steel (Austenitic related)		★	☆		
	Stainless Steel (Martensitic related)		★			
	Stainless Steel (Precipitation Hardening)		★			
K	Gray Cast Iron				★	
	Nodular Cast Iron				★	
N	Non-ferrous Metals					
S	Ni-base heat-resistant alloys		★			
	Titanium Alloys		★			
H	Hard Materials					★

Insert		Description	Dimension (mm)					Cermet	MEGACOAT (PVD Coated Carbide)			
			INSL	S	D1	BCH	BS	TN620M	PR1535	PR1525	PR1510	PR015S
 General purpose		**PNMU 0905XNER-GM**	14.6	5.56	4.7	2.0	2.0	●	●	●	●	
 Low cutting force		**PNMU 0905XNER-SM**							●	●	●	
 Tough Edge (For Heavy Milling)		**PNMU 0905XNER-GH**							●	●	●	●

Recommended Cutting Conditions ➡ M37

● : Std. Item

Recommended Cutting Conditions

Coated Carbide

Chipbreaker	Workpiece Material	Feed (fz : mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)			
			MEGACOAT (PVD Coated Carbide)			
			PR1535	**PR1525**	**PR1510**	**PR015S**
GM	Carbon Steel	0.1~**0.2**~0.3	☆ 120~**180**~250	★ 120~**180**~250	-	-
	Alloy Steel	0.1~**0.2**~0.3	☆ 100~**160**~220	★ 100~**160**~220	-	-
	Mold Steel	0.1~**0.18**~0.25	★ 80~**140**~180	★ 80~**140**~180	-	-
	Stainless Steel (Austenitic related)	0.1~**0.18**~0.25	☆ 100~**150**~200	☆ 100~**150**~200	-	-
	Stainless Steel (Martensitic related)	0.1~**0.18**~0.25	☆ 100~**150**~200	-	-	-
	Stainless Steel (Precipitation Hardening)	0.1~**0.18**~0.25	★ 90~**120**~150	-	-	-
	Gray Cast Iron	0.1~**0.2**~0.3	-	-	★ 120~**180**~250	-
	Nodular Cast Iron	0.1~**0.18**~0.25	-	-	★ 100~**150**~200	-
	Ni-base heat-resistant alloys	0.1~**0.12**~0.2	☆ 20~**30**~50	-	-	-
SM	Carbon Steel	0.06~**0.12**~0.2	-	☆ 120~**180**~250	-	-
	Alloy Steel	0.06~**0.12**~0.2	-	☆ 100~**160**~220	-	-
	Mold Steel	0.06~**0.1**~0.15	-	☆ 80~**140**~180	-	-
	Stainless Steel (Austenitic related)	0.06~**0.12**~0.2	★ 100~**150**~200	☆ 100~**150**~200	-	-
	Stainless Steel (Martensitic related)	0.06~**0.12**~0.2	★ 100~**150**~200	-	-	-
	Stainless Steel (Precipitation Hardening)	0.06~**0.12**~0.2	☆ 90~**120**~150	-	-	-
	Gray Cast Iron	0.06~**0.12**~0.2	-	-	☆ 120~**180**~250	-
	Nodular Cast Iron	0.06~**0.1**~0.15	-	-	☆ 100~**150**~200	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.15	★ 20~**30**~50	-	-	-
	Titanium Alloys	0.06~**0.08**~0.15	★ 40~**60**~80	-	-	-
GH	Carbon Steel	0.15~**0.25**~0.35	-	☆ 120~**180**~250	-	-
	Alloy Steel	0.15~**0.25**~0.35	-	☆ 100~**160**~220	-	-
	Mold Steel	0.1~**0.2**~0.3	-	☆ 80~**140**~180	-	-
	Gray Cast Iron	0.15~**0.25**~0.35	-	-	☆ 120~**180**~250	-
	Nodular Cast Iron	0.1~**0.2**~0.3	-	-	☆ 100~**150**~200	-
	Hard Materials (60HRC or less)	0.05~**0.08**~0.16	-	-	-	★ 50~**80**~100

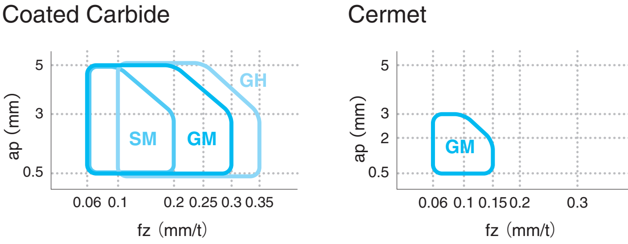
★ : 1st Recommendation ☆ : 2nd Recommendation

Cermet

Chipbreaker	Workpiece Material	Feed (fz : mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)
			Cermet
			TN620M
GM	Carbon Steel	0.06~**0.12**~0.15	★ 200~**250**~300
	Alloy Steel	0.06~**0.12**~0.15	★ 180~**220**~250
	Mold Steel	0.06~**0.1**~0.13	★ 150~**180**~220

★1st Recommendation

Applicable Chipbreaker Range



Applicable chipbreaker

Cutter Type	Chipbreaker		
	GM	SM	GH
Fine pitch	✓	✓	✓
Extra fine pitch	✓	✓	△ (Feed rate is recommended fz=0.2mm/t or under)

High-Precision Cutter for Finishing Applications

MFLN

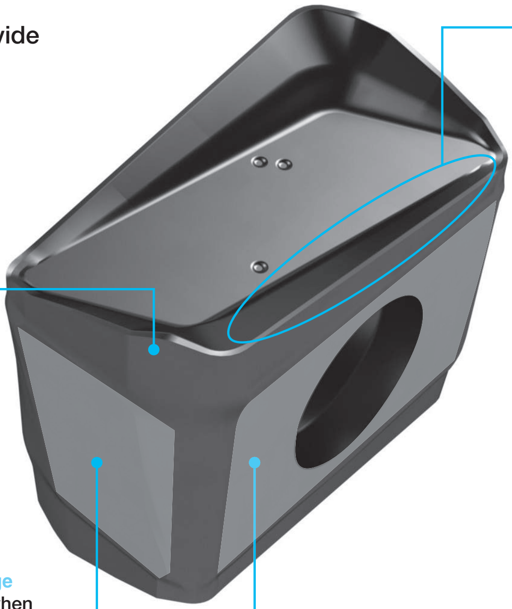
Tough 4-edge Vertical Inserts Provide High Reliability on Heavy Milling at Large Depths of Cut and High Feed Rates

Three Cutting Edge Angles (including MFLN90) Optimized for Various Machining Applications

1 Tough and Reliable Inserts for Stable Heavy Milling

22 mm long inserts offer increased rigidity

Tangentially mounted inserts provide 2 cutting edges on both sides

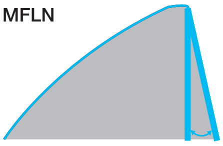


Obtuse Edge Design

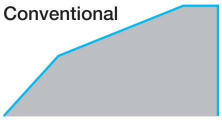
Increases the cutting edge angle only at the tip to maintain both strength and sharpness

Cross-section view of cutting edge (Image)

MFLN



Conventional

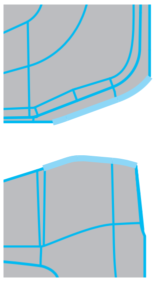


Corner Chamfer

(only available on MFLN90)

Both general corner-R type and chamfered corner type available

Prevents chattering and insert fracturing



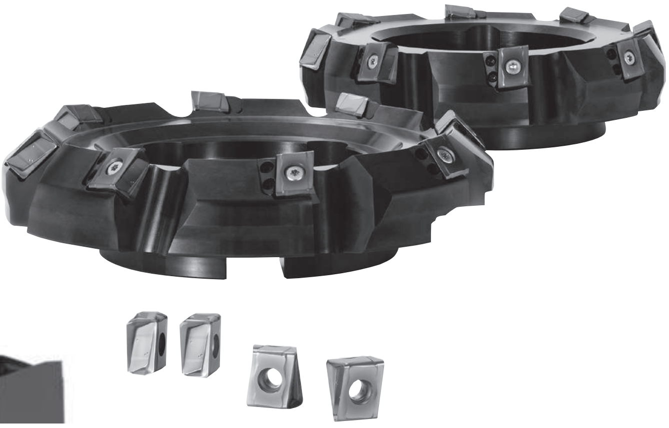
Convex cutting edge ridge

Reduced impact forces when entering the workpiece

Wide Flat Mounting Surface

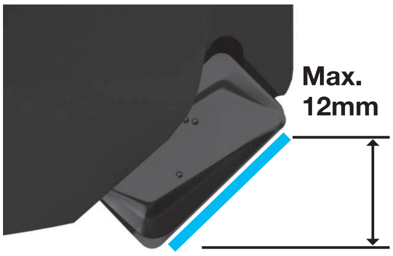
Hold an insert firmly in heavy milling

Tangentially mounted inserts increase rigidity

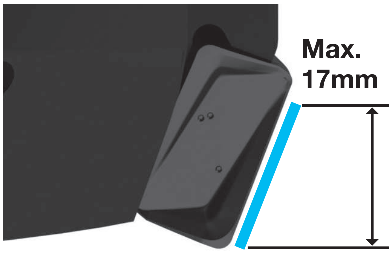


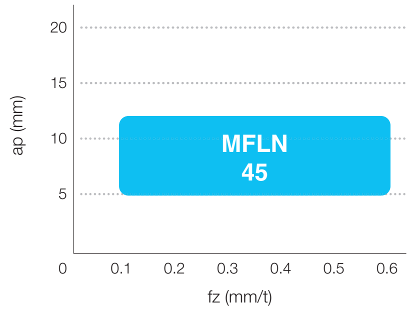
2 For Large Depths of Cut and High Feed Rates

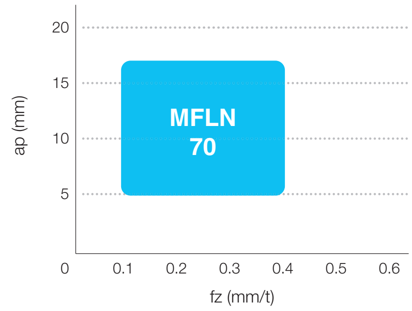
MFLN45
(Cutting edge angle 45°)



MFLN70
(Cutting edge angle 70°)



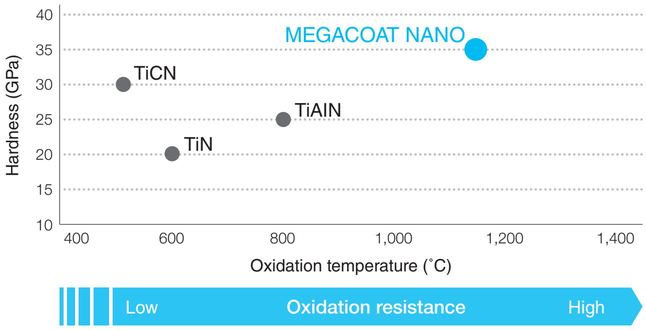




3 Stable machining and long tool life with MEGACOAT NANO

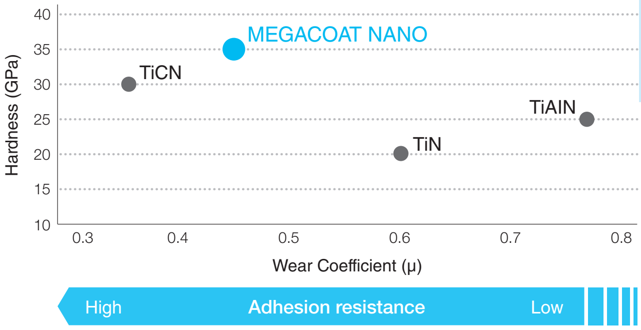
MEGACOAT NANO coating technology with high hardness (35Gpa) and excellent oxidation resistance (oxidation temperature: 1,150˚C) improves wear resistance and chipping resistance.

Coating Properties (Wear Resistance)



Long tool life with the combination of a tough substrate and a special nano layer coating

Coating Properties (Adhesion Resistance)



Stable Machining with Excellent Wear Resistance

PR1525 : 1st recommendation for wear resistance. Great for scale removal and cast iron machining

PR1535 : Defect resistant, tough substrate for stable machining

MFLN45

MFLN45 (Cutting edge angle 45°)

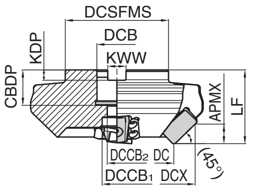


Fig.1

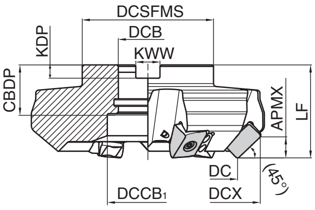


Fig.2

Rake Angle	A.R.	Max. +3.0°	
	R.R.	-16.5°~-13.5°	
Applicable Inserts	LOGU221616ER-GM		

LOGU2216PAER-GM is not applicable

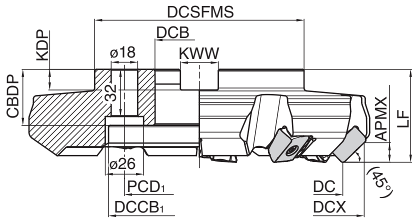


Fig.3

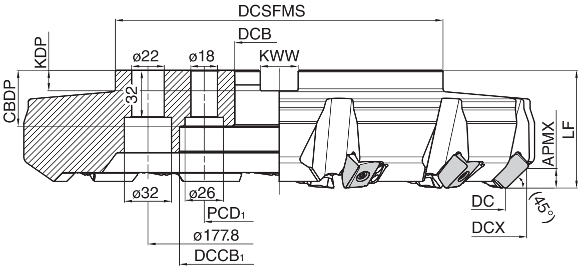


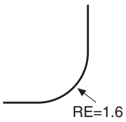
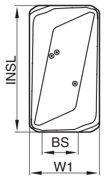
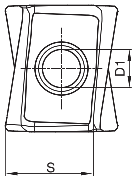
Fig.4

Toolholder Dimensions

	Description		Stock	No. of Inserts	DC	DCX	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX	PCD_1	Coolant Hole	Drawing	Weight (kg)
					Dimension (mm)														
Metric	MFLN	45080R-4T-M	●	4	80	104	70	27	20	13	50	24	7	12.4	12	-	Yes	Fig.1	2.0
		45100R-4T-M	●		100	124	78	32	45	-		30	8	14.4				Fig.2	2.7
		45125R-6T-M	●	6	125	149	89	40	55		63	33	9	16.4					4.6
		45160R-7T-M	●	7	160	184	110		90							66.7	No	Fig.3	6.7
		45200R-8T-M	●	8	200	224	142	60	124			38	14	25.7		101.6			9.7
		45250R-10T-M	●	10	250	274	222		160										16.9
		45315R-12T-M	MTO	12	315	339			215		80							Fig.4	25.1
Bore Dia. Inch spec	MFLN	45080R-4T	●	4	80	104	70	25.4	20	13	50	27	6	9.5	12	-	Yes	Fig.1	2.0
		45100R-4T	●		100	124	78	31.75	45	-		34	8	12.7				Fig.2	2.7
		45125R-6T	●	6	125	149	89	38.1	55		63	38	10	15.9					4.6
		45160R-7T	●	7	160	184	110	50.8	90				11	19.1			No		6.8
		45200R-8T	●	8	200	224	142	47.625	124				14	25.4		101.6		Fig.3	10.0
		45250R-10T	●	10	250	274	222		160										17.1
		45315R-12T	MTO	12	315	339			215		80							Fig.4	25.3

Applicable Inserts

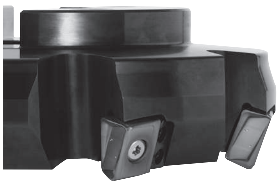
Classification of usage ★ : 1st Recommendation ☆ : 2nd Recommendation	P	Carbon Steel / Alloy Steel	☆	★
		Mold Steel	☆	★
	K	Gray Cast Iron	☆	★
		Nodular Cast Iron	☆	★

Insert	Description	Dimension (mm)					MEGACOAT NANO		Applicable Toolholders ➡M40 M41 M116
		W1	S	D1	INSL	BS	PR1535	PR1525	
 Corner-R  RE=1.6  INSL BS W1  D1 S	**LOGU 221616ER-GM**	12.5	16.6	6.8	22.8	6.3	●	●	MFLN90.. MFLN70.. MFLN45..

● : Std. Item
MTO : Made to order

MFLN70

MFLN70 (Cutting edge angle 70°)



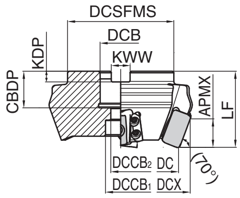


Fig.1

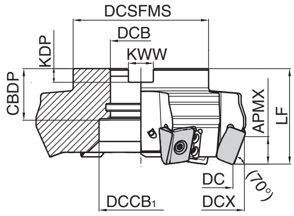


Fig.2

Rake Angle	A.R.	Max. +1.0°
	R.R.	-16.5°~-13.5°
Applicable Inserts	LOGU221616ER-GM	

LOGU2216PAER-GM is not applicable

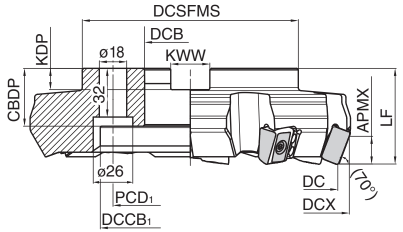


Fig.3

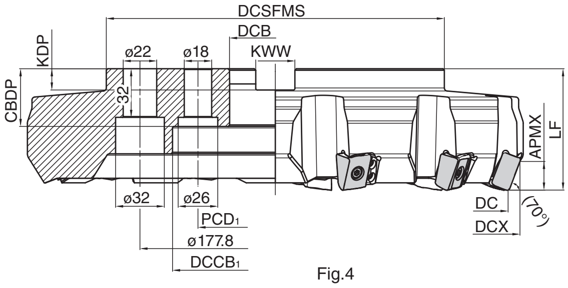
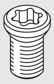
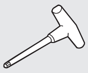
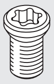
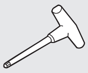
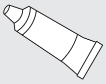
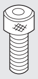


Fig.4

Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)												Coolant Hole	Drawing	Weight (kg)
					DC	DCX	DCSFMS	DCB	DCCB₁	DCCB₂	LF	CBDP	KDP	KWW	APMX	PCD₁			
Metric	MFLN	70080R-4T-M	●	4	80	93	70	27	20	13	50	24	7	12.4	17	-	Yes	Fig.1	1.4
		70100R-4T-M	●		100	113	78	32	45	-		30	8	14.4				Fig.2	1.9
		70125R-6T-M	●	6	125	138	89	40	55		63	33	9	16.4					3.4
		70160R-7T-M	●	7	160	173	110		90							66.7	No	Fig.3	5.3
		70200R-8T-M	●	8	200	213	142	60	120			38	14	25.7		101.6			8.2
		70250R-10T-M	●	10	250	263	222		160										14.8
		70315R-12T-M	MTO	12	315	328			215		80							Fig.4	21.9
Bore Dia. Inch spec	MFLN	70080R-4T	●	4	80	93	70	25.4	20	13	50	27	6	9.5	17	-	Yes	Fig.1	1.4
		70100R-4T	●		100	113	78	31.75	45	-		34	8	12.7				Fig.2	2.0
		70125R-6T	●	6	125	138	89	38.1	55		63	38	10	15.9					3.5
		70160R-7T	●	7	160	173	110	50.8	70				11	19.1			No		5.8
		70200R-8T	●	8	200	213	142	47.625	120				14	25.4		101.6		Fig.3	8.5
		70250R-10T	●	10	250	263	222		160										15.1
		70315R-12T	MTO	12	315	328			215		80							Fig.4	22.2

Spare Parts

Description	Spare Parts						
	Clamp Screw	Wrench	Shim	Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
							
MFLN ○○080R-4T(-M)	SB-60200TRP	TTP-20	MAP-2216	SB-40140TR	DTM-15	P-37	HH12X35
○○100R-4T(-M) ~ ○○315R-12T(-M)	Recommended tightening torque for Insert Clamp 6.0 N•m			Recommended tightening torque for Shim Clamp 3.5 N•m			–

● : Std. Item
MTO : Made to order

MFLN45 / MFLN70

◆ Recommended Cutting Conditions

	Workpiece Material	D.O.C. (mm)		fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)	
		Width of Cut (≤0.5×DC)	Width of Cut (>0.5×DC)		MEGACOAT NANO	
					PR1535	**PR1525**
MFLN 45	Carbon Steel	~10	~8	0.1 - **0.3** - 0.6	☆ 80 – **120** – 150	★ 100 – **150** – 180
	Alloy Steel				☆ 80 – **120** – 150	★ 100 – **150** – 180
	Mold Steel				☆ 70 – **100** – 120	★ 80 – **120** – 150
	Gray Cast Iron	~12	~10	0.1 - **0.3** - 0.6	☆ 80 – **120** – 150	★ 100 – **150** – 180
	Nodular Cast Iron				☆ 80 – **120** – 150	★ 100 – **150** – 180
MFLN 70	Carbon Steel	~15	~12	0.1 - **0.2** - 0.4	☆ 80 – **120** – 150	★ 100 – **150** – 180
	Alloy Steel				☆ 80 – **120** – 150	★ 100 – **150** – 180
	Mold Steel				☆ 70 – **100** – 120	★ 80 – **120** – 150
	Gray Cast Iron	~17	~15	0.1 - **0.2** - 0.4	☆ 80 – **120** – 150	★ 100 – **150** – 180
	Nodular Cast Iron				☆ 80 – **120** – 150	★ 100 – **150** – 180

The table above provides recommendations based on product specifications. Before using the product, check the machine's specifications such as power. ★1st Recommendation ☆2nd Recommendation

The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
Dry machining is recommended.

● About Applicable Insert

	LOGU221616ER-GM (Corner-R)	LOGU2216PWER-GM (Corner Chamfer)
MFLN 45	✓	Not applicable
MFLN 70	✓	Not applicable

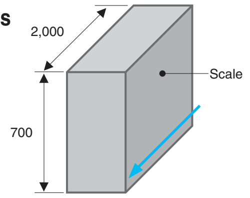
● Max. Revolution for Each Cutting Diameter

Cutting Dia. DC (mm)	Max. Revolution (min^{-1})
ø80	5,970
ø100	4,780
ø125	3,820
ø160	2,990
ø200	2,390
ø250	1,910
ø315	1,520

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Case Studies

Forging Die for Automotive Parts



Vc = 90 m/min
ap × ae = ~10 × ~80 mm
fz = 0.36 mm/t Dry
MFLN45080R-4T-M (ø80-4 flutes)
LOGU221616ER-GM PR1535

Chip Evacuation Rate

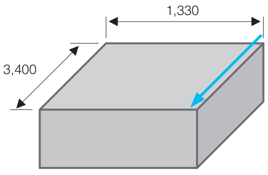
MFLN45 (ø80-4 flutes) Q=416cc/min — Machining efficiency x1.2

Competitor H (ø100-5 flutes) Q=336cc/min

MFLN achieved 1.2 times machining efficiency.
Quieter machining and good chip shapes.

(User Evaluation)

Machining base FCD600



Vc = 120 m/min
ap = 11×165 mm
fz = 0.65 mm/t Dry
XMFLN70250R-13T-OH-M (ø250-13 flutes)
Fine pitch, internal coolant, custom holder
LOGU221616ER-GM PR1525

Chip Evacuation Rate

	Roughing	Finishing
MFLN70	Q=2,340cc/min	Q=2,340cc/min
	Roughing (Competitor F)	Finishing (Competitor G)
Competitor	Q=2,100cc/min	Q=1,970cc/min

Machining efficiency x1.1

MFLN improved machining efficiency with lower cutting force.
Also it can be used both for roughing and finishing.

(User Evaluation)

How to mount an insert

1. Completely eliminate chips and dust from the insert mounting side.
2. After mounting a clamp screw on the top edge of wrench, tighten the screw while keeping the insert pushed against the shim seat surface and holder surface. (Fig.1,2)
3. Make sure that the identification on the top of the insert is the same in each pocket. (Fig.3)
4. Tighten the wrench (TTP-20) in while holding parallel to the clamp screw.
5. Tighten the insert clamp screw at an appropriate torque. (Recommended torque : 6.0 N·m)
6. After tightening, check that there is no gap between the insert and the surface of the shim, or between the side surface of insert and the holder surface. If there is a gap, remount the insert using the directions above.

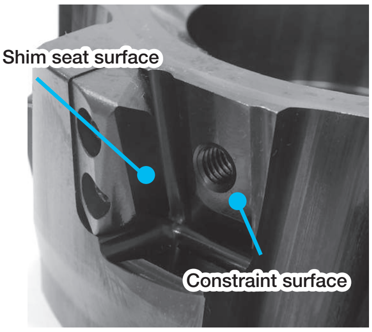


Fig.1

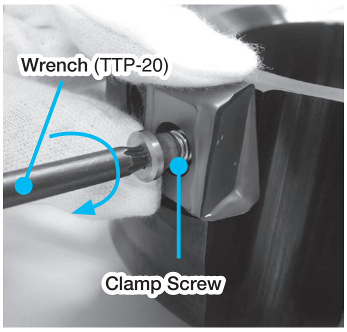


Fig.2

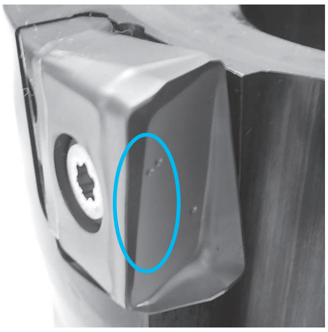


Fig.3

How to replace a shim

1. Completely eliminate chips and dust from the shim mounting side.
2. Coat medium strength screw locking adhesive on the screws.
3. Tighten the screw keeping the shim pushed against the pocket surface of toolholder.
4. After tightening both screws temporarily, tighten them with appropriate torque. (Recommended torque : 3.5 N·m)
5. Please check that there is no gap between the shim and the pocket surfaces of toolholder.

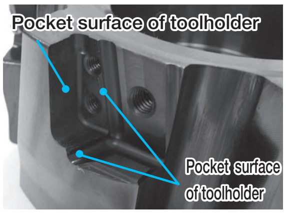


Fig.1

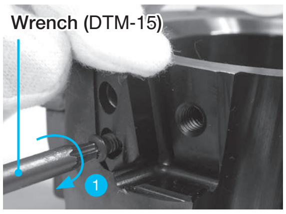


Fig.2

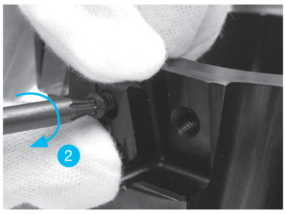


Fig.3

Fig.4

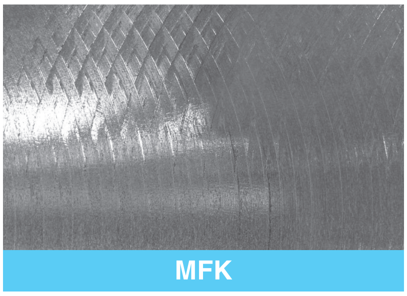
MFK Cutter for Cast Iron

MFK

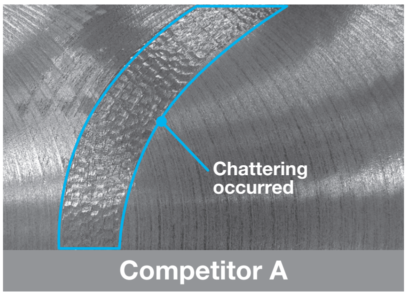
- **Multi edge cutter realizes the high efficiency cast iron machining**
- **10-edge pentagonal inserts for stable and economical machining**

MFK reduces cutting force by good balanced design
Excellent surface finish by controlling chattering

Surface finish comparison (Internal evaluation)



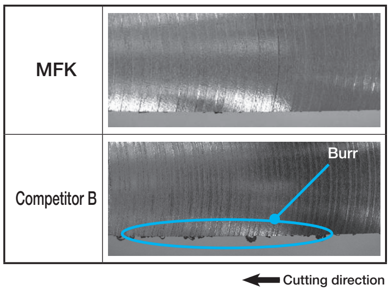
MFK



Competitor A

<Cutting Conditions>
Workpiece Material : FCD600, Dry, Vc=180m/min, ap×ae=3×78mm, fz=0.3mm/t

Burr comparison (Internal evaluation)

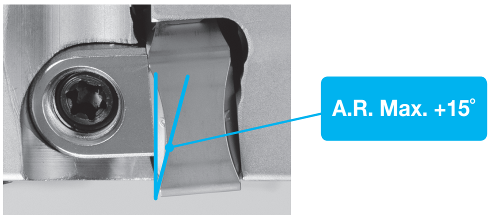


Sharp cutting prevents burr formation

Two points

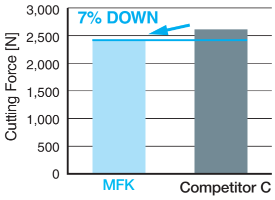
Two special insert structures reduce cutting force and improve edge strength

POINT. 1 Low cutting force with helical cutting-edge design

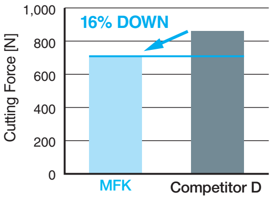


Cutting Force Comparison (Internal evaluation)

Resultant force in radial direction

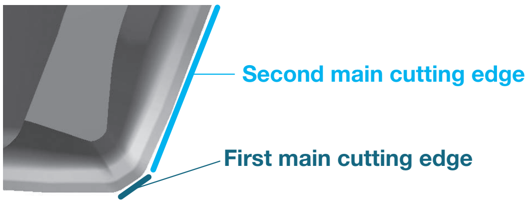


Resultant force in axial direction

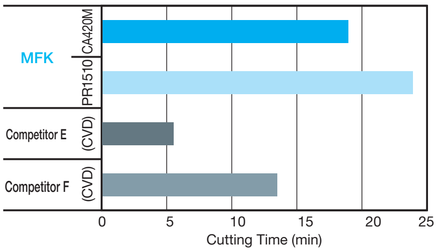


<Cutting Conditions>
Workpiece Material : FCD600, Dry, ø125
Vc=180m/min, ap×ae=3.0×62mm, fz=0.3mm/t

POINT. 2 Dual Cutting Edge Design (High Toughness)



Fracture Resistance Comparison (Internal evaluation)

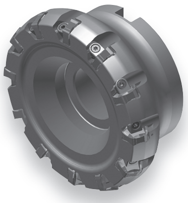


<Cutting Conditions>
Workpiece Material :
FCD450 with 4 bores
Vc=300m/min
ap=2.0mm
fz=0.5mm/t
Wet

Reducing impact load when biting into the workpiece

Toolholder lineup to meet various applications

Fine pitch type and extra fine pitch type are available
Choose most suitable cutter for your application



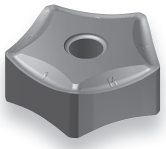
Fine pitch (Example : ø125 12 flutes)

- Recommended for low rigid workpiece
- For wide application range

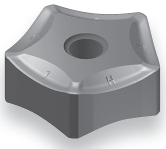
Extra fine pitch (Example : ø125 18 flutes)

- Recommended for high rigid workpiece
- For high efficiency machining

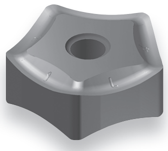
Applicable to various applications with wide range lineup of chipbreakers



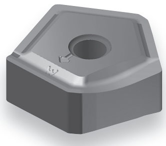
General purpose :
GM Chipbreaker



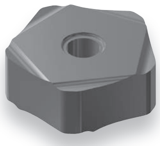
Tough Edge :
GH Chipbreaker



Finishing :
GL Ground Chipbreaker

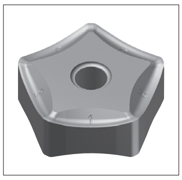


With Wiper Edge :
W Ground Chipbreaker

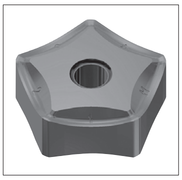


High speed machining :
Ceramic with chipbreaker

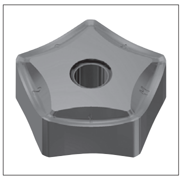
Insert grade lineup



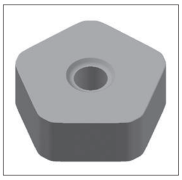
Long tool life
(1st recommendation)
CA420M
(CVD)



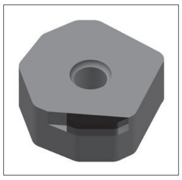
Stable machining
PR1510
(PVD)



Fracture Resistance
Oriented
PR1525
(PVD)

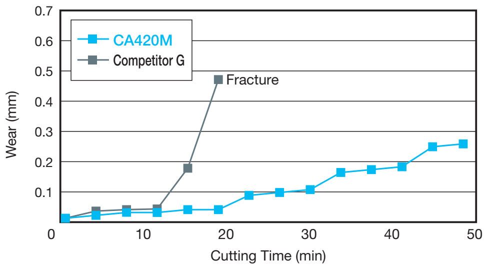


High speed machining
KS6050/CS7050
(Ceramic)



High speed and high
precision machining
KBN475
(CBN Wiper Insert)
[Use CBN wiper inserts together with ceramic (KS6050/CS7050) inserts.]

Wear Resistance Comparison (Internal evaluation)



<Cutting Conditions>
Workpiece Material : FCD450, Dry
Vc=200m/min, apxae=2.0x80mm, fz=0.3mm/t

MFK Face Mill

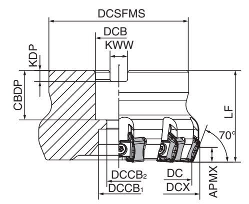


Fig. 1

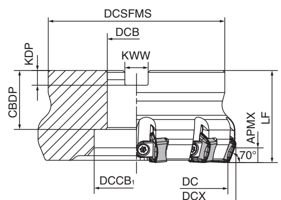


Fig. 2

Rake Angle		
Description	A.R.	R.R.
MFK080R-○○	(MAX.) +15°	-7°
MFK100R-○○		-6°
MFK125R-○○ ⋮ MFK315R-○○		-5°

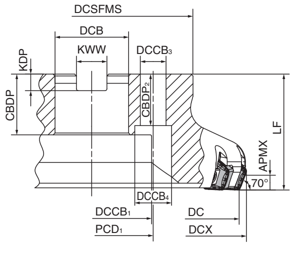


Fig. 3

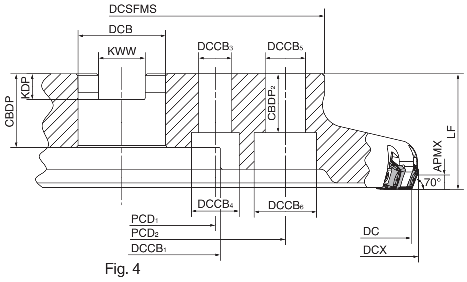


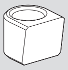
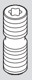
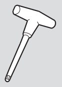
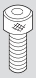
Fig. 4

Toolholder Dimensions

Description				Stock	No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)	Max. Revolution (min^{-1})
						DC	DCX	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	DCCB$_3$	DCCB$_4$	DCCB$_5$	DCCB$_6$	PCD$_1$	PCD$_2$	CBDP$_2$			
Metric	Fine pitch	MFK	080R-11-8T-M	●	8	80	89	76	27	20	13	63	24	7	12.4	6.0	-	-	-	-	-	-	-	Fig. 1	1.87	8,000
			100R-11-10T-M	●	10	100	109	96	32	26	17		28	8	14.4										2.99	7,000
			125R-11-12T-M	●	12	125	134	100	40	55	-		33	9	16.4									Fig. 2	3.56	6,100
			160R-11-16T-M	●	16	160	169			70							14	20			66.7		28	Fig. 3	4.51	5,300
			200R-11-20T-M	●	20	200	209	142	60	110			40	14	25.7		18	26			101.6		32		7.35	4,700
			250R-11-24T-M	●	24	250	259																		10.43	4,200
			315R-11-28T-M	MTO	28	315	324	220											22	32		177.8		Fig. 4	19.41	3,700
	Extra fine pitch	MFK	080R-11-10T-M	●	10	80	89	76	27	20	13	63	24	7	12.4	6.0	-	-	-	-	-	-	-	Fig. 1	1.81	8,000
			100R-11-14T-M	●	14	100	109	96	32	26	17		28	8	14.4										2.86	7,000
			125R-11-18T-M	●	18	125	134	100	40	55	-		33	9	16.4									Fig. 2	3.38	6,100
			160R-11-22T-M	●	22	160	169			70							14	20			66.7		28	Fig. 3	4.32	5,300
			200R-11-28T-M	●	28	200	209	142	60	110			40	14	25.7		18	26			101.6		32		7.10	4,700
			250R-11-36T-M	●	36	250	259																		10.07	4,200
			315R-11-44T-M	MTO	44	315	324	220											22	32		177.8		Fig. 4	18.92	3,700
Bore Dia. Inch spec	Fine pitch	MFK	080R-11-8T	●	8	80	89	76	31.75	26	17	63	32	8	12.7	6.0	-	-	-	-	-	-	-	Fig. 1	1.76	8,000
			100R-11-10T	●	10	100	109	96																	2.98	7,000
			125R-11-12T	●	12	125	134	100	38.1	55	-		38	10	15.9									Fig. 2	3.65	6,100
			160R-11-16T	●	16	160	169		50.8	70				11	19.1										4.62	5,300
			200R-11-20T	●	20	200	209	142	47.625	110			40	14	25.4		18	26			101.6		32	Fig. 3	7.65	4,700
			250R-11-24T	●	24	250	259																		10.73	4,200
			315R-11-28T	MTO	28	315	324	220											22	32		177.8		Fig. 4	19.71	3,700
	Extra fine pitch	MFK	080R-11-10T	●	10	80	89	76	31.75	26	17	63	32	8	12.7	6.0	-	-	-	-	-	-	-	Fig. 1	1.70	8,000
			100R-11-14T	●	14	100	109	96																	2.85	7,000
			125R-11-18T	●	18	125	134	100	38.1	55	-		38	10	15.9									Fig. 2	3.44	6,100
			160R-11-22T	●	22	160	169		50.8	70				11	19.1										4.44	5,300
			200R-11-28T	●	28	200	209	142	47.625	110			40	14	25.4		18	26			101.6		32	Fig. 3	7.40	4,700
			250R-11-36T	●	36	250	259																		10.36	4,200
			315R-11-44T	MTO	44	315	324	220											22	32		177.8		Fig. 4	19.21	3,700

■ Max. Revolution
Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Spare Parts and Applicable Inserts

Description		Spare Parts				Applicable Inserts ➡ M17
		Wedge	Wedge screw	Wrench	Mounting bolt	
						
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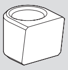
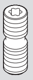
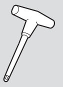
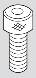
	100R-11-10T-M				HH16X40	
	125R-11-12T-M				-	
	160R-11-16T-M					
	200R-11-20T-M					
	250R-11-24T-M					
	315R-11-28T-M					
MFK	080R-11-10T-M	C09N	W6X18N	TT-15	HH12X35	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020 PNEG1106XNTR-T00515 PNEG1106XNTR-T01015W
	100R-11-14T-M				HH16X40	
	125R-11-18T-M				-	
	160R-11-22T-M					
	200R-11-28T-M					
	250R-11-36T-M					
	315R-11-44T-M					

Description		Spare Parts				Applicable Inserts ➡ M17
		Wedge	Wedge screw	Wrench	Mounting bolt	
						
MFK	080R-11-8T	C09N	W6X18N	TT-15	HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020 PNEG1106XNTR-T00515 PNEG1106XNTR-T01015W
	100R-11-10T					
	125R-11-12T				-	
	160R-11-16T					
	200R-11-20T					
	250R-11-24T					
	315R-11-28T					
MFK	080R-11-10T	C09N	W6X18N	TT-15	HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020 PNEG1106XNTR-T00515 PNEG1106XNTR-T01015W
	100R-11-14T					
	125R-11-18T				-	
	160R-11-22T					
	200R-11-28T					
	250R-11-36T					
	315R-11-44T					

Recommended Cutting Conditions ➡ **M48,M49**

● : Std. Item
MTO : Made to order

MFK-SF Face Mill

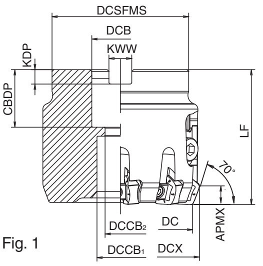


Fig. 1

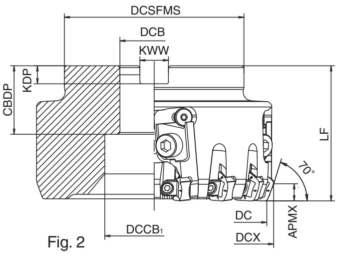


Fig. 2

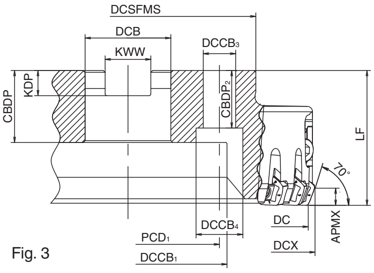


Fig. 3

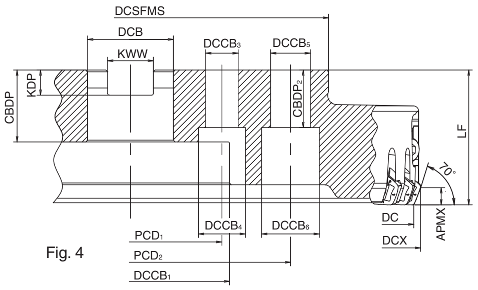


Fig. 4

Rake Angle		
Description	A.R.	R.R.
MFK080R-◯◯	(MAX.) +15°	-7°
MFK100R-◯◯		-6°
MFK125R-◯◯ ⋮ MFK315R-◯◯		-5°

Toolholder Dimensions

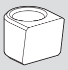
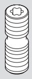
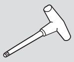
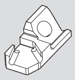
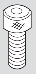
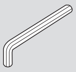
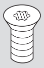
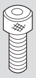
Description			Stock	*No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)	Max. Revolution (min^{-1})
					DC	DCX	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	DCCB$_3$	DCCB$_4$	DCCB$_5$	DCCB$_6$	PCD$_1$	PCD$_2$	CBDP$_2$			
Metric	MFK	080R-11-9T-M-SF	●	9(3)	80	89	76	27	20	13	75	24	7	12.4	6.0	-	-	-	-	-	-	-	Fig. 1	2.21	8,000
		100R-11-12T-M-SF	●	12(4)	100	109	96	32	26	17		28	8	14.4										3.49	7,000
		125R-11-15T-M-SF	●	15(5)	125	134	100	40	55	-		33	9	16.4									Fig. 2	4.47	6,100
		160R-11-18T-M-SF	●	18(6)	160	169										14	20			66.7		28	Fig. 3	6.99	5,300
		200R-11-24T-M-SF	●	24(8)	200	209	142	60	110			35	14	25.7		18	26			101.6		32		9.89	4,700
		250R-11-30T-M-SF	MTO	30(10)	250	259																		16.35	4,200
		315R-11-39T-M-SF	MTO	39(13)	315	324	220											22	32		177.8		Fig. 4	28.14	3,700
Bore Dia. Inch spec	MFK	080R-11-9T-SF	●	9(3)	80	89	76	31.75	26	17	75	32	8	12.7	6.0	-	-	-	-	-	-	-	Fig. 1	2.08	8,000
		100R-11-12T-SF	●	12(4)	100	109	96																	3.49	7,000
		125R-11-15T-SF	●	15(5)	125	134	100	38.1	55	-		38	10	15.9									Fig. 2	4.54	6,100
		160R-11-18T-SF	●	18(6)	160	169		50.8	70				11	19.1										6.82	5,300
		200R-11-24T-SF	●	24(8)	200	209	142	47.625	110			40	14	25.4		18	26			101.6		32	Fig. 3	10.39	4,700
		250R-11-30T-SF	MTO	30(10)	250	259																		16.85	4,200
		315R-11-39T-SF	MTO	39(13)	315	324	220											22	32		177.8		Fig. 4	28.65	3,700

* Numbers in parenthese ( ) are the number of adjustable cutting edge pockets
Please install wiper inserts in the adjustable cutting edge pockets

■ **Max. Revolution**

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

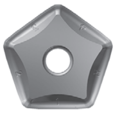
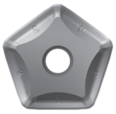
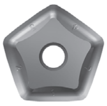
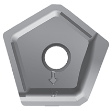
Spare Parts

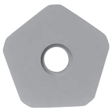
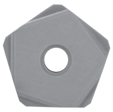
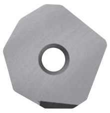
Description		Spare Parts								Applicable Inserts ➡ **M17**
		Wedge 	Wedge Screw 	Wrench 	Cartridge 	Cartridge Clamp Screw 	Wrench 	Adjustment Screw 	Mounting bolt 	
MFK	080R-11-9T-M-SF	C09N	W6X18N	TT-15	CR-MFK70R	HH8X25	LW-6	AJ-519TR	HH12X35	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020 PNEG1106XNTR-T00515 PNEG1106XNTR-T01015W
	100R-11-12T-M-SF								HH16X40	
	125R-11-15T-M-SF								-	
	160R-11-18T-M-SF									
	200R-11-24T-M-SF									
	250R-11-30T-M-SF									
	315R-11-39T-M-SF									
MFK	080R-11-9T-SF	C09N	W6X18N	TT-15	CR-MFK70R	HH8X25	LW-6	AJ-519TR	HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTN-T01020 PNEG1106XNTR-T00515 PNEG1106XNTR-T01015W
	100R-11-12T-SF									
	125R-11-15T-SF								-	
	160R-11-18T-SF									
	200R-11-24T-SF									
	250R-11-30T-SF									
	315R-11-39T-SF									

Recommended Cutting Conditions ➡ **M48,M49**

● : Std. Item
MTO : Made to order

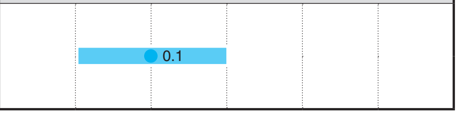
Applicable Inserts

Description	Applicable Inserts ➡ M17			
	 General purpose	 Tough Edge	 Surface-Finish Oriented	 Wiper Insert (2-edge)
MFK...-11-...	PNMG1106XNEN-GM	PNMG1106XNEN-GH	PNEG1106XNEN-GL	PNEG1106XNER-W

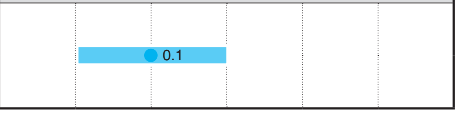
Description	Applicable Inserts ➡ M17		
	 High speed machining	 High speed machining (With Chipbreaker)	 Wiper Insert (2-edge)
MFK...-11-...	PNEA1106XNTN-T01020	PNEG1106XNTR-T00515	PNEG1106XNTR-T01015W

Recommended Cutting Conditions (Ceramic / CBN)

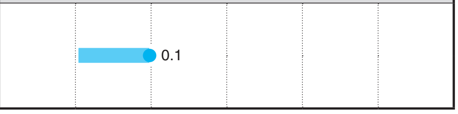
Without Chipbreaker

Workpiece Material	Insert Grades	Cutting Speed Vc (m/min)	Edge Preparation	fz(mm/t) 0.05 0.1 0.2 0.3 0.4
Gray Cast Iron	KS6050★ CS7050☆	600~**900**~1,200	0.10x20°	 0.1
Nodular Cast Iron	KS6050☆ CS7050★	400~**600**~900		

With Chipbreaker

Workpiece Material	Insert Grades	Cutting Speed Vc (m/min)	Edge Preparation	fz(mm/t) 0.05 0.1 0.2 0.3 0.4
Gray Cast Iron	KS6050★ CS7050☆	600~**900**~1,200	0.05x15°	 0.1
Nodular Cast Iron	KS6050☆ CS7050★	400~**600**~900		

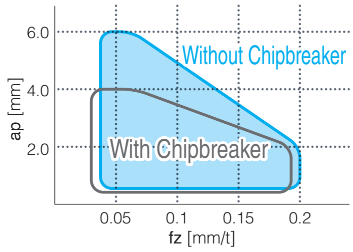
CBN Wiper Insert

Workpiece Material	Insert Grades	Cutting Speed Vc (m/min)	Edge Preparation	fz(mm/t) 0.05 0.1 0.2 0.3 0.4
Gray Cast Iron	KBN475	600~**900**~1,200	0.10x15°	 0.1
Nodular Cast Iron		400~**600**~900		

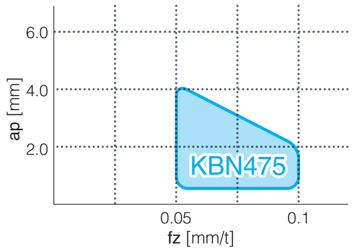
★ : 1st Recommendation ☆ : 2nd Recommendation

Recommended application range (Ceramic / CBN)

Workpiece Material : Cast Iron (Ceramic)



Workpiece Material : Cast Iron (CBN)



When Using CBN Wiper Inserts

1. Please use CBN wiper inserts together with ceramic inserts.
   Feed rate should be fz=0.1mm/t or under.
2. The main cutting edge of CBN wiper insert is slightly higher than that of ceramic inserts.
   Therefore, the feed rate for the inserts next to CBN wiper inserts is double that of other inserts.

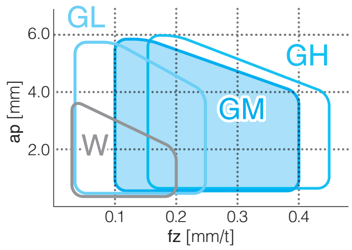
◆ Recommended Cutting Conditions (Coated Carbide)

Workpiece Material	Insert Grades	Cutting Speed Vc (m/min)	Chipbreaker	fz(mm/t) 0.06 / 0.1 / 0.2 / 0.3 / 0.4
Gray Cast Iron	**CA420M**	170~**230**~300	GM★	● 0.25
	PR1510	120~**180**~250	GH☆	● 0.3
	PR1525		GL	● 0.12
Nodular Cast Iron	**CA420M**	150~**200**~250	GM★	● 0.2
	PR1510	100~**150**~200	GH☆	● 0.25
	PR1525		GL	● 0.1

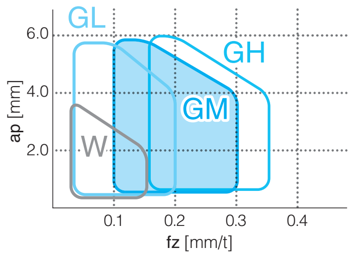
★ : 1st Recommendation ☆ : 2nd Recommendation

Recommended application range

Workpiece Material : Gray Cast Iron



Workpiece Material : Nodular Cast Iron



Notes)

1. When using W, please use together with GM or GH.
2. If machining fz=0.2 or over, insert corner will be damaged. The main cutting edge of W insert is receding from that of GM and GH.
   Therefore, the feed rate for the insert next to W type is double of the other inserts.

How to Adjust Cutting Edge Height

1. Assemble all related parts into the cutter.
2. Make sure the back end of cartridge makes contact with adjustment screw (Fig. 1), and pull them lightly inwards (Fig. 2).
   Tighten the cartridge clamp screw temporary.
3. Install the insert (Fig. 3), and tighten the wedge screw temporary.
   Temporarily tighten the screw with a 40 to 45 degree rotation after the wedge contacts the insert.
4. Loosen the cartridge clamp screw. (Fig. 4)
5. Adjust the extruding amount with adjustment screw. (Fig. 5)
6. Tighten the wedge screw and firmly fix the insert.
   (Recommended tightening torque : 6N·m)
7. Tighten the cartridge clamp screw firmly.
   (Recommended tightening torque : 10N·m)

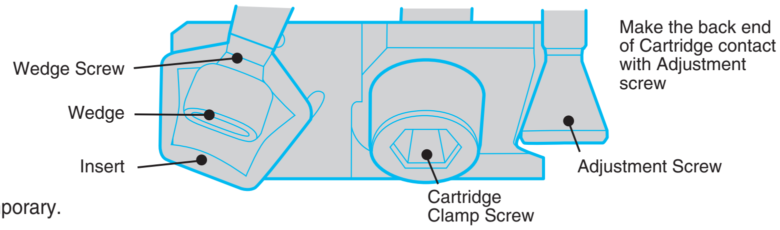


Fig. 1

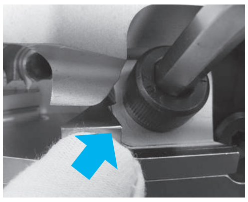


Fig. 2

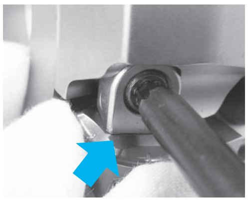


Fig. 3

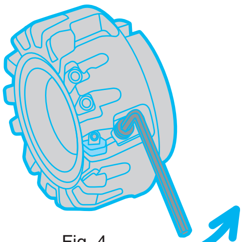


Fig. 4

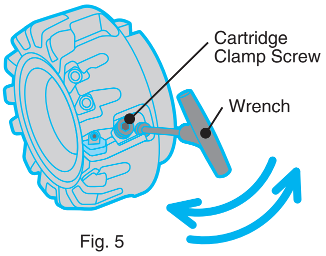
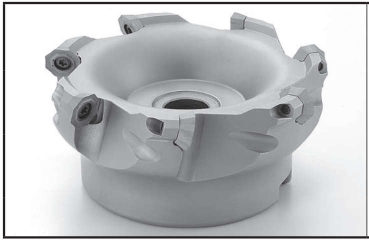


Fig. 5

Notes :

1. Follow steps 1 ~ 7 above for adjustment.
2. To adjust the edge height adjust the wedge screw and loosen the cartridge clamp screw.
   Tightening the adjustment screw with the clamp screw fixed firmly may damage the adjustment screw.
3. The adjusted edge height difference must be within 5μm.

MOF45 Face Mill (05 type / 07 type)



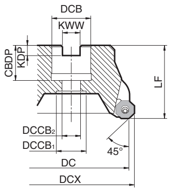


Fig. 1

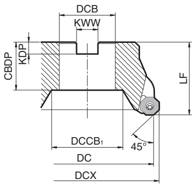


Fig. 2

Rake Angle	
A.R.	R.R.
+15˚	+5˚

Toolholder Dimensions

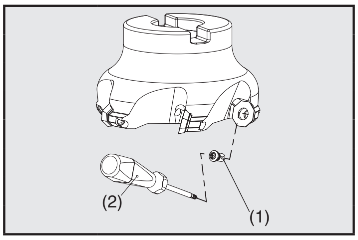
Description			Stock	No. of Inserts	Dimension (mm)										Drawing	Weight (kg)	Applicable Inserts ➡ M25
					DC	DCX	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX			
Metric	**MOF**	**45040R-05-3T-M**	▲	3	40	49	16	13.5	8.5	40	19	5.6	8.4	-	Fig. 1	0.3	OFMT05 type
		45050R-05-4T-M	▲	4	50	59	22	17	11		21	6.3	10.4			0.4	
		45063R-05-5T-M	▲	5	63	72										0.6	
		45080R-05-6T-M	▲	6	80	89	27	20	13	50	24	7	12.4			1.1	
	MOF	**45063R-07-4T-M**	▲	4	63	75	22	17	11	40	21	6.3	10.4	-	Fig. 1	0.6	OFMT07 type
		45080R-07-5T-M	▲	5	80	92	27	20	13	50	24	7	12.4			1.2	
		45100R-07-6T-M	▲	6	100	112	32	45	-		32	8	14.4		Fig. 2	1.9	
Bore Dia. Inch spec	**MOF**	**45080R-05-6T**	▲	6	80	89	25.4	20	13	50	26	6	9.5	-	Fig. 1	1.1	OFMT05 type
		45100R-05-7T	▲	7	100	109	31.75	45	-		32	8	12.7		Fig. 2	1.8	

Spare Parts

Description		(1) Clamp Screw	(2) Wrench	Mounting bolt
MOF	**45040R-05-3T-M**	SB-4082TPR	DTP-15	HH8X25
	45050R-05-4T-M			HH10X30
	45063R-05-5T-M			
	45080R-05-6T-M			HH12X35
MOF	**45063R-07-4T-M**	SB-50120TRS	DTP-15	HH10X30S
	45080R-07-5T-M			HH12X35
	45100R-07-6T-M			-
MOF	**45080R-05-6T**	SB-4082TPR	DTP-15	HH12X35
	45100R-05-7T			-

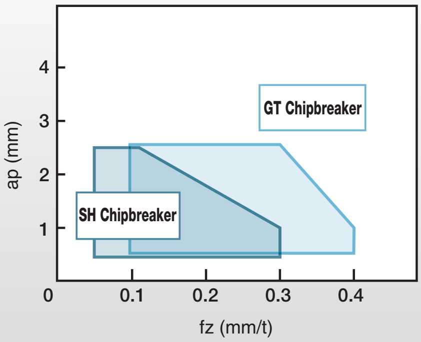
Max. ap and usable edges

Usable edges	Max. ap	
	OFMT05 type	OFMT07 type
4 edges	7mm	10mm
8 edges	2.5mm	4mm

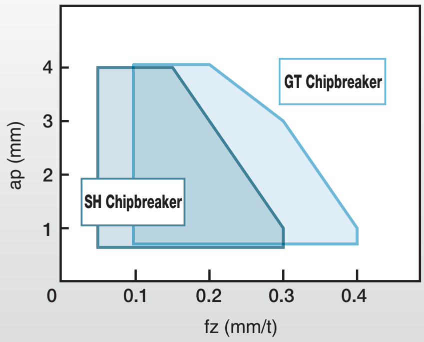


Applicable Chipbreaker Range

05 type



07 type



Recommended Cutting Conditions (MOF)

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)	
	GT Chipbreaker (Tough Edge)	SH Chipbreaker (General purpose)	MEGACOAT	
			PR1225	**PR1210**
Carbon Steel	0.10~**0.25**~0.40	0.10~**0.15**~0.30	★ 120~**180**~250	-
Alloy Steel	0.10~**0.25**~0.35	0.10~**0.15**~0.30	★ 100~**160**~220	-
Mold Steel	0.10~**0.20**~0.35	0.08~**0.12**~0.25	★ 80~**140**~180	-
Stainless Steel	-	0.08~**0.12**~0.25	★ 120~**160**~220	-
Gray Cast Iron	0.10~**0.25**~0.40	0.10~**0.15**~0.30	-	★ 120~**180**~250
Nodular Cast Iron	0.10~**0.20**~0.35	0.08~**0.12**~0.25	-	★ 100~**150**~200

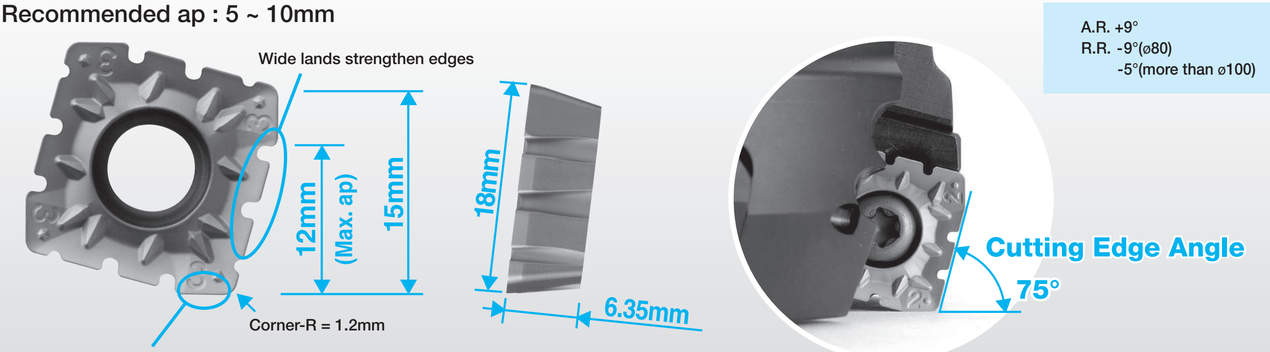
★ : 1st Recommendation ☆ : 2nd Recommendation

▲ : To be replaced by a new product

Face Mill for Heavy Milling MSRS15

Large depth of cut and high feed rate achieve high efficiency machining

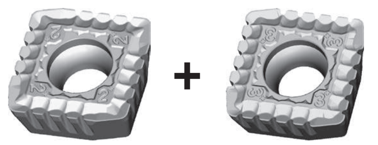
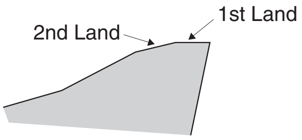
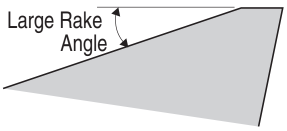
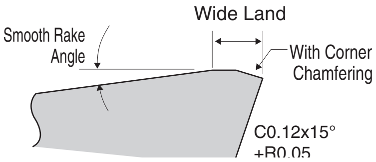
● Recommended ap : 5 ~ 10mm



Large wiper edges achieve high feed rate.

Inserts are strengthened with 6.35mm thickness.

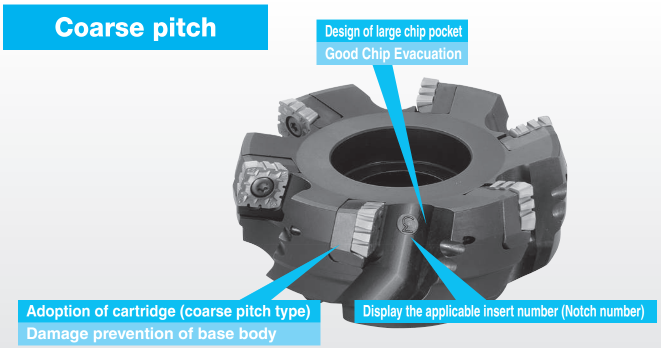
● Selection of chipbreaker

	Low Cutting Force	General purpose	Edge Strength Oriented
Insert Type	 **NB2P** (4-Notched) **NB3P** (5-Notched)	 **NB2** (2-Notched) **NB3** (3-Notched)	 **NB2T** (2-Notched) **NB3T** (3-Notched)
Applications	When using long arbor or for machining of thin-plate workpieces	General purpose type with good balance of strength and cutting force	For interrupted machining and high load machining When feed rate is increased or workpiece material is Cast Iron
Edge preparation	As many as four (or five) notches help to alleviate the shock when biting into the workpiece	Strength, edge and chip control are all well balance	Strength is increased by the edge shape and moderate rake angle of the chamfer edge
			

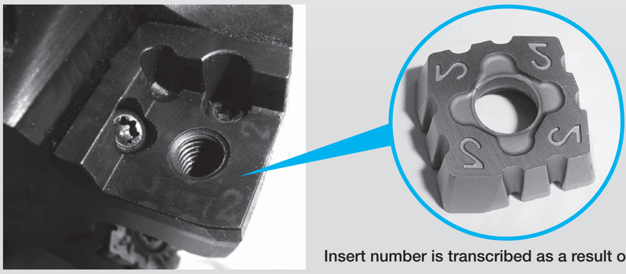
A supplemental chipbreaker is used when it is necessary to increase strength and bite while focusing on resistance, as when machining welded areas.

● About insert no. of NB2P (4-Notched) and NB3P (5-Notched)
In order to adjust applicable inserts on marked numbers on toolholders, "2+" is marked for NB2P (4-Notched) and "3+" is marked on NB3P (5-Notched).

Features of Toolholder



Insert Replacement Identification

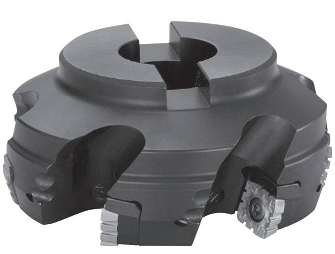


Insert number is transcribed as a result of the cutting tool load.

* Depending on the cutting conditions, marks are not transcribed.

MSRS15

MSRS15



(The photo shows the coarse pitch type)

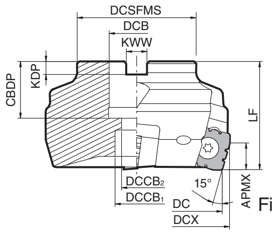


Fig. 1

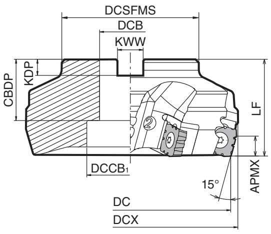


Fig. 2

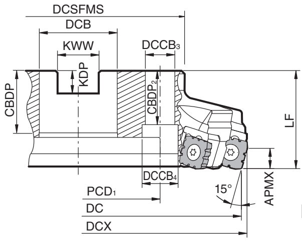


Fig. 3

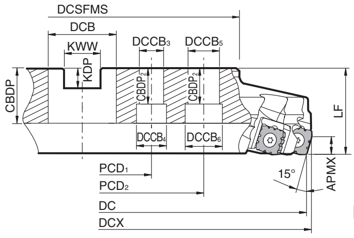


Fig. 4

Rake Angle		
Description	A.R.	R.R.
MSRS15080R-..	+9°	-9°
MSRS15100R-.. ~ MSRS15315R-..	+9°	-5°

Toolholder Dimensions (Metric)

Description			Stock	No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)
					DC	DCX	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	DCCB$_3$	DCCB$_4$	DCCB$_5$	DCCB$_6$	PCD$_1$	PCD$_2$	CBDP$_2$		
Coarse pitch	MSRS	15080R-4T-M	●	4	80	87	70	27	20	13	50	24	7	12.4	12	-	-	-	-	-	-	-	Fig. 1	1.3
		15100R-4T-M	●	4	100	107	85	32	45	-		29	8	14.4									Fig. 2	2.0
		15125R-6T-M	●	6	125	132		40	55		60	33	9	16.4										3.6
		15160R-8T-M	●	8	160	167	110		68							14	20			66.7		28	Fig. 3	5.0
		15200R-10T-M	●	10	200	207	140	60	-			38	15	25.7		18	26			101.6		32		7.7
		15250R-12T-M	●	12	250	257																		12.0
		15315R-14T-M	●	14	315	322	230											22	32		177.8		Fig. 4	17.0
Fine pitch	MSRS	15080R-6T-M	●	6	80	87	70	27	20	13	50	24	7	12.4	12	-	-	-	-	-	-	-	Fig. 1	1.3
		15100R-6T-M	●	6	100	107	85	32	45	-		29	8	14.4									Fig. 2	1.9
		15125R-8T-M	●	8	125	132		40	55		60	33	9	16.4										3.5
		15160R-10T-M	●	10	160	167	110		68							14	20			66.7		28	Fig. 3	4.9
		15200R-12T-M	●	12	200	207	140	60	-			38	15	25.7		18	26			101.6		32		7.6
		15250R-14T-M	●	14	250	257																		11.9
		15315R-16T-M	MTO	16	315	322	230											22	32		177.8		Fig. 4	17.0

· Mounting bolt (HH12X35) is included for MSRS15080R-○T-M.
· Cartridge is included in the coarse pitch type, but no cartridge in the fine pitch type.

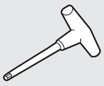
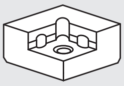
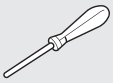
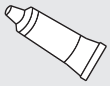
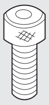
Toolholder Dimensions (Bore Dia. : Inch spec)

Description			Stock	No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)
					DC	DCX	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	DCCB$_3$	DCCB$_4$	DCCB$_5$	DCCB$_6$	PCD$_1$	PCD$_2$	CBDP$_2$		
Coarse pitch	MSRS	15080R-4T	●	4	80	87	55	25.4	20	13	50	26	6	9.5	12	-	-	-	-	-	-	-	Fig. 1	1.3
		15100R-4T	●	4	100	107	70	31.75	42	-		32	8	12.7									Fig. 2	2.0
		15125R-6T	●	6	125	132	85	38.1	54		60	38	10	15.9										3.6
		15160R-8T	●	8	160	167	100	50.8	68				11	19.0										5.0
		15200R-10T	●	10	200	207	130	47.625	-				14	25.4		18	26			101.6		32	Fig. 3	7.7
		15250R-12T	●	12	250	257																		12.0
		15315R-14T	●	14	315	322	220											22	32		177.8	25	Fig. 4	17.0
Fine pitch	MSRS	15080R-6T	●	6	80	87	55	25.4	20	13	50	26	6	9.5	12	-	-	-	-	-	-	-	Fig. 1	1.3
		15100R-6T	●	6	100	107	70	31.75	42	-		32	8	12.7									Fig. 2	1.9
		15125R-8T	●	8	125	132	85	38.1	54		60	38	10	15.9										3.5
		15160R-10T	●	10	160	167	100	50.8	68				11	19.0										4.9
		15200R-12T	●	12	200	207	130	47.625	-				14	25.4		18	26			101.6		32	Fig. 3	7.6
		15250R-14T	●	14	250	257																		11.9
		15315R-16T	MTO	16	315	322	220											22	32		177.8	25	Fig. 4	17.0

· Mounting bolt (HH12X35) is included for MSRS15080R-○T.
· Cartridge is included in the coarse pitch type, but no cartridge in the fine pitch type.

● : Std. Item
MTO : Made to order

Spare Parts

	Description	Clamp Screw	Wrench	Cartridge	Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
								
Coarse pitch	**MSRS 15080R-○○(M)**	SB-60120TR	TT-25L	MAP-1806	SB-40140TR	DT-15	P-37	HH12X35
	MSRS 15100R-○○(M) ~ **15315R-○○(M)**	Recommended tightening torque for Insert Clamp 7.5N·m			Recommended tightening torque for Cartridge Clamp 3.5N·m			-
Fine pitch	**MSRS 15080R-○○(M)**	SB-60120TR	TT-25L	-	-	-	P-37	HH12X35
	MSRS 15100R-○○(M) ~ **15315R-○○(M)**	Recommended tightening torque for Insert Clamp 7.5N·m						-

 Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Applicable Inserts

Description	Applicable Inserts ➡ **M27** (Handed Insert shows Right-hand)			
	 2-Notched	 3-Notched	 2-Notched / Tough Edge	 3-Notched / Tough Edge
MSRS… **MSRS…M**	SPMT 1806EDER-NB2	SPMT 1806EDER-NB3	SPMT 1806EDSR-NB2T	SPMT 1806EDSR-NB3T

Description	Applicable Inserts ➡ **M27**		
	 4-Notched / Low cutting force	 5-Notched / Low cutting force	 Without notch
MSRS… **MSRS…M**	SPMT 1806EDER-NB2P	SPMT 1806EDER-NB3P	SPMT 1806EDER-V

Selection of chipbreaker ➡ **M51**

◆ Recommended Cutting Conditions

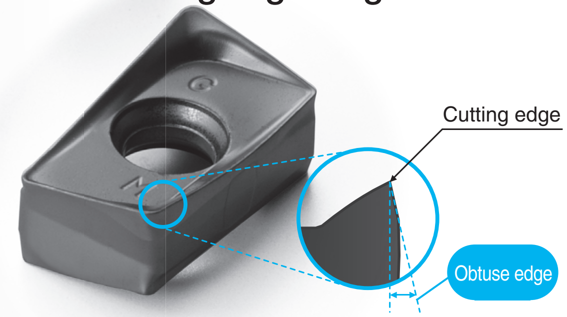
Workpiece Material	fz (mm/t)			Recommended Insert Grades (Cutting Speed Vc: m/min)		
	NB2P + NB3P	NB2 + NB3	NB2T + NB3T	MEGACOAT		
				PR1225	**PR1230**	**PR1210**
Carbon Steel	0.15	0.2	0.3	☆ 120~**180**~250	★ 120~**180**~220	-
Alloy Steel	0.15	0.2	0.3	☆ 120~**180**~250	★ 120~**180**~220	-
Mold Steel	0.1	0.15	0.2	☆ 100~**160**~220	★ 100~**160**~200	-
Gray Cast Iron	0.2	0.25	0.35	-	-	★ 120~**180**~250
Nodular Cast Iron	0.15	0.2	0.3	-	-	★ 100~**160**~220
Stainless Steel	Not recommended					
Aluminum / Copper	Not recommended					

★ : 1st Recommendation ☆ : 2nd Recommendation

MEW

Double-sided 4-edge insert, Newly Developed End Mill KYOCERA's unique mold technology reduces cutting force equivalent to positive inserts

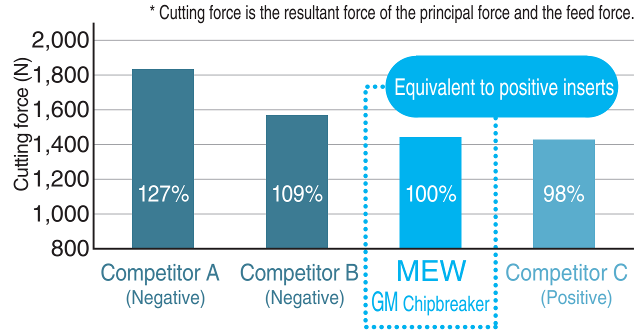
Obtuse edge increases cutting edge toughness



Low cutting force equivalent to positive inserts

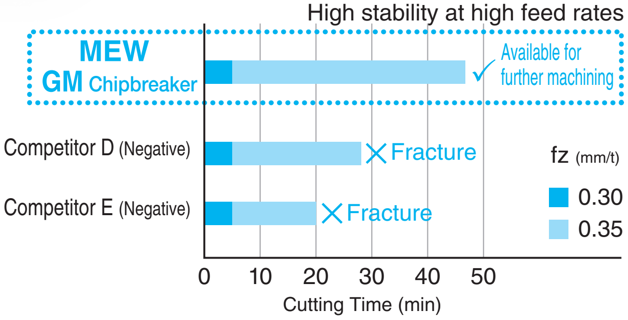
- Cutting Force Comparison (Internal evaluation)

* Cutting force is the resultant force of the principal force and the feed force.



<Cutting Conditions>
Vc=150m/min apxae=3x15mm fz=0.15mm/t S50C Cutting Dia.ø20

- Fracture Resistance Comparison (Internal evaluation)



<Cutting Conditions>
Vc=120m/min apxae=3x10mm fz=0.3~0.35mm/t
SCM440H (37~39HS) Cutting Dia.ø20

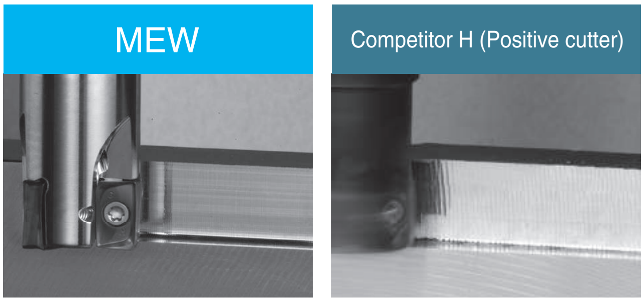
Improved surface finish, minimizing chattering

Sharp cutting and superior resistance to chattering and burrs with helical cutting edge and optimum axial rake design

MEW GM Chipbreaker	Competitor F (Negative)	Competitor G (Positive)
+20°	+17°	+17°

Large actual rake angle lowers cutting force

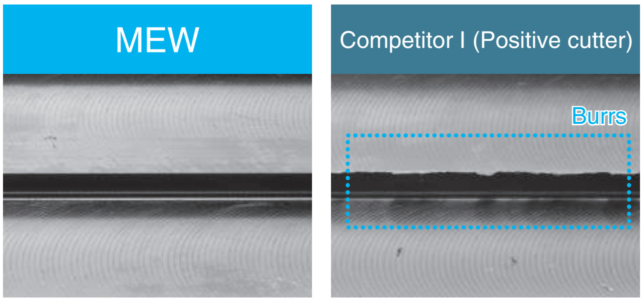
Surface of shoulder wall (Internal evaluation)



Smooth surface of MEW without chattering

<Cutting Conditions>
Vc=240m/min apxae=4(3 passes)x5mm fz=0.12mm/t Dry SS400 Cutting Dia.ø20

Burr comparison with positive cutters (Internal evaluation)



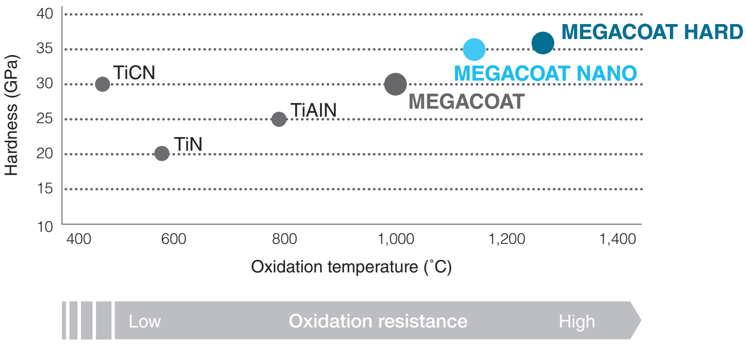
Sharp cutting enables less burrs than positive cutters

<Cutting Conditions>
Vc=250m/min apxae=4x5mm fz=0.1mm/t Dry S50C Cutting Dia.ø20

Extended Tool Life by New MEGACOAT NANO Technology

Stable and longer tool life by special nano coating layer "**MEGACOAT NANO**"
PR1525 for steel and stainless steel (austenitic related), **PR1510** for cast iron are available.
PR1535 for heat-resistant alloys, titanium and stainless steel (precipitation hardening) are available, too.
CA6535 (CVD coated carbide) for heat-resistant alloys and stainless steel (martensitic) is available.
PDL025 (DLC coated carbide) and **GW25** (Carbide) for non-ferrous metals,
PR015S (MEGACOAT HARD) for hard materials are available.

Properties of Coating



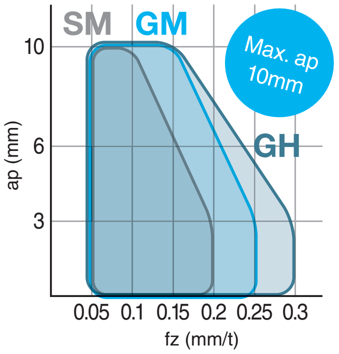
Prevents wear and fracture with high hardness (35GPa) and superior oxidation resistance (oxidation temperature : 1,150˚C)

Various chipbreaker lineup

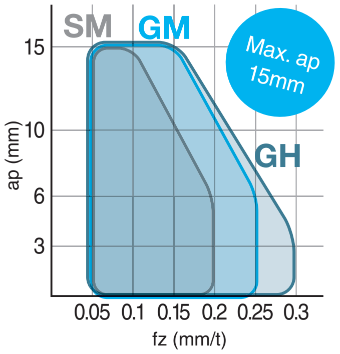
Newly developed 4 chipbreakers for various applications
Applicable to a wide range of application

Chipbreaker	Applications	Insert
GM	General purpose	
SM	Low cutting force	
GH	For Heavy Milling	
AM	For Non-ferrous Metals	

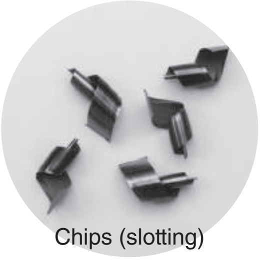
●LOMU10 type



●LOMU15 type



<Cutting Conditions> Vc=150m/min ae=DC/2mm Workpiece Material : S50C



Chips (slotting)

Chips (shouldering)

Lineup of Corner-R(RE)

Corner-R(RE) 0.4, 1.0, 1.2, 1.6 and 2.0 added to GM chipbreaker lineup

LOMU100404ER-GM
LOMU150504ER-GM

LOMU100408ER-GM
LOMU150508ER-GM

LOMU150510ER-GM

LOMU100412ER-GM
LOMU150512ER-GM

LOMU100416ER-GM
LOMU150516ER-GM

LOMU100420ER-GM
LOMU150520ER-GM

MEW End Mill


(Cylindrical)

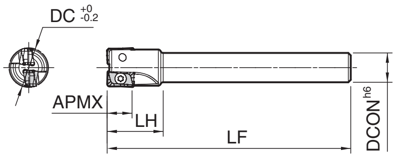


Fig. 1

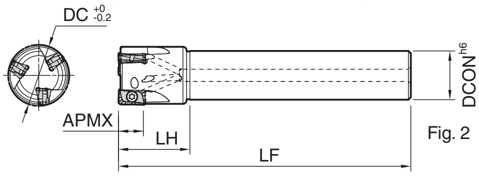


Fig. 2

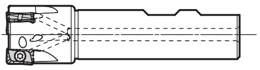


Fig. 3

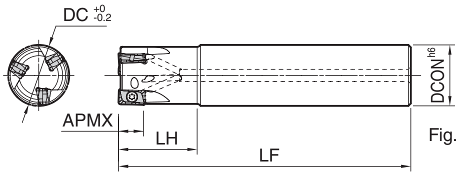


Fig. 4

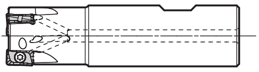


Fig. 5

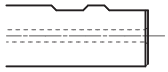


Fig. 6

Toolholder Dimensions

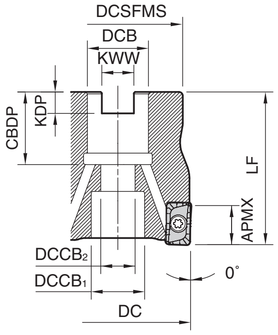
Description				Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Max. Revolution (min^{-1})
						DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			
Cylindrical	Standard Shank	MEW	16-S12-10-2T	●	2	16	12	100	23	10	+7°	-22°	No	Fig. 1	43,750
			18-S16-10-2T	●		18	16		25			-21°	Yes	Fig. 2	43,000
			20-S16-10-2T	●		20		110	26			-20°			41,000
			22-S20-10-3T	●	3	22	20								39,600
			25-S20-10-3T	●		25		120	29						37,500
			28-S25-10-3T	●		28	25								35,800
			30-S25-10-4T	●	4	30		130	32						34,800
			32-S25-10-4T	●		32									33,900
			40-S32-10-5T	●	5	40	32	150	50			-19°			30,000
			50-S32-10-5T	●		50		120	40						22,500
	Same Shank	MEW	16-S16-10-2T	●	2	16	16	100	26	10	+7°	-22°	Yes	Fig. 4	43,750
			20-S20-10-2T	●		20	20	110	30			-20°			41,000
			20-S20-10-3T	●	3										41,000
			25-S25-10-2T	●	2	25	25	120	32						37,500
			25-S25-10-3T	●	3										37,500
			32-S32-10-3T	●		32	32	130	40						33,900
			32-S32-10-4T	●	4										33,900
	Long Shank	MEW	20-S20-10-150-2T	●	2	20	20	150	40	10	+7°	-20°	Yes	Fig. 4	41,000
			25-S25-10-170-2T	●		25	25	170	50						37,500
	Standard Shank	MEW	25-S20-15-2T	●	2	25	20	120	29	15	+10°	-22°	Yes	Fig. 2	35,000
			32-S25-15-2T	●		32	25	130	32						30,000
			40-S32-15-3T	●	3	40	32	150	50			-21°			25,000
			40-S32-15-4T	●	4										25,000
			50-S32-15-4T	●		50		120	40						17,000
	Same Shank	MEW	25-S25-15-2T	●	2	25	25	120	32	15	+10°	-22°	Yes	Fig. 4	35,000
			32-S32-15-2T	●		32	32	130	40						30,000
			32-S32-15-3T	●	3										30,000
Weldon	Standard Shank	MEW	40-W32-10-5T	MTO	5	40	32	111	50	10	+7°	-19°	Yes	Fig. 3	30,000
		MEW	40-W32-15-4T	MTO	4					15	+10°	-21°			25,000
	Same Shank	MEW	16-W16-10-2T	MTO	2	16	16	75	25	10	+7°	-22°	Yes	Fig. 5	43,750
			20-W20-10-2T	MTO		20	20	77				-20°			41,000
			20-W20-10-3T	MTO	3										41,000
			25-W25-10-3T	MTO		25	25	90	32					Fig. 6	37,500
			32-W32-10-4T	MTO	4	32	32	102	40						33,900
		MEW	25-W25-15-2T	MTO	2	25	25	90	32	15	+10°	-22°	Yes	Fig. 6	35,000
			32-W32-15-3T	MTO	3	32	32	102	40						30,000

Max. Revolution

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

● : Std. Item
MTO : Made to order

MEW Face Mill



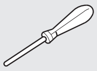
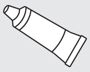
Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Weight (kg)	Max. Revolution (min^{-1})
				DC	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	A.R. (MAX.)	R.R.			
MEW	**032R-10-4T-M**	●	4	32	30	16	14	9	35	19	5.6	8.4	10	+7°	-20°	Yes	0.1	33,900
	040R-10-5T-M	●	5	40	34				40						-19°		0.2	30,000
	050R-10-5T-M	●		50	45	22	18	11		21	6.3	10.4					0.4	22,500
	063R-10-6T-M	●	6	63	47												0.5	20,500
MEW	**040R-15-4T-M**	●	4	40	34	16	14	9	40	19	5.6	8.4	15	+10°	-21°	Yes	0.2	25,000
	050R-15-4T-M	●		50	45	22	18	11		21	6.3	10.4					0.3	17,000
	063R-15-5T-M	●	5	63	47												0.5	14,500
	080R-15-6T-M	●	6	80	60	27	20	13	50	25	7	12.4			-20°		1.0	12,000
	080R-15-6T	●				25.4				27	6	9.5					1.0	12,000

■ Max. Revolution

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Spare Parts and Applicable Inserts (end mill / face mill)

Description		Spare Parts				Applicable Inserts ➡ **M16**			
		Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt	 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)	 Non-ferrous Metals
									
MEW	**…-10-_T**	SB-3065TRP	DTPM-8	P-37	-	LOMU10…-GM	LOMU10…-SM	LOMU10…-GH	LOGT10…-AM
MEW	**032R-10_-M**	Recommended tightening torque for Insert Clamp 1.2N·m			HH8X25				
	040R-10_-M								
	050R-10_-M				HH10X30				
	063R-10_-M								
MEW	**…-15-_T**	SB-4090TRP	DTPM-15	P-37	-	LOMU15…-GM	LOMU15…-SM	LOMU15…-GH	LOGT15…-AM
MEW	**040R-15_-M**	Recommended tightening torque for Insert Clamp 3.5N·m			HH8X25				
	050R-15_-M				HH10X30				
	063R-15_-M								
	080R-15_(-M)				HH12X35				

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➡ **M62**

About wrench specifications

Wrenches and clamp screws are “Torx Plus”.

(1) Ref. to Fig. 1 for “Torx Plus” Wrench. (Purple grip)

(2) Ref. to Fig. 2 for “Torx” Wrench. (Black grip)

A “Torx Plus” Wrench and a “Torx” Wrench have different top shapes.

Please use a “Torx Plus” Wrench.

* If a “Torx” Wrench is used to tighten, the screw head might become damaged and then the screw cannot be removed.

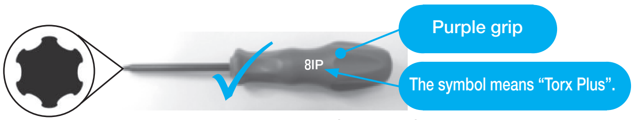


Fig. 1 “Torx Plus” Wrench (For MEW)

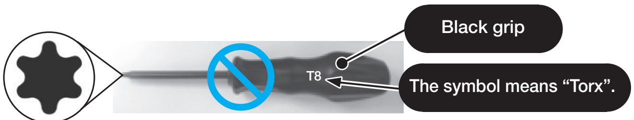
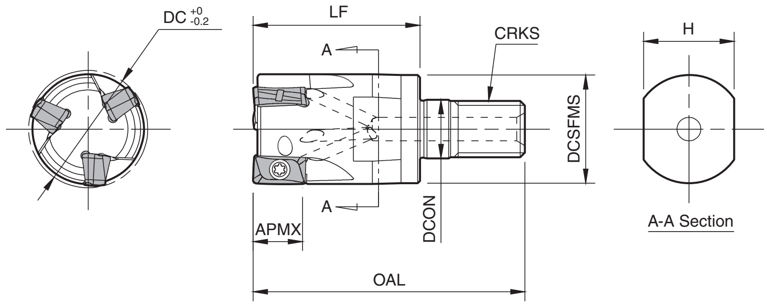


Fig. 2 “Torx” Wrench (Do NOT use it for MEW)

● : Std. Item

MEW Modular type

MEW Head



Dimensions

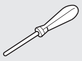
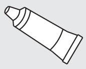
Description	Stock	No. of Inserts	Dimension (mm)								Rake Angle		Coolant Hole	Applicable Inserts ➔M16	Max. Revolution (min^{-1})
			DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX	A.R. (MAX.)	R.R.			
MEW 16-M08-10-2T	●	2	16	14.7	8.5	42	25	M8×P1.25	12	10	+7°	-22°	Yes	LOMU1004	43,750
20-M10-10-2T	●		20	18.7	10.5	48	30	M10×P1.5	15			-20°			41,000
20-M10-10-3T	●	3													41,000
25-M12-10-3T	●		25	23	12.5	56	35	M12×P1.75	19						37,500
32-M16-10-4T	●	4	32	30	17	62	40	M16×P2.0	24						33,900
MEW 25-M12-15-2T	●	2	25	23	12.5	56	35	M12×P1.75	19	15	+10°	-22°	Yes	LOMU1505	35,000
32-M16-15-3T	●	3	32	30	17	62	40	M16×P2.0	24						30,000

■ **Max. Revolution**

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

See page ➔ **M60** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

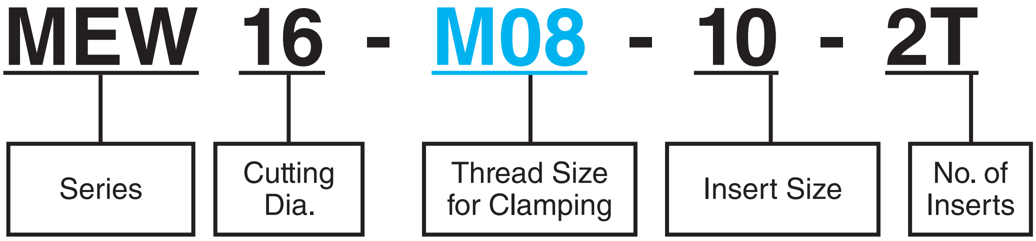
Spare Parts and Applicable Inserts

Description	Spare Parts			Applicable Inserts ➔ **M16**			
	Clamp Screw	Wrench	Anti-seize Compound	 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)	 Non-ferrous Metals
							
MEW 16-M08-10-2T **20-M10-10-2T** **20-M10-10-3T** **25-M12-10-3T** **32-M16-10-4T**	SB-3065TRP Recommended tightening torque for Insert Clamp 1.2N·m	DTPM-8	P-37	LOMU10…-GM	LOMU10…-SM	LOMU10…-GH	LOGT10…-AM
MEW 25-M12-15-2T **32-M16-15-3T**	SB-4090TRP Recommended tightening torque for Insert Clamp 3.5N·m	DTPM-15	P-37	LOMU15…-GM	LOMU15…-SM	LOMU15…-GH	LOGT15…-AM

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➔ **M62**

Modular End Mill Head Identification System

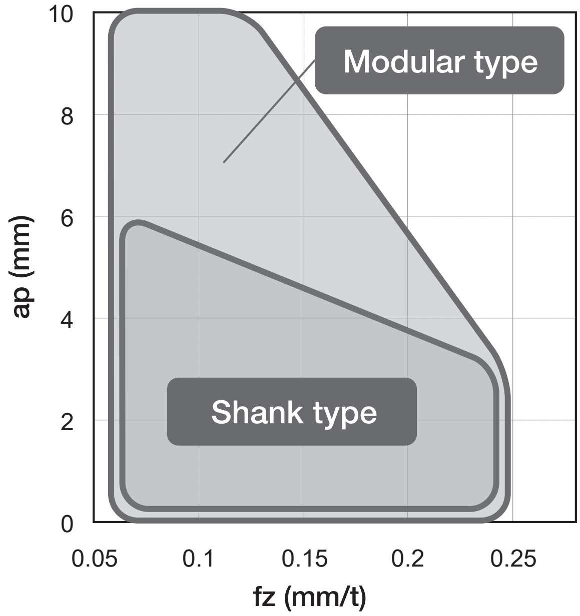


● : Std. Item

M
Milling
Insert
Lead Angle 45°~20°
Lead Angle 15°
Lead Angle 0°/2°
High Feed Cutter
Cutter for Finishing
Multi-Function
Slot Mill
Ball-nose Radius
Others

Feature of Modular type

● Applicable to a wide range of applications



<Cutting Conditions>

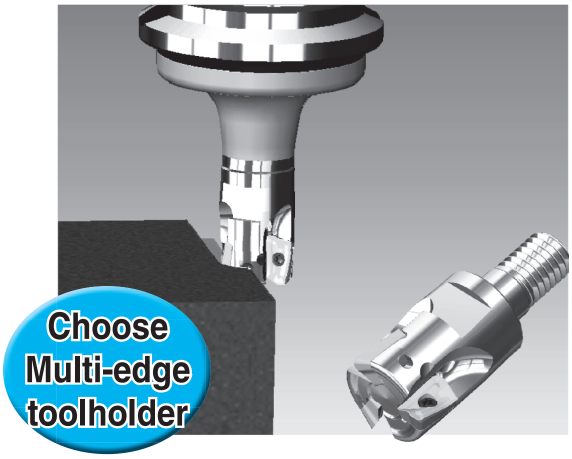
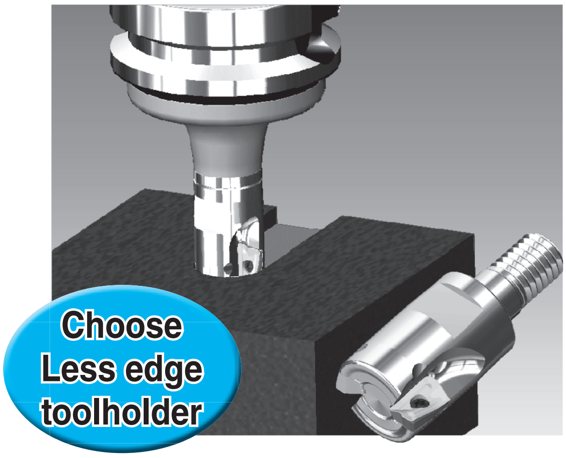
· Cutting Speed : Vc=150m/min (n=2,390min^{-1})
· Width of Cut : ae=10mm (Shouldering)
· Workpiece Material : S55C
· **Machine : BT30 M/C**

<Cutting Tool>

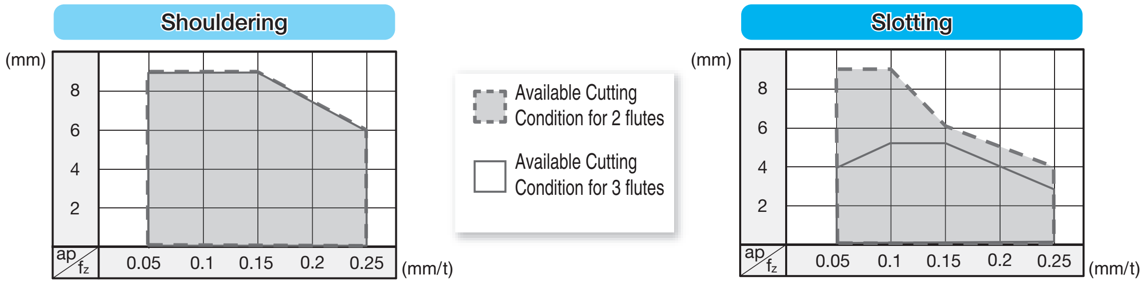
· Modular type
  Head : MEW20-M10-10-3T
  Arbor : BT30K-M10-45
  Insert : LOMU100408ER-GM (PR1525)
· Shank type
  Toolholder : MEW20-S20-10-3T
  Arbor : BT30 Milling Chuck (Double-face clamping)
  Insert : LOMU100408ER-GM (PR1525)

A wide range of applications even in BT30 M/C with the superior anti-chattering performance

● How to select Multi-edge or Less edge toolholder

Shouldering (ae=10mm)	**Slotting**
	

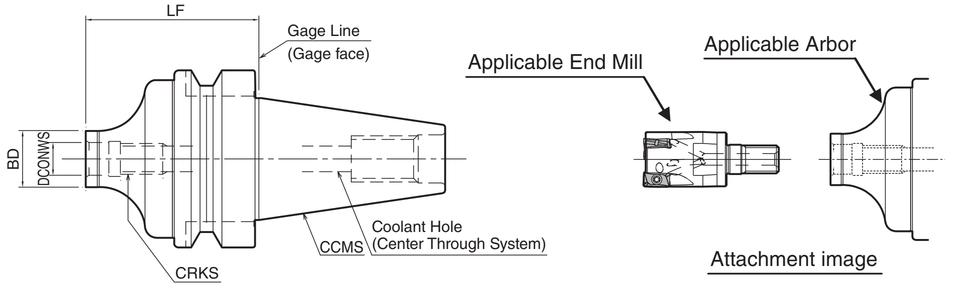
· Available Cutting Condition of Modular type



Choose Multi-edge toolholder for shouldering; higher efficiency in machining by higher feed rate.
For grooving, choose less edge toolholder to lower cutting force.

BT Arbor for Modular End Mill

BT Arbor (for exchangeable head / double-face clamping spindle)

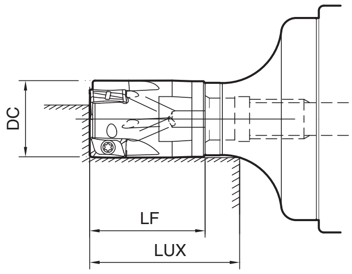


Dimensions

Description		Stock	Dimension (mm)				Coolant Hole	Arbor (Double-face clamping)	Applicable End Mill (Head) ➡ **M58(MEW), M67(MEC)** **M154(MFH Harrier)** **M159(MFH Mini)** **M165(MFH Micro)** **M217(MRX)**
			LF	BD	DCONWS	CRKS		CCMS	
BT30K-	**M08-45**	●	45	14.7	8.5	M8×P1.25	Yes	BT30	(MEW/MEC/MFH/MRX)..-M08-..
	M10-45	●		18.7	10.5	M10×P1.5			(MEW/MEC/MFH/MRX)..-M10-..
	M12-45	●		23	12.5	M12×P1.75			(MEW/MEC/MFH/MRX)..-M12-..
BT40K-	**M08-55**	●	55	14.7	8.5	M8×P1.25	Yes	BT40	(MEW/MEC/MFH/MRX)..-M08-..
	M10-60	●	60	18.7	10.5	M10×P1.5			(MEW/MEC/MFH/MRX)..-M10-..
	M12-55	●	55	23	12.5	M12×P1.75			(MEW/MEC/MFH/MRX)..-M12-..
	M16-65	●	65	30	17	M16×P2.0			(MEW/MEC/MFH/MRX)..-M16-..

· When using with MEV, see page **M82**.

Actual End Mill depth (See page **M165** for **MFH Micro**)



Arbor Description		Applicable End Mill (Head)			Actual End Mill depth (mm)
		Description	Cutting Dia. (mm)	Dimension (mm)	
			DC	LF	LUX
BT30K-	**M08-45**	...16-M08-...	16	25	31.8
		...17-M08-...	17		33.2
		...18-M08-...	18		34.2
	M10-45	...20-M10-...	20	30	36.8
		...22-M10-...	22		39.2
	M12-45	...25-M12-...	25	35	42.8
		...28-M12-...	28		45.5
BT40K-	**M08-55**	...16-M08-...	16	25	31.7
		...17-M08-...	17		33.2
		...18-M08-...	18		34.3
	M10-60	...20-M10-...	20	30	38.7
		...22-M10-...	22		44.5
	M12-55	...25-M12-...	25	35	44.6
		...28-M12-...	28		47.6
	M16-65	...32-M16-...	32	40	51.2
		...35-M16-...	35		60.2
		...40-M16-...	40		64

● : Std. Item

Arbor Identification System

BT30	K	-	M08	-	45
Arbor Size	Double-face clamping spindle		Thread Size for Clamping		Length from Gauge Line

How to Attach Head

(1) When clamping the head on the arbor, make sure there is no dust or chips inside (Fig. 1).
Do NOT put lubricant on the clamping portion.

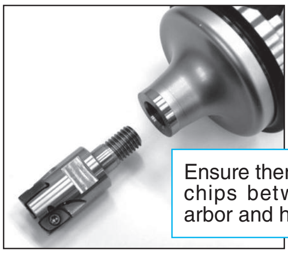

Ensure there are NO chips between the arbor and head

Fig. 1

(2) Attach the head on the arbor and fix it using the wrench (Fig. 2).
Ref. to the Table 1 for Recommended tightening torque.
Note) The wrench is NOT included in the products.

Table 1 Recommended Head Tightening Torque

Thread Size for Clamping	Wrench Double width [mm]	Recommended tightening torque [N · m]
M8	12	23
M10	15	46
M12	19	80
M16	24	90


Ref. to the Table 1 for the wrench size and recommended tightening torque

Fig. 2

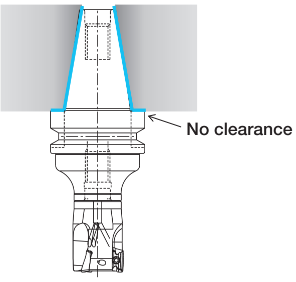
(3) Confirm that the head is fixed firmly on the arbor. (Fig. 3)


No clearance in between

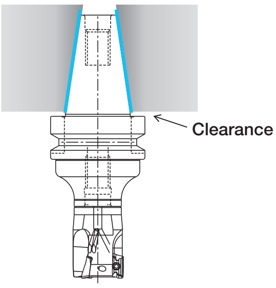
Fig. 3

Frequently Asked Question

Q : Can the double-face clamping arbor be mounted on a general BT spindle?
A : Yes. It can be used as a general BT arbor with a general BT spindle.



Double-face clamping arbor mounted on double-face clamping spindle



Double-face clamping arbor mounted on general spindle

It can be used as a general BT arbor, though the advantage of the double-face clamping will not be shown.

How to mount an insert

1. Be sure to remove dust and chips from the insert mounting pocket.
2. Clamp Screw
   (1) Apply anti-seize compound on portion of taper and thread of clamp screw.
   (2) Attach the screw (magnetic head) to the front end of the wrench. While lightly pressing the insert against the constraint surfaces, put the screw into the hole of the insert and tighten. (Ref. to Fig. 1) Tighten M3 screws (SB-3065TRP) slightly inclined from the insert surface. (Ref. to Fig. 2)
3. When tightening the screw, make sure that the wrench is parallel to the screw. Recommended tightening torque, see page ➡ **M57**, **M58**.
4. After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the toolholder or between the insert side surfaces and the constraint surface of the toolholder. If there is any clearance, remove the insert and mount it again according to the above steps.

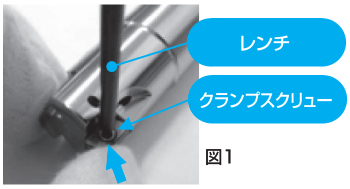


図1

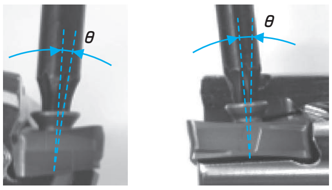


図2

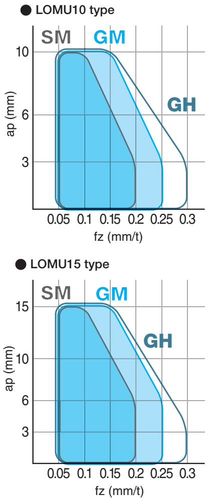
Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t) Toolholder Description MEW16~MEW18	fz (mm/t) Toolholder Description MEW20~MEW40 MEW040R~MEW080R	Recommended Insert Grades (Cutting Speed Vc: m/min) MEGACOAT (PVD Coated Carbide) PR1535	PR1525	PR1510	PR015S	CVD Coated Carbide CA6535
GM	Carbon Steel	0.06~**0.1**~0.2	0.08~**0.15**~0.25	☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.06~**0.1**~0.14	0.08~**0.15**~0.2	☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel	0.06~**0.08**~0.12	0.08~**0.12**~0.2	☆ 80~**140**~180	★ 80~**140**~180	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.08**~0.12	0.08~**0.12**~0.15	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.08**~0.12	0.08~**0.12**~0.2	☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.12	0.08~**0.12**~0.2	★ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.06~**0.1**~0.17	0.08~**0.18**~0.25	-	-	★ 120~**180**~250	-	-
	Nodular Cast Iron	0.06~**0.08**~0.12	0.08~**0.15**~0.2	-	-	★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.12	0.08~**0.12**~0.15	☆ 20~**30**~50	-	-	-	★ 20~**30**~50
	Titanium Alloys	0.06~**0.08**~0.12	0.08~**0.15**~0.2	☆ 40~**60**~80	-	☆ 30~**50**~70	-	-
SM	Carbon Steel	0.06~**0.1**~0.17	0.08~**0.15**~0.2	☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.06~**0.08**~0.12	0.08~**0.12**~0.18	☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel	0.06~**0.08**~0.12	0.08~**0.1**~0.15	☆ 80~**140**~180	★ 80~**140**~180	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.08**~0.12	0.08~**0.1**~0.15	★ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.08**~0.12	0.08~**0.1**~0.15	☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.12	0.08~**0.1**~0.15	☆ 90~**120**~150	-	-	-	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.1	0.08~**0.1**~0.12	☆ 20~**30**~50	-	-	-	★ 20~**30**~50
	Titanium Alloys	0.06~**0.08**~0.12	0.08~**0.12**~0.15	★ 40~**60**~80	-	☆ 30~**50**~70	-	-
GH	Carbon Steel	0.06~**0.1**~0.2	0.08~**0.2**~0.3	☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.06~**0.1**~0.14	0.08~**0.2**~0.25	☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel	0.06~**0.08**~0.12	0.08~**0.15**~0.22	☆ 80~**140**~180	★ 80~**140**~180	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.08**~0.12	0.08~**0.12**~0.15	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.08**~0.12	0.08~**0.12**~0.2	☆ 150~**200**~250	-	-	-	☆ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.12	0.08~**0.12**~0.2	☆ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.06~**0.1**~0.2	0.08~**0.22**~0.3	-	-	☆ 120~**180**~250	-	-
	Nodular Cast Iron	0.06~**0.08**~0.15	0.08~**0.18**~0.25	-	-	☆ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.12	0.08~**0.12**~0.15	☆ 20~**30**~50	-	-	-	☆ 20~**30**~50
	Titanium Alloys	0.06~**0.08**~0.12	0.08~**0.15**~0.2	☆ 40~**60**~80	-	☆ 30~**50**~70	-	-
	Hard Materials (60HRC or less)	0.06~**0.08**~0.12	0.08~**0.15**~0.22	-	-	-	★ 60~**80**~100	-

Chipbreaker	Workpiece Material	fz (mm/t) Toolholder Description MEW16~MEW18	fz (mm/t) Toolholder Description MEW20~MEW40 MEW040R~MEW080R	Recommended Insert Grades (Cutting Speed Vc: m/min) DLC Coated Carbide PDL025	Carbide GW25
AM	Aluminum Alloys	0.06~**0.1**~0.2	0.08~**0.15**~0.25	★ 200~**600**~900	☆ 200~**500**~800

★ : 1st Recommendation
☆ : 2nd Recommendation

Applicable Chipbreaker Range (Shouldering)



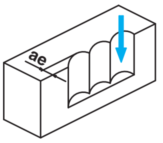
<Cutting Conditions>
Vc=150m/min ae=DC/2mm Workpiece Material : S50C

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

Ramping, Helical milling and Vertical milling (Plunging)

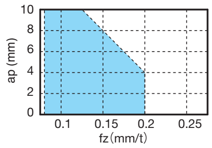
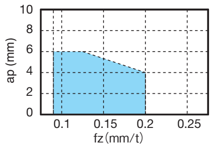
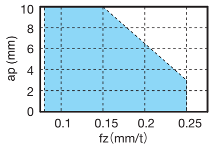
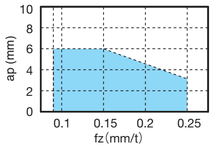
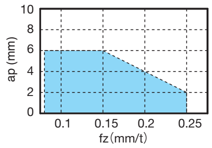
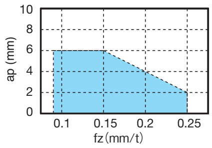
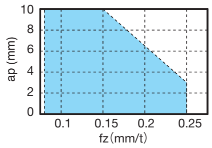
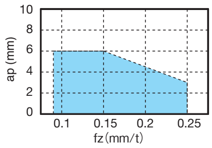
1. Available for vertical milling (plunging).
2. NOT available for ramping and helical milling, because interference between workpiece and insert may occur.

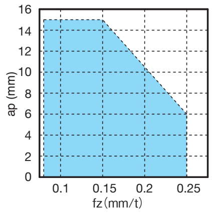
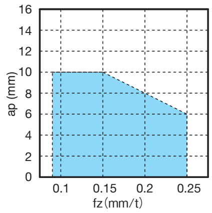
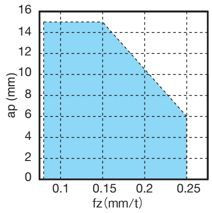
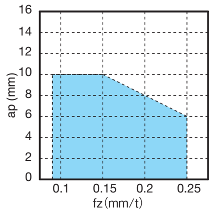
Vertical Milling (Plunging)



Insert Description	Max. Width of Cut (ae)
LOMU10 type	5mm
LOMU15 type	7mm

Cutting Performance

Description	Shouldering (Cutting width ae = DC/2)	Slotting
MEW16...-10 **MEW18...-10**		
MEW20...-10 ~ **MEW50...-10**		
MEW20-S20 **-10-150-2T** **MEW25-S25** **-10-170-2T** (Long Shank)		
MEW032R... **-10** ~ **MEW063R...** **-10**		

Description	Shouldering (Cutting width ae = DC/2)	Slotting
MEW25...-15 ~ **MEW50...-15**		
MEW040R... **-15** ~ **MEW080R...** **-15**		

<Cutting Conditions>
- Vc=180m/min
- GM Chipbreaker
- Workpiece Material : S50C
- Overhang Length
  1. End mill : Same length as LH of the dimension
  2. Face mill : LF of the dimension + minimum overhang length of the arbor

Case Studies

SS400

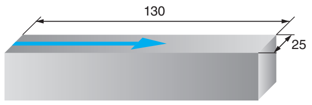
- Construction machine part
- Vc=250m/min
- apxae=4x20mm
- fz=0.14mm/t (Vf=1,350mm/min)
- Wet
- MEW32-S32-10-4T (4 Flutes)
- LOMU100408ER-GM (PR1525)

PR1525	Chip Evacuation Rate =108cc/min
Competitor A (Positive Cutter)	Chip Evacuation Rate = 72cc/min

MEW showed stable milling without chattering at higher feed, improving the machining efficiency by 150%.
Burrs are prevented and excellent surface finish is achieved. (User Evaluation)

15-5PH (42HRC)

- Aircraft Part
- Vc=180m/min
- apxae=2x25mm
- fz=0.1mm/t (Vf=716mm/min)
- Wet
- MEW32-S32-10-4T (4 Flutes)
- LOMU100408ER-GM (PR1525)



PR1525	Chip Evacuation Rate = 35.8cc/min (Further Machining Possible)
Competitor B (Positive Cutter)	Chip Evacuation Rate = 26.8cc/min (Unable to continue machining)

No chattering and more stable milling is possible with MEW.
Despite the milling difficulty because of the properties of the material (42HRC), PR1525 kept good cutting edge form, minimizing wear and adhesion. (User Evaluation)

Shouldering Slotting Facing

MEC End Mill


(Cylindrical)

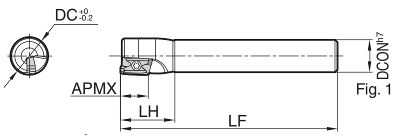


Fig. 1

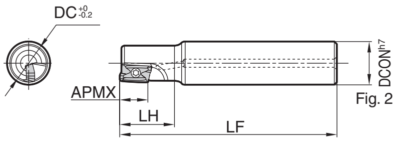


Fig. 2

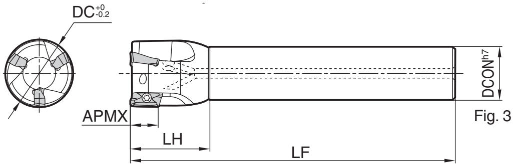


Fig. 3

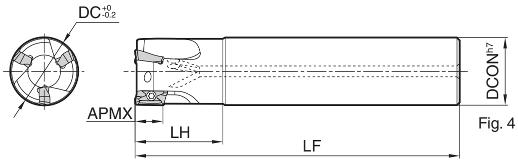


Fig. 4

Toolholder Dimensions

Description				Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts		Max. Revolution (min^{-1})
						DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	
Cylindrical	Standard Shank	MEC	10-S10-11	●	1	10	10	80	17	10	+10°	-24°	No	Fig. 1	SB-2545TR	DTM-8	54,800
			10-S16-11	●			16						Yes	Fig. 2			
			12-S10-11	●		12	10		20		+12°	-21°	No	Fig. 1			50,800
			12-S12-11	●			12										
			12-S16-11	●			16						Yes	Fig. 2			
			13-S12-11	●		13	12					-19°	No	Fig. 1			49,200
			14-S12-11	●		14											47,700
			14-S16-11	●			16						Yes	Fig. 2			
		MEC	16-S12-11T	●	2	16	12	100	23	10	+18°	-14°	No	Fig. 1	SB-2555TRG	DTM-8	43,750
			17-S16-11T	●		17	16					-13°	Yes	Fig. 3			43,500
			18-S16-11T	●		18					+19°						43,000
			19-S16-11T	●	3	19		110	26		+20°	-10°					42,000
			20-S16-11T	●		20											41,000
			21-S20-11T	●		21	20					-9°					40,300
			22-S20-11T	●		22					+21°	-10°					39,600
			24-S20-11T	●		24		120	29								38,200
			25-S20-11T	●		25											37,500
			25-S20-11T-4	●	4												
			28-S25-11T	●	3	28	25				+22°	-9°					35,800
			30-S25-11T	●	4	30		130	32		+23°						34,800
			32-S25-11T	●		32											33,900
			32-S25-11T-5	●	5												
			40-S32-11T	●		40	32	150	50			-8°					30,000
			50-S32-11T	●		50						-7°					22,500
	Same Shank	MEC	16-S16-11T	●	2	16	16	100	30	10	+18°	-14°	Yes	Fig. 4	SB-2555TRG	DTM-8	43,750
			20-S20-11T	●	3	20	20	110			+20°	-10°					41,000
			25-S25-11T	●		25	25	120	32		+21°						37,500
			25-S25-11T-4	●	4												
			32-S32-11T	●		32	32	130	40		+23°	-9°					33,900
			32-S32-11T-5	●	5												
	Long Shank	MEC	20-S18-170-11T	●	2	20	18	170	30	10	+20°	-10°	Yes	Fig. 3	SB-2555TRG	DTM-8	41,000
			20-S20-140-11T	●			20	140	60					Fig. 4			
			20-S20-170-11T	●				170									
			22-S20-170-11T	●		22			30		+21°			Fig. 3			39,600
			25-S23-210-11T	●		25	23	210	32								37,500
			25-S25-160-11T	●			25	160	60					Fig. 4			
			25-S25-210-11T	●				210									
			28-S25-210-11T	●		28			32		+22°	-9°		Fig. 3			35,800
			32-S30-250-11T	●		32	30	250	40		+23°						33,900
			32-S32-200-11T	●			32	200	65					Fig. 4			
			32-S32-250-11T	●				250									
			35-S32-250-11T	●		35			40					Fig. 3			32,600
			40-S32-240-11T	●		40		240	65			-8°					30,000

Coat Anti-seize Compound(P-37) thinly on portion of taper and thread when insert is fixed.

Max. Revolution

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

For more details, see "Warning" on page **M69**.

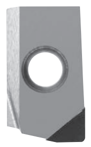
● : Std. Item

Toolholder Dimensions

Description				Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts		Max. Revolution (min^{-1})
						DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	
Cylindrical	Long Shank	MEC	20-S20-150-11T-3	●	3	20	20	150	60	10	+20°	-10°	Yes	Fig. 4	SB-2555TRG	DTM-8	41,000
			25-S25-170-11T-3	●		25	25	170			+21°						37,500
			25-S25-170-11T-4	●	4												
			30-S25-180-11T-3	●	3	30		180	32		+23°	-9°		Fig. 3			34,800
			32-S32-200-11T-3	●		32	32	200	65					Fig. 4			33,900
			32-S32-200-11T-4	●	4												
			32-S32-200-11T-5	●	5												
	Standard	MEC	25-S20-17	●	2	25	20	120	36	15.7	+16°	-11°	Yes	Fig. 3	SB-4070TRN	DTM-15	35,000
			32-S25-17	●	3	32	25	130	40		+17°	-7°					30,000
			40-S32-17	●	4	40	32	150	50		+19°						25,000
			50-S32-17	●		50											17,000
	Same Shank	MEC	25-S25-17	●	2	25	25	120	36	15.7	+16°	-11°	Yes	Fig. 4	SB-4070TRN	DTM-15	35,000
			32-S32-17	●	3	32	32	130	40		+17°	-7°					30,000
	Long Shank	MEC	25-S25-160-17	●	2	25	25	160	60	15.7	+16°	-11°	Yes	Fig. 4	SB-4070TRN	DTM-15	35,000
			25-S25-210-17	●				210									
			28-S25-210-17	●		28			36					Fig. 3			32,500
			32-S32-200-17	●		32	32	200	65		+17°	-7°		Fig. 4			30,000
			32-S32-250-17	●				250									
			35-S32-250-17	●		35			40					Fig. 3			27,700
			40-S32-240-17	●		40		240	65		+19°						25,000
		MEC	32-S32-250-17-3	●	3	32	32	250	65	15.7	+17°	-7°	Yes	Fig. 4	SB-4070TRN	DTM-15	30,000
			40-S32-250-17-3	●		40					+19°			Fig. 3			25,000
			40-S32-250-17-4	●	4												
			50-S42-250-17-4	●		50	42		64			-6°					17,000

Coat Anti-seize Compound(P-37) thinly on portion of taper and thread when insert is fixed.

Applicable Inserts

Description	Applicable Inserts ➡ **M22, M23**			Applicable Inserts ➡ **M29**	
					
MEC....-11 **MEC....-1103**	BDMT 1103○○ER-JT	BDMT 1103○○ER-JS	-	-	-
MEC....-11T **MEC....-11T03**	BDMT 11T3○○ER-JT	BDMT 11T3○○ER-JS	BDGT 11T3○○FR-JA	BDGT 11T3○○FR(-LE)	BDMT 11T3○○FR
MEC....-17 **MEC....-1704**	BDMT 1704○○ER-JT	BDMT 1704○○ER-JS	BDGT 1704○○FR-JA	-	BDMT 1704○○FR

Recommended Cutting Conditions ➡ **M68, M69**

● : Std. Item

A Insert Grades
B Turning Indexable Inserts
C CBN & PCD Tools
D External
E Small Parts Machining
F Boring
G Grooving
H Cut-off
J Threading
K Drilling
L Solid Tools
M Milling
N Tools for Turning Mill
P Spare Parts
R Technical Information
T Index

MEC

Shouldering Slotting Facing

MEC Face Mill

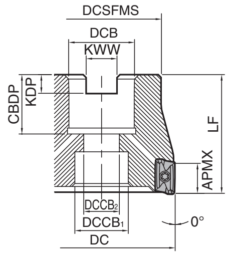


Fig.1

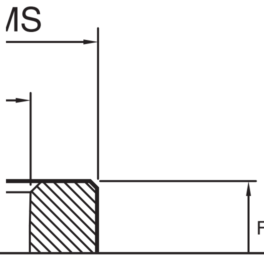
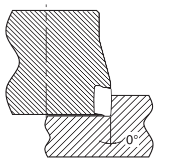


Fig.2

Rake Angle
11 type A.R.(MAX): +23° R.R. : -7°
17 type A.R.(MAX): +19° R.R. : -7°



Toolholder Dimensions

Description				Stock	No. of Inserts	Dimension (mm)										Coolant Hole	Drawing	Weight (kg)	Spare Parts		Max. Revolution (min^{-1})
						DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX				Clamp Screw	Wrench	
Metric	Coarse pitch	**MEC**	**040R-11-5T-M**	●	5	40	34	16	14	8.5	40	20	5.5	8.5	10	Yes	Fig.1	0.2	SB-2555TRG	DTM-8	30,000
			050R-11-5T-M	●	5	50	40	22	18	12		22	6.3	10.4				0.3			22,500
			063R-11-6T-M	●	6	63												0.7			20,500
			080R-11-7T-M	●	7	80	52.5	27	20	14	50	26	7	12.4				1.0			18,500
			100R-11-9T-MN	●	9	100	65	32	26	17.6	55		8	14.4				1.6			17,000
			125R-11-11T-M	●	11	125	85	40	45	32	63	33	9.5	16.4				3.1			15,000
			160R-11-14T-M	●	14	160	110		68	-						No	Fig.2	4.5			13,900
	Fine pitch	**MEC**	**032R-11-5T-M**	●	5	32	30	16	11.5	8.5	35	20	5.6	8.4	10	Yes	Fig.1	0.1	SB-2555TRG	DTM-8	33,900
			040R-11-6T-M	●	6	40	34		14		40							0.2			30,000
			080R-11-10T-M	●	10	80	52.5	27	20	14	50	26.5	7	12.4				0.9			18,500
			100R-11-11T-M	●	11	100	65	32	26	17.6	55	34	8	14.4				1.7			17,000
	Coarse pitch	**MEC**	**040R-17-4T-M**	●	4	40	34	16	14	8.5	40	20	5.5	8.5	15.7	Yes	Fig.1	0.3	SB-4070TRN	DTM-15	25,000
			050R-17-4T-M	●	4	50	40	22	18	12		22	6.3	10.4				0.4			17,000
			063R-17-5T-M	●	5	63												0.6			14,500
			080R-17-6T-M	●	6	80	52.5	27	20	14	50	26	7	12.4				1.0			12,000
			100R-17-7T-MN	●	7	100	65	32	26	17.6	55		8	14.4				1.8			10,500
			125R-17-9T-M	●	9	125	85	40	45	32	63	33	9.5	16.4				3.1			8,900
			160R-17-12T-M	●	12	160	110		68	-						No	Fig.2	4.5			7,400
Bore Dia. Inch spec	Coarse pitch	**MEC**	**063R-11-6T**	●	6	63	40	25.4	20	14	50	26	6	9.5	10	Yes	Fig.1	0.8	SB-2555TRG	DTM-8	20,500
			080R-11-7T	●	7	80	52.5											1.0			18,500
			100R-11-9TN	●	9	100	65	31.75	26	17.6	63	32	8	12.7				1.8			17,000
			125R-11-11T	●	11	125	80	38.1	45	32		38	10	15.9				3.4			15,000
			160R-11-14T	●	14	160	100	50.8	70	-		47	10	19.1			Fig.2	4.4			13,900
	Fine pitch	**MEC**	**063R-11-8T**	●	8	63	40	25.4	20	14	50	26	6	9.5	10	Yes	Fig.1	0.8	SB-2555TRG	DTM-8	20,500
			080R-11-10T	●	10	80	52.5											1.0			18,500
	Coarse pitch	**MEC**	**063R-17-5T**	●	5	63	40	25.4	20	14	50	26	6	9.5	15.7	Yes		0.8	SB-4070TRN	DTM-15	14,500
			080R-17-6T	●	6	80	52.5											1.0			12,000
			100R-17-7TN	●	7	100	65	31.75	26	17.6	63	32	8	12.7				1.8			10,500
			125R-17-9T	●	9	125	80	38.1	45	32		38	10	15.9				3.4			8,900
			160R-17-12T	●	12	160	100	50.8	70	-		47	10	19.1			Fig.2	4.5			7,400
	Fine pitch	**MEC**	**063R-17-6T**	●	6	63	40	25.4	20	14	50	26	6	9.5	15.7	Yes	Fig.1	0.8	SB-4070TRN	DTM-15	14,500
			080R-17-8T	●	8	80	52.5											1.0			12,000
			100R-17-9TN	●	9	100	65	31.75	26	17.6	63	32	8	12.7				1.8			10,500

Coat Anti-seize Compound(P-37) thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➡ **M68, M69**

■ Max. Revolution

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
For more details, see "Warning" on page **M69**.

When using Center-through Air / Coolant / Mist

If Center Through air (Coolant, Mist) is used, please use appropriate arbor and clamp with mounting bolt. (Table1)

Table 1

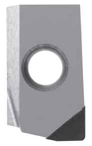
Description	Mounting bolt (Attachment)	Wrench
MEC032R·····-M	SP8X35	LW-5 (Double width 5mm)
MEC040R·····-M	HH8X25H	LW-5 (Double width 5mm)
MEC050R·····-M **MEC063R·····-M**	HH10X30H	LW-6 (Double width 6mm)
MEC063R···· **MEC080R····(-M)**	HH12X35H	LW-8 (Double width 8mm)
MEC100R····N/M	HH16X52H	LW-12 (Double width 12mm)
MEC125R····	HF20X53H	LW-14 (Double width 14mm)
MEC160R····	HF24X60H	LW-17 (Double width 17mm)

Wrench is not attached. Please purchase it separately.

For good shoulder finishes by MEC multistage ap.

In order to obtain smooth machining wall surface by multiple passes of MEC Milling Cutter, please keep ap 5.5mm or less for 11T3 type and also keep ap 9mm or less for 1704 type.

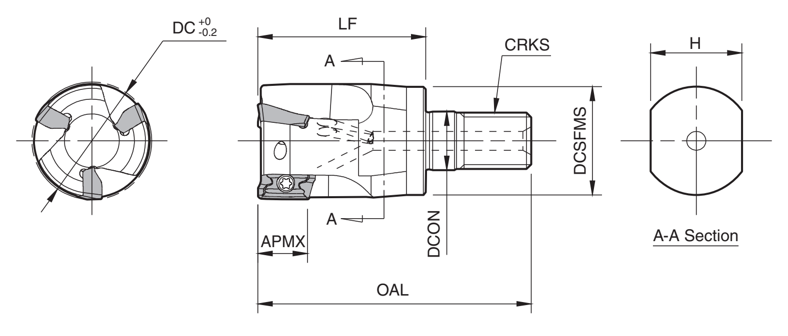
Applicable Inserts

Description	Applicable Inserts ➡ **M22, M23**			Applicable Inserts ➡ **M29**	
					
MEC..R-11	BDMT 11T3 ○○ ER-JT	BDMT 11T3 ○○ ER-JS	BDGT 11T3 ○○ FR-JA	BDGT 11T3 ○○ FR(-LE)	BDMT 11T3 ○○ FR
MEC..R-17	BDMT 1704 ○○ ER-JT	BDMT 1704 ○○ ER-JS	BDGT 1704 ○○ FR-JA	-	BDMT 1704 ○○ FR

● : Std. Item

MEC Modular type

MEC Head



Dimensions

Description		Stock	No. of Inserts	Dimension (mm)								Rake Angle		Coolant Hole		Max. Revolution (min^{-1})
				DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX	A.R. (MAX.)	R.R.			
MEC	**16-M08-11T-2T**	●	2	16	14.7	8.5	42	25	M8×P1.25	12	10	+18°	-14°	Yes	BDMT11T3 BDGT11T3	43,750
	20-M10-11T-2T	●	2	20	18.7	10.5	48	30	M10×P1.5	15		+20°	-10°			41,000
	20-M10-11T-3T	●	3	20	18.7	10.5	48	30	M10×P1.5	15		+20°	-10°			41,000
	25-M12-11T-3T	●	3	25	23	12.5	56	35	M12×P1.75	19		+21°	-10°			37,500
	32-M16-11T-4T	●	4	32	30	17	62	40	M16×P2.0	24		+23°	-9°			33,900
MEC	**25-M12-17-2T**	●	2	25	23	12.5	56	35	M12×P1.75	19	15.7	+16°	-11°	Yes	BDMT1704 BDGT1704	35,000
	32-M16-17-3T	●	3	32	30	17	62	40	M16×P2.0	24		+17°	-7°			30,000

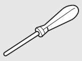
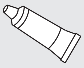
■ Max. Revolution

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Recommended Cutting Conditions ➡ **M68, M69**

See page ➡ **M60** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

Spare Parts

Description		Spare Parts		
		Clamp Screw	Wrench	Anti-seize Compound
				
MEC	**16-M08-11T-2T**	SB-2555TRG Recommended tightening torque for Insert Clamp 1.2N·m	DTM-8	P-37
	20-M10-11T-2T			
	20-M10-11T-3T			
	25-M12-11T-3T			
	32-M16-11T-4T			
MEC	**25-M12-17-2T**	SB-4070TRN Recommended tightening torque for Insert Clamp 3.5N·m	DTM-15	P-37
	32-M16-17-3T			

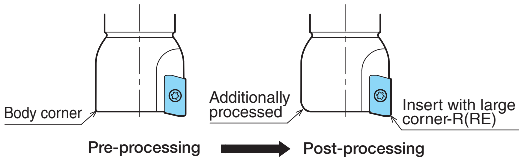
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

■ When using inserts with corner-R(RE) 1.6 or larger, additional modifications of the cutter body will be necessary.
Ref. to the chart below for the recommended modifications. (Additional grind off is not necessary when corner-R(RE) is 1.2mm or less.)

Insert Corner-R(RE) (mm)	Additional Processing Dimension to Body Corner (mm)
1.6	R1.0
2.0	
2.4	R1.2
3.1	R1.6
4.0	R2.5

* Round- shaped additional processing is recommended.
When applying chamfer shaped additional processing, do not cut away too much.



Recommended Cutting Conditions

· JT Chipbreaker

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)				
	Toolholder Description		Cermet	MEGACOAT NANO	MEGACOAT		CVD Coated Carbide
	MEC10~ MEC19	**MEC20~MEC40 MEC032R~MEC160R**	**TN100M**	**PR1535**	**PR1225**	**PR1210**	**CA6535**
Carbon Steel	0.06~**0.1**~0.15	0.08~**0.15**~0.25	☆ 120~**160**~200	☆ 120~**180**~250	★ 120~**180**~250	-	-
Alloy Steel	0.06~**0.1**~0.12	0.08~**0.15**~0.2	☆ 100~**140**~180	☆ 100~**160**~220	★ 100~**160**~220	-	-
Mold Steel	0.06~**0.08**~0.1	0.08~**0.12**~0.2	☆ 80~**120**~150	☆ 80~**140**~180	★ 80~**140**~180	-	-
Stainless Steel (Austenitic related)	0.06~**0.08**~0.1	0.08~**0.12**~0.15	-	☆ 100~**160**~200	☆ 100~**160**~200	-	-
Stainless Steel (Martensitic related)	0.06~**0.08**~0.1	0.08~**0.12**~0.2	-	☆ 150~**200**~250	-	-	★ 180~**240**~300
Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.1	0.08~**0.12**~0.2	-	★ 90~**120**~150	-	-	-
Gray Cast Iron	0.06~**0.1**~0.15	0.08~**0.18**~0.25	-	-	-	★ 120~**180**~250	-
Nodular Cast Iron	0.06~**0.08**~0.1	0.08~**0.15**~0.2	-	-	-	★ 100~**150**~200	-
Ni-base heat-resistant alloys	0.06~**0.08**~0.1	0.08~**0.12**~0.15	-	☆ 20~**30**~50	-	-	★ 20~**30**~50
Titanium Alloys	0.06~**0.08**~0.1	0.08~**0.15**~0.2	-	☆ 40~**60**~80	-	☆ 30~**50**~70	-

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

★ : 1st Recommendation
☆ : 2nd Recommendation

· JS Chipbreaker

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)			
	Toolholder Description		MEGACOAT NANO	MEGACOAT		CVD Coated Carbide
	MEC10~ MEC19	**MEC20~MEC40 MEC032R~MEC160R**	**PR1535**	**PR1225**	**PR1210**	**CA6535**
Carbon Steel	0.06~**0.1**~0.12	0.08~**0.15**~0.18	☆ 120~**180**~250	★ 120~**180**~250	-	-
Alloy Steel	0.06~**0.08**~0.1	0.08~**0.12**~0.15	☆ 100~**160**~220	★ 100~**160**~220	-	-
Mold Steel	0.06~**0.08**~0.1	0.08~**0.1**~0.12	☆ 80~**140**~180	★ 80~**140**~180	-	-
Stainless Steel (Austenitic related)	0.06~**0.08**~0.1	0.08~**0.1**~0.12	★ 100~**160**~200	☆ 100~**160**~200	-	-
Stainless Steel (Martensitic related)	0.06~**0.08**~0.1	0.08~**0.1**~0.12	☆ 150~**200**~250	-	-	★ 180~**240**~300
Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.1	0.08~**0.1**~0.12	☆ 90~**120**~150	-	-	-
Ni-base heat-resistant alloys	0.06~**0.08**~0.1	0.08~**0.1**~0.12	☆ 20~**30**~50	-	-	★ 20~**30**~50
Titanium Alloys	0.06~**0.08**~0.1	0.08~**0.1**~0.12	★ 40~**60**~80	-	-	-

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

★ : 1st Recommendation
☆ : 2nd Recommendation

· JA Chipbreaker

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)	
		DLC Coated Carbide	Carbide
		PDL025	**GW25**
Aluminum Alloys (Si 13% or less)	0.05~0.3	200~1,000	200~800
Aluminum Alloys (Si 13% and over)	0.05~0.2	200~300	200~300

· PCD

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)
		PCD
		KPD230 (KPD001)
Aluminum Alloys (Si 13% or less)	0.05~0.2	500~1,500
Aluminum Alloys (Si 13% and over)	0.05~0.15	300~1,000

⚠ Warning **Please observe below precautions fully. Failure to observe the precautions may cause serious damage to human body.**

Warning about Max. Revolution indicated on main body

1. Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter or the body may be damaged even under no load.
2. For actual practical revolution, please set within recommended cutting condition.
3. When using at a higher revolution (over 10,000min^{-1}), refer to the table to adjust the balance of MEC and suitable arbor.

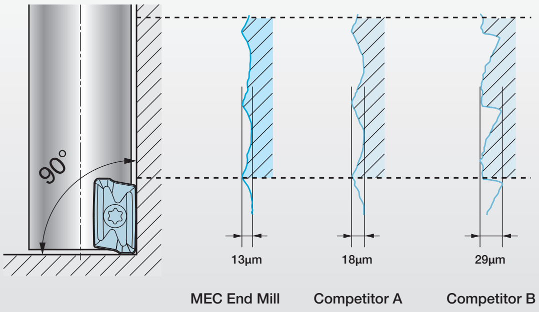
Revolution (min^{-1})	Balance quality grade G ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

MEC

Features of MEC

Good squareness

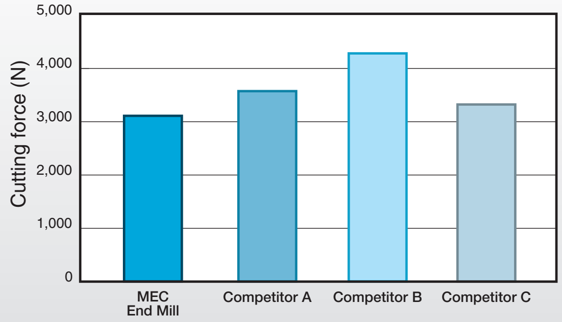
<Cutting Surface Comparison>



(Internal evaluation)

Low cutting force

<Cutting Force Comparison>

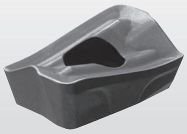


Tool Dia.ø20 S50C
Vc=100m/min Shouldering apxae=9x10mm
fz=0.2mm/t Dry

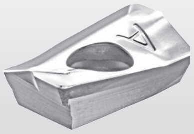
(Internal evaluation)

Chipbreaker

JT Chipbreaker (General purpose)

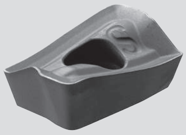


JA Chipbreaker (For Aluminum)



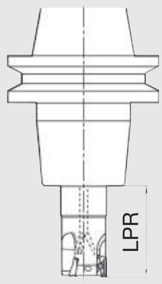
JS Chipbreaker (Low cutting force)

Cutting force 20% lower

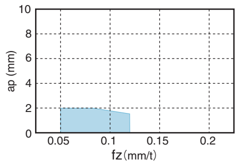
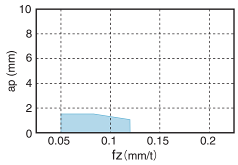
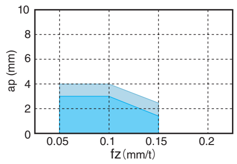
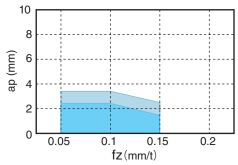
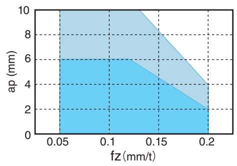
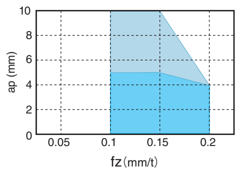
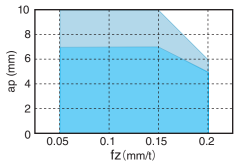
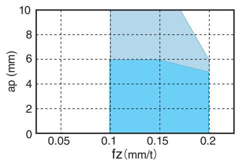
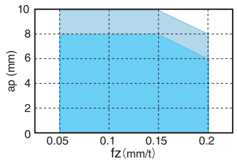
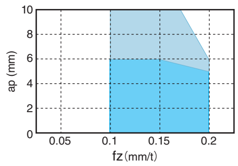
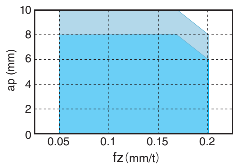
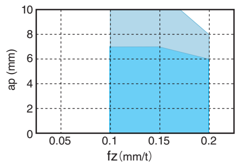


Cutting Performance of MEC End Mill

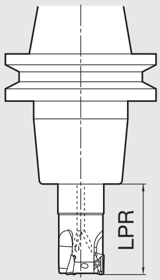
(1) Cutting edge length 10mm type (Standard / Same Shank with JT Chipbreaker)

Cutting Dia.	Description	Overhang Length LPR (mm)		Shape
ø10	**MEC10-S10-11**	17	-	
ø12	**MEC12-S16-11**	20	30	
ø16	**MEC16-S16-11T**	30	45	
ø20	**MEC20-S20-11T**	30	45	
ø25	**MEC25-S25-11T**	32	48	
ø32	**MEC32-S32-11T**	40	60	

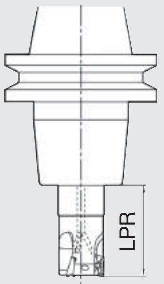
[Vc=120m/min Workpiece Material : S50C]

Description	■ Shouldering (Cutting width ae = DC/2)	■ Slotting ■ Ramping and Helical Milling
MEC10-S10-11		
MEC12-S16-11		
MEC16-S16-11T		
MEC20-S20-11T		
MEC25-S25-11T		
MEC32-S32-11T		

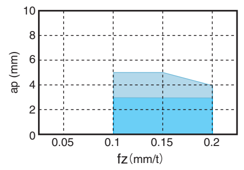
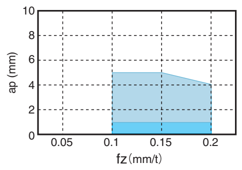
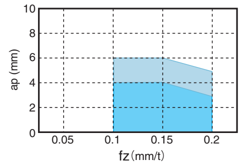
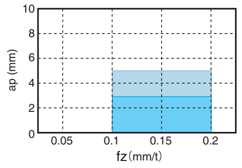
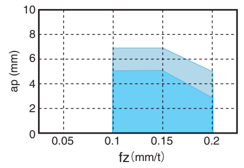
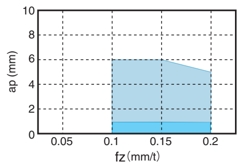
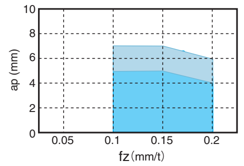
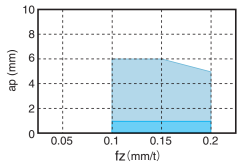
(2) Cutting edge length 10mm type (Long Shank with JT Chipbreaker)

Cutting Dia.	Description	Overhang Length LPR (mm)		Shape
ø20 Long Shank	**MEC20-S20-140-11T**	60	90	
ø25 Long Shank	**MEC25-S25-160-11T**	60	100	
ø32 Long Shank	**MEC32-S32-200-11T**	100	130	
ø40 Long Shank	**MEC40-S32-240-11T**	100	130	

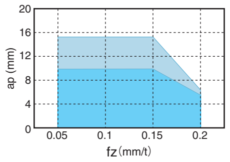
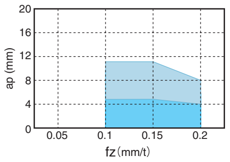
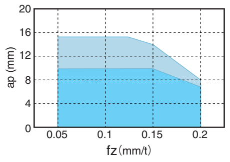
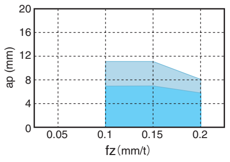
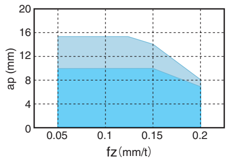
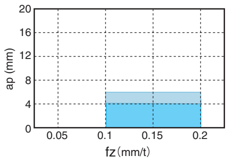
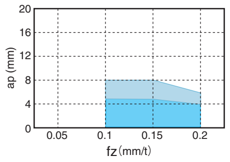
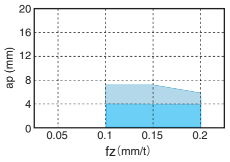
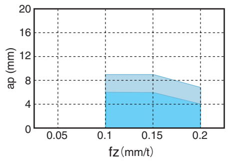
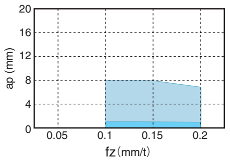
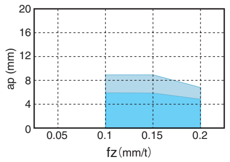
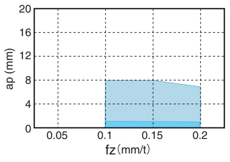
(3) Cutting edge length 15.7mm type (JT Chipbreaker)

Cutting Dia.	Description	Overhang Length LPR (mm)		Shape
ø25	**MEC25-S25-17**	36	54	
ø32	**MEC32-S32-17**	40	60	
ø40	**MEC40-S32-17**	50	75	
ø25 Long Shank	**MEC25-S25-160-17**	60	100	
ø32 Long Shank	**MEC32-S32-200-17**	100	130	
ø40 Long Shank	**MEC40-S32-240-17**	100	130	

[Vc=120m/min Workpiece Material : S50C]

Description	■ Shouldering (Cutting width ae = DC/2)	■ Slotting ■ Ramping and Helical Milling
MEC20 -S20-140-11T Long Shank		
MEC25 -S25-160-11T Long Shank		
MEC32 -S32-200-11T Long Shank		
MEC40 -S32-240-11T Long Shank		

[Vc=120m/min Workpiece Material : S50C]

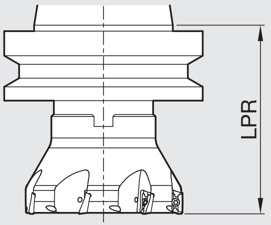
Description	■ Shouldering (Cutting width ae = DC/2)	■ Slotting ■ Ramping and Helical Milling
MEC25-S25-17		
MEC32-S32-17		
MEC40-S32-17		
MEC25 -S25-160-17 Long Shank		
MEC32 -S32-200-17 Long Shank		
MEC40 -S32-240-17 Long Shank		

Cutting Performance of MEC Face Mill

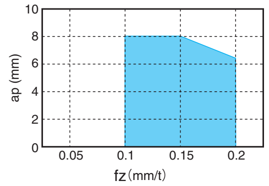
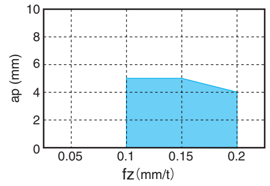
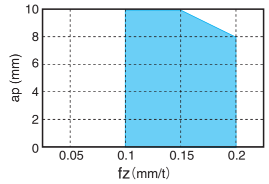
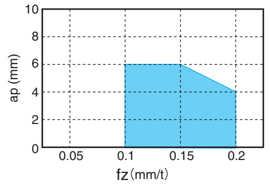
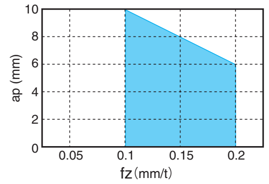
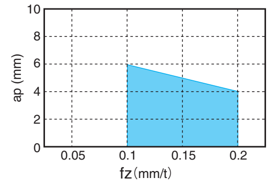
Cutting edge length 10 mm type (JT Chipbreaker)

Cutting Dia.	Description	Overhang Length LPR (mm)
ø32	**MEC032M-11-5T-M**	110
ø40	**MEC040R-11-◯T-M**	115
ø50	**MEC050R-11-◯T-M**	100
ø63	**MEC063R-11-◯T**	95
	MEC063R-11-◯T-M	
ø80	**MEC080R-11-◯T**	95
ø100	**MEC100R-11-9TN**	108
ø125	**MEC125R-11-11T**	

Shape



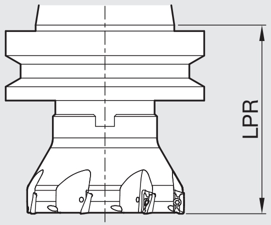
[Vc=120m/min Workpiece Material : S50C]

Description	■ Shouldering (Cutting width ae = DC/2)	■ Slotting
MEC040R -11-◯T-M		
MEC050R -11-◯T-M ~ MEC100R -11-9TN		
MEC125R -11-11T		

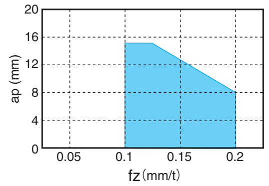
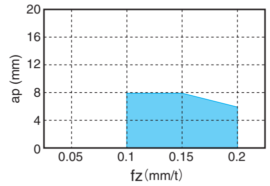
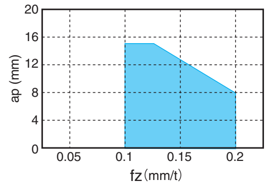
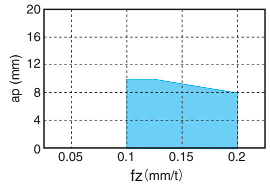
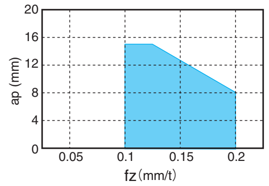
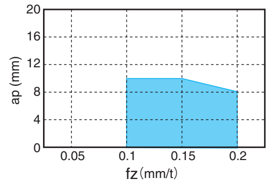
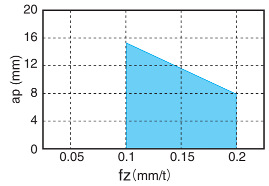
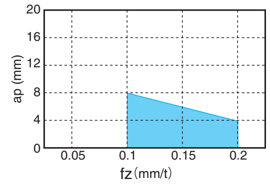
Cutting edge length 15.7mm type (JT Chipbreaker)

Cutting Dia.	Description	Overhang Length LPR (mm)
ø40	**MEC040R-17-4T-M**	115
ø50	**MEC050R-17-◯T-M**	100
ø63	**MEC063R-17-◯T**	95
	MEC063R-17-◯T-M	
ø80	**MEC080R-17-◯T**	95
ø100	**MEC100R-17-◯TN**	108
ø125	**MEC125R-17-9T**	

Shape



[Vc=120m/min Workpiece Material : S50C]

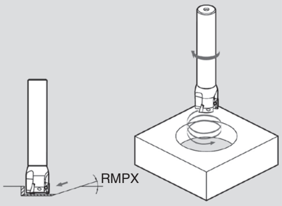
Description	■ Shouldering (Cutting width ae = DC/2)	■ Slotting
MEC040R -17-4T-M		
MEC050R -17-◯T-M		
MEC063R -17-◯T(-M) ~ MEC100R -17-◯TN		
MEC125R -17-9T		

M
Milling
Insert
Lead Angle 45°~20°
Lead Angle 15°
Lead Angle 0°/2°
High Feed Cutter
Cutter for Finishing
Multi-Function
Slot Mill
Ball-nose Radius
Others

Ramping, Helical milling and Vertical milling (Plunging)

Ramping / Helical Milling

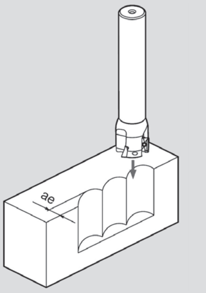
- Ramping angle is recommended under RMPX.
- Refer to each tool's cutting performance list for sinking depth per revolution when helical milling. Use compressed air when during machining.



Cutting Dia.	Applicable Inserts	Max. ramping angle (RMPX)
ø16~ø18	BDMT11T3 type BDGT11T3 type	3°
ø19~ø21		5°
ø22~ø25		2.5°
ø28~ø32		1.5°
ø40		0.7°
ø50 and over		Not recommended
ø25	BDMT1704 type BDGT1704 type	8°
ø32		5°
ø40		2.5°
ø50 and over		Not recommended

BDMT1103 type is not recommended for ramping and helical milling.

Vertical Milling (Plunging)



Cutting Dia.	Applicable Inserts	Max. Width of Cut (ae)
ø16 ~ ø19	BDMT11T3 type BDGT11T3 type	1.5mm
ø20 ~ ø160	BDMT11T3 type BDGT11T3 type	5mm
ø25 ~ ø160	BDMT1704 type BDGT1704 type	8mm

BDMT1103 type is not recommended for vertical milling (plunging).

Guidance of minimum cutting dia. by helical milling

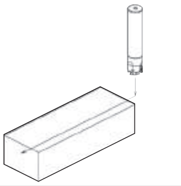
MEC	Cutting Dia.	ø16	ø18	ø20	ø22	ø25	ø28	ø30	ø32	ø40	ø50
BD_T11T3 type	Guidance of minimum cutting dia. by helical milling	ø21	ø25	ø29	ø33	ø39	ø45	ø49	ø53	ø69	Helical milling is not recommended.
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling.	ø28	ø32	ø36	ø40	ø46	ø52	ø56	ø60	ø76	

MEC	Cutting Dia.	ø25	ø32	ø40	ø50
BD_T1704 type	Guidance of minimum cutting dia. by helical milling	ø34	ø48	ø64	Helical milling is not recommended.
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling.	ø46	ø60	ø76	

Case Studies

RC55 (Pre-hardened Tool Steel)

- Test piece (54~56HRC)
- Vc=50m/min (n=800min^{-1})
- ap x ae=2 x 14mm
- fz=0.125mm/t (Vf=300mm/min)
- Dry
- MEC20-S20-11T
- 3 flutes
- BDMT11T308ER-JT (PR830)



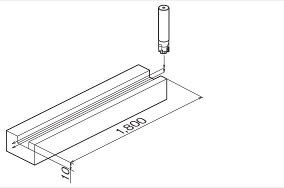
MEC	Chip Removal Amount = 71.3cm^3 (Further Machining Possible)
Competitor's End Mill A	Chip Removal Amount = 2.9cm^3 (Chipping occurred)

Competitor's End Mill A [ø25 (2 Flutes) Vc=40m/min fz=0.075mm/t apxae= 2x3mm] had chipping occurred in 10 minutes and had loud machining sound. MEC could increase the feed rate, and the cutting edge remained in extremely good condition and is still sustainable for further machining.

(User Evaluation)

SS400

- Plate
- Vc=88m/min (n=1,400min^{-1})
- ap=5mm x 2 passes
- fz=0.12mm/t (Vf=500mm/min)
- Dry
- MEC20-S20-11T
- 3 flutes
- BDMT11T308ER-JT (PR830)



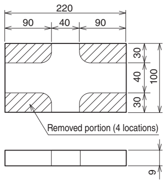
MEC	23pcs/edge
Competitor's End Mill B	10~11pcs/edge

MEC extended the tool life for more than twice.

(User Evaluation)

SUS304

- Plate
- Vc=125m/min (n =1,600min^{-1})
- ap =9.0mm
- fz =0.1mm/t (Vf=320mm/min)
- Dry
- MEC25- S25-17
- 2 flutes
- BDMT170408ER-JT (PR830)



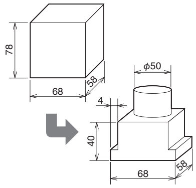
MEC	4pcs/edge or more
Competitor's End Mill C	1pc/edge or less

Competitor's End Mill C (indexable end mill) had high cutting force and had insert breakage, but MEC had no insert breakage and was still usable for further machining after machining 4 pieces (16 points).

(User Evaluation)

DAC10 (Hot Work Tool Steel)

- Mold
- Vc=130m/min (n =1,040min^{-1})
- ap x ae =(~3)x(~5) (Varies depending on machining point)
- fz =0.18mm/t(Vf=936mm/min)
- Dry (Air blow)
- MEC40- S32-11T · 5 flutes
- BDMT11T308ER-JT (PR830)



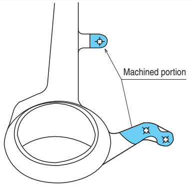
MEC	2 hours (Small Wear : Extendible)
Competitor's End Mill D	2 hours (halted due to insert breakage)

MEC had better cutting performance / insert life comparing to Competitor's End Mill D, and the insert had only small wear and was usable for further machining after used for machining of the same duration as Competitor's End Mill D. Competitor's End Mill D (6 flutes type) was used with Vf=936mm/min (fz=0.15mm/t).

(User Evaluation)

SCM420

- Knuckle Steering
- Vc=150m/min (n=1,200min^{-1})
- ap=0.5~5mm (Shouldering)
- fz=0.1mm/t (Vf=478mm/min)
- Dry
- MEC40-S32-17
- 4 flutes
- BDMT170408ER-JT (PR830)



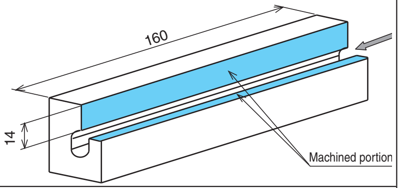
MEC	150 pcs/edge
Competitor's End Mill E	40pcs/edge

MEC had a better finished surface comparing to Competitor's End Mill E and also improved the tool life by more than 3 times.

(User Evaluation)

Ni-base heat-resistant alloys

- Turbine parts
- Vc=15m/min (n=120min^{-1})
- ap=0.5mm
- fz=0.08mm/t (Vf=38mm/min)
- Wet
- MEC040R-17-4T-M
- 4 flutes
- BDMT170408ER-JS (PR1025)



MEC	9pcs/edge
Competitor's End Mill F	1pc/edge or less

Competitor's End Mill F (Coated Carbide Insert) could not finish machining of 1 workpiece, but MEC could cut 9pcs/edge and the finished surface was good.

(User Evaluation)

Shouldering Slotting Facing

MECX End Mill

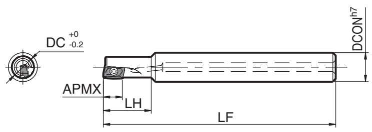


Fig. 1

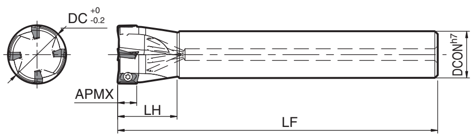


Fig. 3

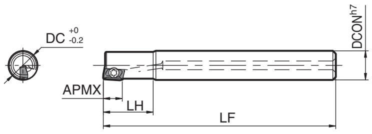


Fig. 2

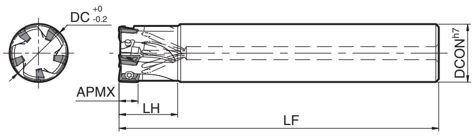


Fig. 4

Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts		Max. Revolution (min^{-1})
					DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	
Standard Shank	Standard	**MECX 08-S10-07-1T**	●	1	8	10	80	16	6	11.7°	-24.0°	Yes	Fig. 1	SB-2035TRG	DTM-6	48,100
		14-S12-07-2T	●	2	14	12		18		16.3°	-12.1°		Fig. 3			44,800
		17-S16-07-3T	●	3	17	16	100	20			-11.0°			SB-2042TRG		42,400
		18-S16-07-3T	●		18						-10.9°					41,600
		20-S16-07-4T	●	4	20		110				-10.4°					40,200
		21-S20-07-4T	●		21	20					-10.1°					39,500
		25-S20-07-5T	●	5	25		120	25			-9.7°					37,000
		26-S25-07-5T	●		26	25					-9.5°					36,500
		33-S32-07-6T	●	6	33	32	130	30			-8.8°					33,100
	Fine pitch	**MECX 20-S16-07-5T**	●	5	20	16	110	20	6	16.3°	-10.4°	Yes	Fig. 3	SB-2042TRG	DTM-6	40,200
		25-S20-07-7T	●	7	25	20	120	25			-9.7°					37,000
Same Shank	Standard	**MECX 10-S10-07-1T**	●	1	10	10	80	17	6	12.8°	-18.7°	Yes	Fig. 2	SB-2035TRG	DTM-6	47,100
		12-S12-07-2T	●	2	12	12		18		14.3°	-13.7°		Fig. 4			46,200
		16-S16-07-3T	●	3	16	16	100	20		16.3°	-11.3°			SB-2042TRG		43,200
		20-S20-07-4T	●	4	20	20	110				-10.4°					40,200
		25-S25-07-5T	●	5	25	25	120	25			-9.7°					37,000
	Fine pitch	**MECX 16-S16-07-4T**	●	4	16	16	100	20	6	16.3°	-11.3°	Yes	Fig. 4	SB-2042TRG	DTM-6	43,200
		20-S20-07-5T	●	5	20	20	110				-10.4°					40,200
		25-S25-07-7T	●	7	25	25	120	25			-9.7°					37,000
		32-S32-07-8T	●	8	32	32	130	30			-8.9°					33,600
Long Shank	Standard	**MECX 17-S16-130-07-3T**	●	3	17	16	130	20	6	16.3°	-11.0°	Yes	Fig. 3	SB-2042TRG	DTM-6	42,400
		21-S20-140-07-4T	●	4	21	20	140				-10.1°					39,500
		26-S25-160-07-5T	●	5	26	25	160	25			-9.5°					36,500

Coat Anti-seize Compound(P-37) thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➡ **M76**

■ Max. Revolution

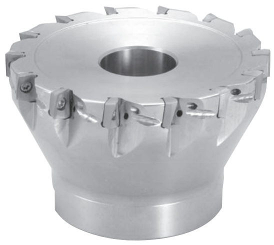
Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
For more details, "Warning" in the next page.

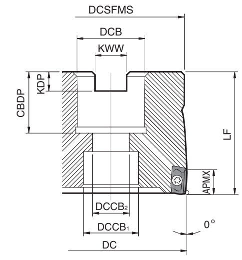
■ For good shoulder finishes by MECX multistage ap.

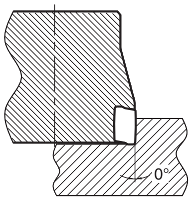
In order to obtain smooth machining wall surface by MECX multistage ap set ap within 5mm for each cut.

● : Std. Item

MECX Face Mill







Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Weight (kg)	Spare Parts		Max. Revolution (min^{-1})
			DC	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	
MECX 032R-07-8T-M	●	8	32	30	16	14	8.5	40	20	5.5	8.5	6	+7°	-8.9°	Yes	0.15	SB-2042TRG	DTM-6	33,600
040R-07-10T-M	●	10	40	38	22	18	12		22	6.3	10.4			-8.4°		0.25			30,500

Coat Anti-seize Compound(P-37) thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➔ **M76**

■ Max. Revolution

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load. For more details, see "Warning" below.

■ For good shoulder finishes by MECX multistage ap.

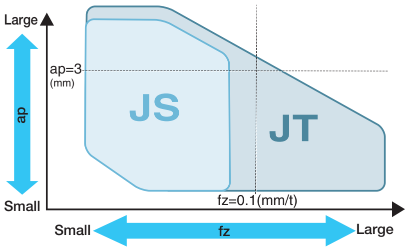
In order to obtain smooth machining wall surface by MECX multistage ap set ap within 5mm for each cut.

■ MECX032R comes with mounting bolt (HH8X25H) and MECX040R/050R/063R comes with mounting bolt (HH10X30H).

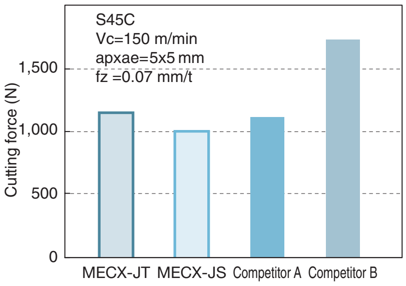
Applicable Inserts

Description	Applicable Inserts ➔ M22	
		
MECX...-07..	BDMT 0703○○ER-JT	BDMT 0703○○ER-JS

Chipbreaker selection



Cutting Force Comparison (Internal evaluation)



⚠ Warning Please observe below precautions fully. Failure to observe the precautions may cause serious damage to human body.

Warning about Max. Revolution indicated on main body

1. Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter or the body may be damaged even under no load.
2. For actual practical revolution, please set within recommended cutting condition.
3. When using at a higher revolution (over 10,000min^{-1}), refer to the table to adjust the balance of MECX and suitable arbor.

Revolution (min^{-1})	Balance quality grade G ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

● : Std. Item

MECX

Recommended Cutting Conditions

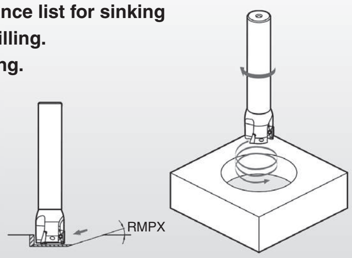
Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)			
	JS Chipbreaker	JT Chipbreaker	MEGACOAT NANO	MEGACOAT		CVD Coated Carbide
			PR1535	**PR1225**	**PR1210**	**CA6535**
Carbon Steel	0.04~0.08~0.1	0.06~0.1~0.12	☆ 120~180~250	★ 120~180~250	-	-
Alloy Steel	0.04~0.06~0.08	0.06~0.08~0.1	☆ 100~160~220	★ 100~160~220	-	-
Mold Steel	0.04~0.06~0.08	0.06~0.08~0.1	☆ 80~140~180	★ 80~140~180	-	-
Stainless Steel (Austenitic related)	0.03~0.04~0.05	0.05~0.06~0.07	★ 100~160~200	☆ 100~160~200	-	-
Stainless Steel (Martensitic related)	0.03~0.04~0.05	0.05~0.06~0.1	☆ 150~200~250	-	-	★ 180~240~300
Stainless Steel (Precipitation Hardening)	0.03~0.04~0.05	0.05~0.06~0.1	★ 90~120~150	-	-	-
Gray Cast Iron	0.04~0.08~0.1	0.08~0.1~0.15	-	-	★ 120~180~250	-
Nodular Cast Iron	0.04~0.06~0.08	0.08~0.1~0.12	-	-	★ 100~150~200	-
Ni-base heat-resistant alloys	0.03~0.04~0.05	0.05~0.06~0.07	☆ 20~30~50	-	-	★ 20~30~50
Titanium Alloys	0.04~0.06~0.08	0.08~0.1~0.12	★ 40~60~80	-	☆ 30~50~70	-

* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

★ : 1st Recommendation ☆ : 2nd Recommendation

Ramping / Helical Milling

- **Ramping angle is recommended under RMPX.**
- **Refer to each tool's cutting performance list for sinking depth per revolution when helical milling.**
  Use compressed air during machining.



Cutting Dia.	Applicable Inserts	Max. ramping angle (RMPX)
ø8	**BDMT0703** type	Not recommended
ø10		1.5°
ø12,ø14		2°
ø16		3°
ø17,ø18		1.5°
ø20		2°
ø21		1.8°
ø25		1.3°
ø26		1.2°
ø32		0.8°
ø33		0.5°

Guidance of minimum cutting dia. by helical milling

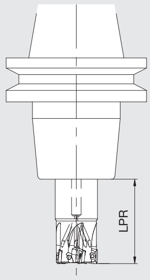
MECX	Cutting Dia.	ø8	ø10	ø12	ø14	ø16	ø17	ø18	ø20
BDMT0703 type	Guidance of minimum cutting dia. by helical milling	Helical milling is not recommended	ø14	ø18	ø22	ø26	ø28	ø30	ø34
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling		ø17	ø21	ø25	ø29	ø31	ø33	ø37

MECX	Cutting Dia.	ø21	ø25	ø26	ø32	ø33
BDMT0703 type	Guidance of minimum cutting dia. by helical milling	ø36	ø44	ø46	ø58	ø60
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling	ø39	ø47	ø49	ø61	ø63

Cutting Performance of MECX End Mill

Cutting Dia.	Description	Overhang Length LPR (mm)	
ø8	**MECX08-S10-07-1T**	16	-
ø10	**MECX10-S10-07-1T**	17	-
ø12	**MECX12-S12-07-2T**	18	30
ø16	**MECX16-S16-07-3T**	20	40
ø20	**MECX20-S20-07-4T**	20	40
ø25	**MECX25-S25-07-5T**	25	50
ø32	**MECX32-S32-07-6T**	30	50

Shape



* Machining with extended overhang length is not recommended for ø8 and ø10.

* The cutting performance list shows applicable range of JT Chipbreaker with Standard flute-number type.

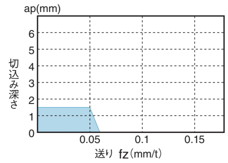
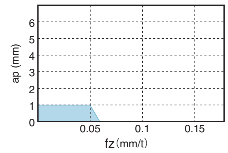
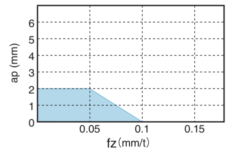
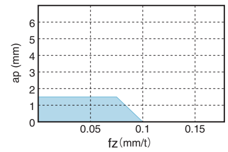
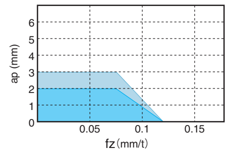
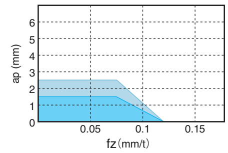
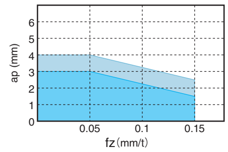
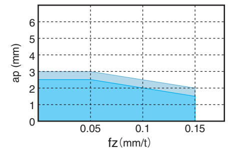
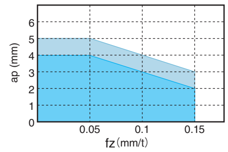
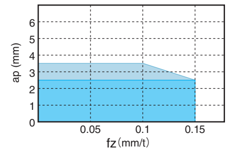
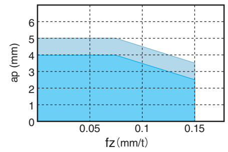
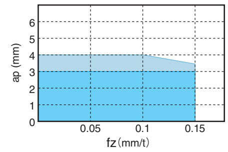
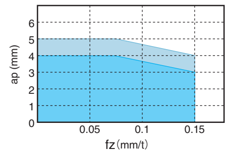
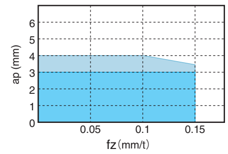
For Multi-Edge type, use with 70% or less of ap.

*** Cutting conditions of JS Chipbreaker**

(1) For MECX08~MECX12
Decrease the feed rate by 25% according to cutting capability list.

(2) For MECX16 and over
Decrease the feed rate and ap by 30% according to cutting capability list.

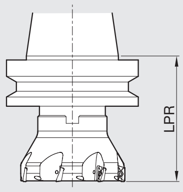
[Vc=150m/min Workpiece Material : S50C]

Description	■ Shouldering (Cutting width ae = DC/2)	■ Slotting ■ Ramping and Helical Milling
MECX08-S10-07-1T		
MECX10-S10-07-1T		
MECX12-S12-07-2T		
MECX16-S16-07-3T		
MECX20-S20-07-4T		
MECX25-S25-07-5T		
MECX32-S32-07-6T		

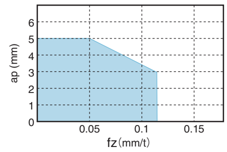
Cutting Performance of MECX Face Mill

Cutting Dia.	Description	Overhang Length LPR (mm)
ø32	**MECX032R-07-8T-M**	100
ø40	**MECX040R-07-10T-M**	

Shape



[Vc=150m/min Workpiece Material : S50C]

Description	■ Shouldering (Cutting width ae = DC/2)
MECX032R-07-8T-M **MECX040R-07-10T-M**	

* Use JT Chipbreaker
* Slotting is not recommended.

High Performance Milling

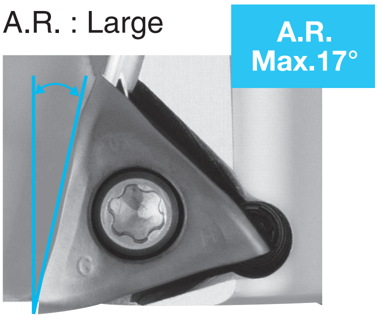
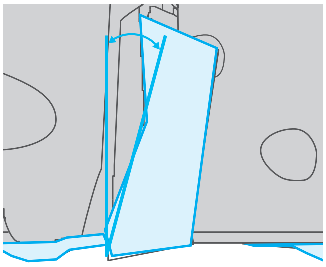
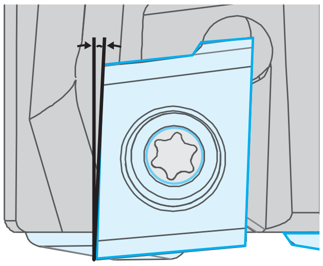
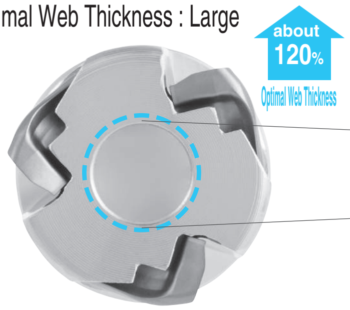
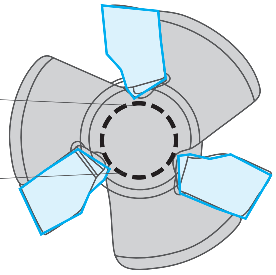
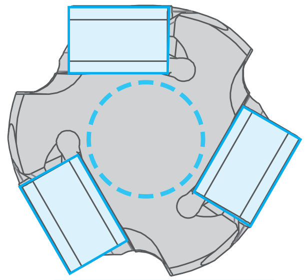
MEV

Newly Developed Triangular Inserts for Provide Low Cutting Forces and Increased Rigidity
High Performance, Economical, and Multi-functional Milling Solutions

1 High Performance : Low Cutting Force and High Rigidity

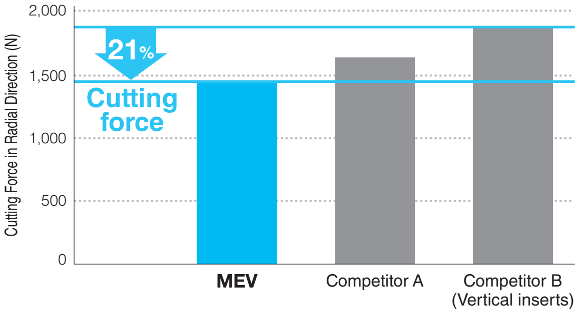
Newly developed vertical triangle inserts with 3 cutting edges. Achieve stable machining with reduced chattering.

MEV vs Competitor

	MEV (New vertical triangle inserts) NEW	Conventional End Mill (Positive inserts)	Conventional End Mill (Vertical inserts)
Cutting Force	A.R. : Large  Low Cutting Force	A.R. : Large  Low Cutting Force	A.R. : Small 
Toolholder's Rigidity	Optimal Web Thickness : Large  High Rigidity	Optimal Web Thickness : Small 	Optimal Web Thickness : Large  High Rigidity
	Cutting Force : **Low** Toolholder's Rigidity : **High**	Cutting Force : **Low** Toolholder's Rigidity : Low	Cutting Force : High Toolholder's Rigidity : **High**

Keeping A.R. max. at 17°, provides lower cutting force than the positive insert types of competitors

Cuttting Force Comparison (Internal evaluation)

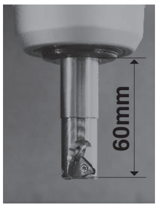


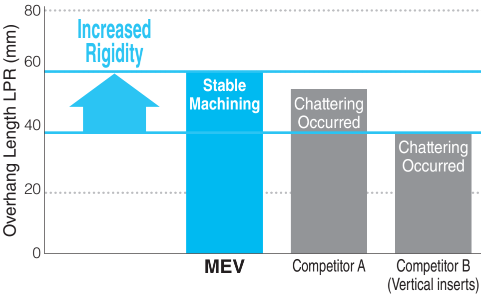
Cutting Conditions : Vc = 200 m/min, ap × ae = 3 × 18 mm, fz = 0.10 mm/t, ø20 (3 flutes), Dry Workpiece Material : SCM440Ⓗ

Low cutting force and large optimal web thickness provides excellent chattering resistance

Chattering Resistance Comparison (Internal evaluation)

Shouldering





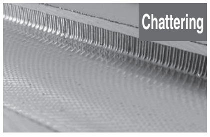
Cutting Conditions : Vc = 200 m/min, ap × ae = 3 × 18 mm, fz = 0.10 mm/t, ø20 (3 flutes), Dry Workpiece Material : SCM440Ⓗ

Slotting

MEV

Competitor A

Competitor B (Vertical inserts)

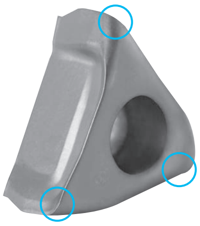


Cutting Conditions : Vc = 220 m/min, ap = 3 mm (Slotting), fz = 0.10 mm/t, ø20 (3 flutes), Dry Workpiece Material : SCM440Ⓗ

M
Milling
Insert
Lead Angle 45°~20°
Lead Angle 15°
Lead Angle 0°/2°
High Feed Cutter
Cutter for Finishing
Multi-Function
Slot Mill
Ball-nose Radius
Others

2 The Economical Choice : Lengthened Insert Life with 3 Usable Cutting Edges

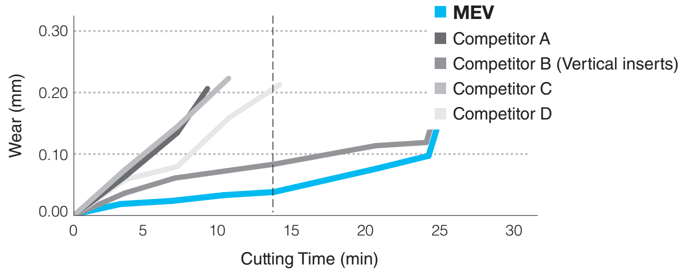
Insert



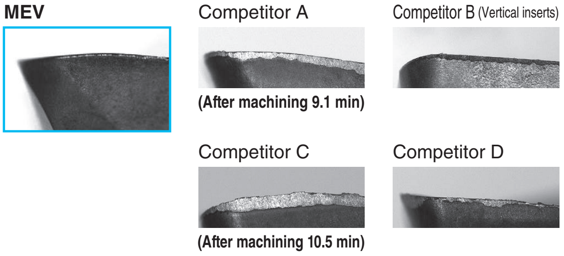
Unique triangle inserts with 3 cutting edges
PR15 series utilizes excellent MEGACOAT NANO coating technology with wear and adhesion resistance

Long Tool Life with Excellent Wear Resistance

Wear Resistance Comparison (Internal evaluation)



Cutting Edge (After machining 14 min)

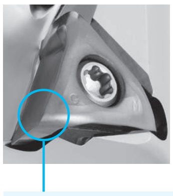


(After machining 9.1 min)

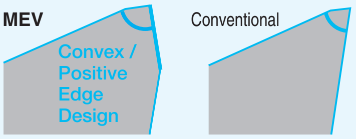
(After machining 10.5 min)

Cutting Conditions : Vc = 180 m/min, ap × ae = 3 × 10 mm, fz = 0.1 mm/t, ⌀20, Dry Workpiece Material : SKD11 (30〜35HS)

Improved Stability with Superior Fracture Resistance

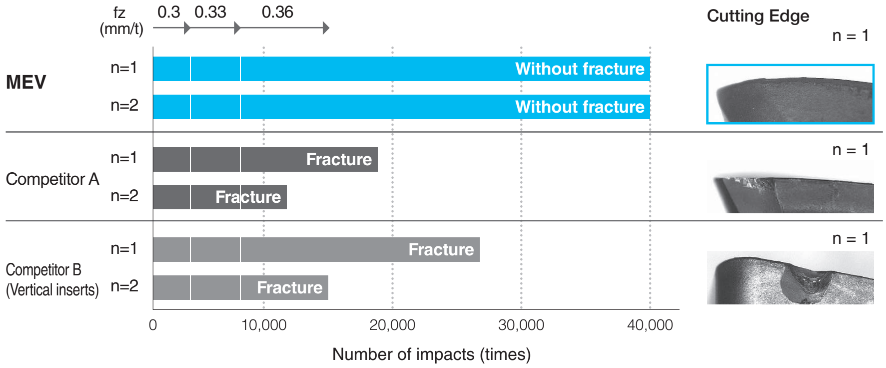


Cutting edge cross-section



The MEV features a larger cutting edge to increase strength

Fracture Resistance Comparison (Internal evaluation)



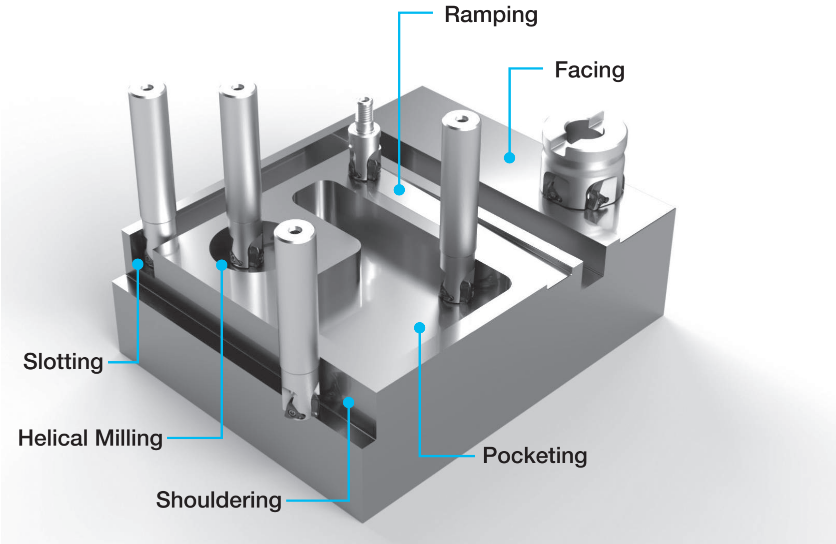
Cutting Conditions : Vc = 120 m/min, ap × ae = 2 × 10 mm, fz = 0.3 - 0.36 mm/t, ⌀20 (single insert), Dry Workpiece Material : SCM440Ⓗ (37〜39HS)

3 Multi-functional : The MEV can perform a wide variety of machining processes

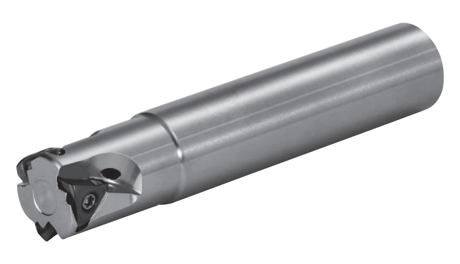
Great performance in shouldering, slotting, and ramping applications (D.O.C. 6 mm or less)

Chip Example (Slotting)

Cutting Conditions : Vc = 150 m/min, ap = 6mm (Slotting)
fz = 0.2 mm/t, ⌀20 (3 flutes), Dry Workpiece Material : SS400



MEV End Mill



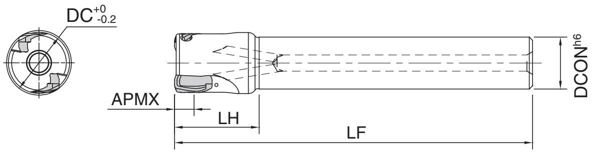


Fig.1

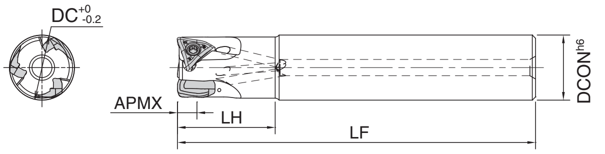


Fig.2

Toolholder Dimensions

Description				Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Weight (kg)	Drawing	Max. Revolution (min^{-1})
						DC	DCON	LF	LH	APMX	A.R.(MAX.)	R.R.				
Cylindrical	Standard Shank	**MEV**	**20-S16-06-2T**	●	2	20	16	110	26	6	+17°	-38°	Yes	0.2	Fig.1	32,000
			22-S20-06-3T	●	3	22	20					-37°				29,000
			25-S20-06-3T	●		25		120	29					0.3		25,000
			28-S25-06-3T	●		28	25					-36°		0.4		23,000
			30-S25-06-4T	●	4	30		130	32					0.5		21,500
			32-S25-06-4T	●		32						-36°				20,000
			40-S32-06-5T	●	5	40	32	150	50					1.0		16,000
			50-S32-06-5T	●		50		120	40		+16°	-36°		0.9		13,000
	Same Shank	**MEV**	**20-S20-06-2T**	●	2	20	20	110	30	6	+17°	-38°	Yes	0.2	Fig.2	32,000
			20-S20-06-3T	●	3											
			25-S25-06-2T	●	2	25	25	120	32			-37°		0.4		25,000
			25-S25-06-3T	●	3											
			32-S32-06-3T	●		32	32	130	40			-36°		0.7		20,000
			32-S32-06-4T	●	4											
	Long Shank	**MEV**	**20-S18-06-150-2T**	●	2	20	18	150	30	6	+17°	-38°	Yes	0.3	Fig.1	32,000
			20-S20-06-150-2T	●			20		40						Fig.2	
			25-S25-06-170-2T	●		25	25	170	50			-37°		0.6		25,000
			32-S32-06-200-2T	●		32	32	200	65			-36°		1.1		20,000

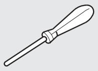
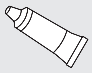
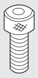
Max. Revolution

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page **M84**

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Spare Parts

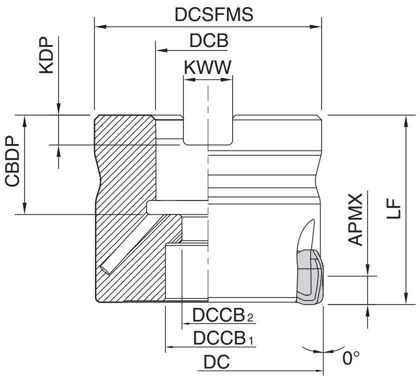
Description			Spare Parts			
			Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
						
End Mill	**MEV**	**...-06-...T**	SB-3076TRP	DTPM-10	P-37	–
Face Mill	**MEV**	**032R-06-4T-M**				HH8X25
		040R-06-5T-M				
		050R-06-5T-M				HH10X30
Modular	**MEV**	**20-M10-06-2T**				–
		20-M10-06-3T				–
		25-M12-06-3T				–
		32-M16-06-4T				–

Recommended tightening torque for Insert Clamp
2.0 N·m

● : Std. Item

M
Milling
Insert
Lead Angle 45°~20°
Lead Angle 15°
Lead Angle 0°/2°
High Feed Cutter
Cutter for Finishing
Multi-Function
Slot Mill
Ball-nose Radius
Others

MEV Face Mill



Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Weight (kg)	Max. Revolution (min^{-1})
			DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX	A.R. (MAX.)	R.R.			
MEV 032R-06-4T-M	●	4	32	30	16	13.5	9	35	19	5.6	8.4	6	+17°	-36°	Yes	0.1	20,000
040R-06-5T-M	●	5	40	38		15		40								0.2	16,000
050R-06-5T-M	●	5	50	48	22	18	11		21	6.3	10.4		+16°			0.4	13,000

■ Max. Revolution

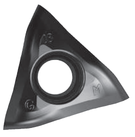
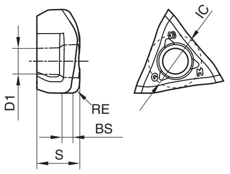
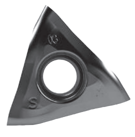
Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page **M84**

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Applicable Inserts

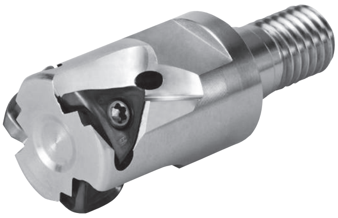
Classification of usage						
	P	Carbon Steel / Alloy Steel	☆	★		
		Mold Steel	☆	★		
★ : Roughing / 1st Choice ☆ : Roughing / 2nd Choice ■ : Finishing / 1st Choice ☐ : Finishing / 2nd Choice (In case hardness is 45HRC or under)	M	Stainless Steel (Austenitic related)	★	☆		
		Stainless Steel (Martensitic related)	☆			★
		Stainless Steel (Precipitation Hardening)	★			
	K	Gray Cast Iron		☆	★	
		Nodular Cast Iron		☆	★	
	N	Non-ferrous Metals				
	S	Heat-resistant Alloys	☆			★
		Titanium Alloys	★		☆	
	H	Hard Materials		☐		

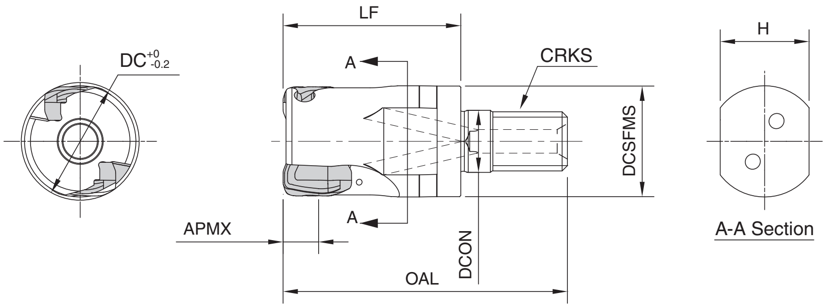
Insert		Description	Dimension (mm)					MEGACOAT NANO			CVD Coated Carbide
			IC	S	D1	BS	RE	PR1535	PR1525	PR1510	CA6535
 General purpose		**TOMT 060504ER-GM**	7.2	5.7	3.4	1.9	0.4	●	●	●	●
		060508ER-GM				1.5	0.8	●	●	●	●
 Low cutting force		**TOMT 060508ER-SM**	7.2	5.7	3.4	1.5	0.8	●	●		●

● : Std. Item

MEV

MEV Head (Modular type)





Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)								Rake Angle		Coolant Hole	Max. Revolution (min^{-1})	Applicable Inserts ➡ **M20, M81**
				DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX	A.R. (MAX.)	R.R.			
MEV	**20-M10-06-2T**	●	2	20	18.7	10.5	48	30	M10×P1.5	15	6	+17°	-38°	Yes	32,000	TOMT06...-GM TOMT06...-SM
	20-M10-06-3T	●	3													
	25-M12-06-3T	●		25	23	12.5	56	35	M12×P1.75	19			-37°		25,000	
	32-M16-06-4T	●	4	32	30	17	62	40	M16×P2.0	24			-36°		20,000	

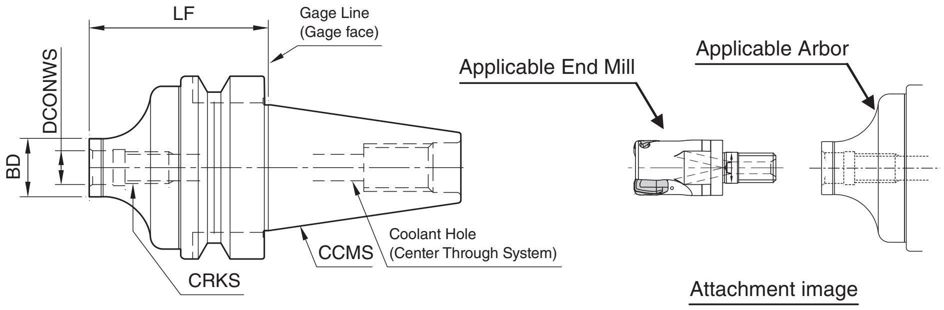
Max. Revolution

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page **M84**

Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

BT Arbor (for exchangeable head / double-face clamping spindle)

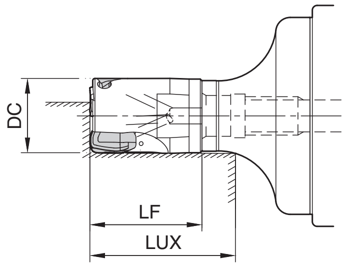


Dimension

Description		Stock	Dimension (mm)				Coolant Hole	Arbor (Double-face clamping)	Applicable End Mill
			LF	BD	DCONWS	CRKS		CCMS	
BT30K-	**M10-45**	●	45	18.7	10.5	M10×P1.5	Yes	BT30	MEV20-M10··
	M12-45	●		23	12.5	M12×P1.75			MEV25-M12··
BT40K-	**M10-60**	●	60	18.7	10.5	M10×P1.5	Yes	BT40	MEV20-M10··
	M12-55	●	55	23	12.5	M12×P1.75			MEV25-M12··
	M16-65	●	65	30	17	M16×P2.0			MEV32-M16··

· When MEV is not used, see page **M60**.

Actual End Mill depth



Arbor Description		Applicable End Mill			Actual End Mill depth (mm)
		Description	Cutting Dia.	Dimension	LUX
			DC	LF	
BT30K-	**M10-45**	**MEV20-M10··**	20	30	36.8
	M12-45	**MEV25-M12··**	25	35	42.8
BT40K-	**M10-60**	**MEV20-M10··**	20	30	38.7
	M12-55	**MEV25-M12··**	25	35	44.6
	M16-65	**MEV32-M16··**	32	40	51.2

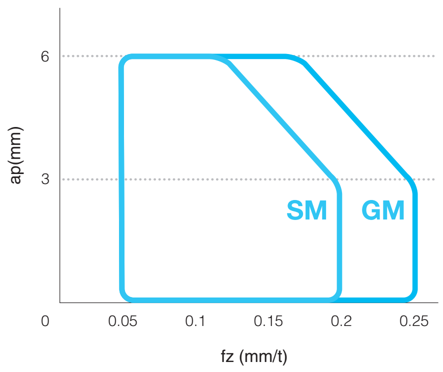
● : Std. Item

Recommended Chipbreaker Range

GM type for General Purpose : Edge Shape Optimized for Various Machining Applications

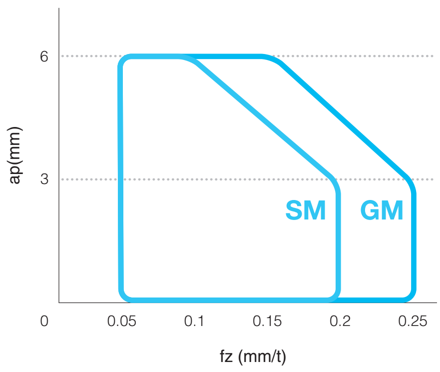
SM type with Low Cutting Force Design : Sharp Cutting and Large Rake Angle

Shouldering



Cutting Conditions : Vc = 150 m/min, ae = DC/2 mm, Workpiece Material : S50C

Slotting

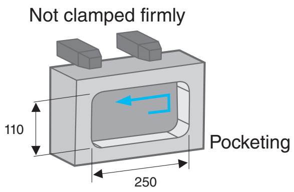


Cutting Conditions : Vc = 150 m/min, ae = DC mm, Workpiece Material : S50C

Case Studies

Parts for machinary SUS420

Vc = 180 m/min
ap × ae = 1 × ~50 mm
fz = 0.1 mm/t Dry
MEV50-S32-06-5T (5 flutes)
TOMT060508ER-GM PR1535



Machining efficiency

Machining efficiency

MEV Vf=575 mm/min x1.6

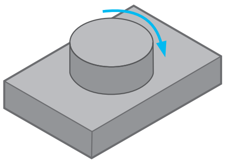
Competitor E Vf=350 mm/min

Quiet machining even when cutting speed increased.
The MEV shows 1.6 times machining efficiency and good bottom surface finish.

(User Evaluation)

Plate SS400

Vc = 180 m/min
ap = 3 mm
fz = 0.14 mm/t Dry
MEV22-S20-06-3T (⌀22-3 flutes)
TOMT060508ER-GM PR1525



Tool life

Tool life

MEV 160 pcs/edge x2.4

Competitor F 65 pcs/edge

The MEV achieved 2.4 times longer tool life than competitor F.
Quieter machining with excellent surface finish.

(User Evaluation)

Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)			
			MEGACOAT NANO			CVD Coated Carbide
			PR1535	PR1525	PR1510	CA6535
GM	Carbon Steel	0.08 – **0.15** – 0.25	☆ 120 – **180** – 250	★ 120 – **180** – 250	-	-
	Alloy Steel	0.08 – **0.15** – 0.2	☆ 100 – **160** – 220	★ 100 – **160** – 220	-	-
	Mold Steel	0.08 – **0.12** – 0.2	☆ 80 – **140** – 180	★ 80 – **140** – 180	-	-
	Stainless Steel (Austenitic related)	0.08 – **0.12** – 0.15	☆ 100 – **160** – 200	☆ 100 – **160** – 200	-	-
	Stainless Steel (Martensitic related)	0.08 – **0.12** – 0.2	☆ 150 – **200** – 250	-	-	★ 180 – **240** – 300
	Stainless Steel (Precipitation Hardening)	0.08 – **0.12** – 0.2	★ 90 – **120** – 150	-	-	-
	Gray Cast Iron	0.08 – **0.18** – 0.25	-	☆ 120 – **180** – 250	★ 120 – **180** – 250	-
	Nodular Cast Iron	0.08 – **0.15** – 0.2	-	☆ 100 – **150** – 200	★ 100 – **150** – 200	-
	Ni-base heat-resistant alloys	0.08 – **0.12** – 0.15	☆ 20 – **30** – 50	-	-	★ 20 – **30** – 50
	Titanium Alloys	0.08 – **0.15** – 0.2	☆ 40 – **60** – 80	-	☆ 30 – **50** – 70	-
SM	Carbon Steel	0.08 – **0.15** – 0.2	☆ 120 – **180** – 250	★ 120 – **180** – 250	-	-
	Alloy Steel	0.08 – **0.12** – 0.18	☆ 100 – **160** – 220	★ 100 – **160** – 220	-	-
	Mold Steel	0.08 – **0.1** – 0.15	☆ 80 – **140** – 180	★ 80 – **140** – 180	-	-
	Stainless Steel (Austenitic related)	0.08 – **0.1** – 0.15	★ 100 – **160** – 200	☆ 100 – **160** – 200	-	-
	Stainless Steel (Martensitic related)	0.08 – **0.1** – 0.15	☆ 150 – **200** – 250	-	-	★ 180 – **240** – 300
	Stainless Steel (Precipitation Hardening)	0.08 – **0.1** – 0.15	☆ 90 – **120** – 150	-	-	-
	Ni-base heat-resistant alloys	0.08 – **0.1** – 0.12	☆ 20 – **30** – 50	-	-	★ 20 – **30** – 50
	Titanium Alloys	0.08 – **0.12** – 0.15	★ 40 – **60** – 80	-	-	-

★ : 1st Recommendation ☆ : 2nd Recommendation

The bold-faced number indicates a center value of recommended cutting condition.
Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.
Cutting with coolant is recommended for finishing.

Applicable to Various Types of Machining such as ramping

Reference data for Ramping

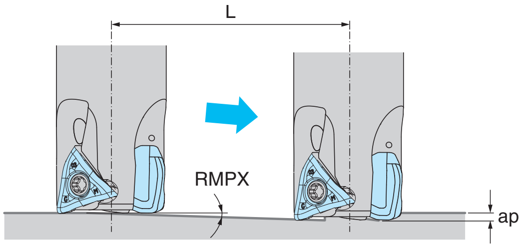
Description	Cutter Dia. DC (mm)	20	22	25	28	30	32	40	50
MEV··· -06- ···	Max. Ramping Angle RMPX	1.00°	0.80°	0.65°	0.60°	0.55°	0.50°	0.40°	0.30°
	tan RMPX	0.017	0.014	0.011	0.010	0.010	0.009	0.007	0.005

Decrease ramping angle if chips become excessively long.

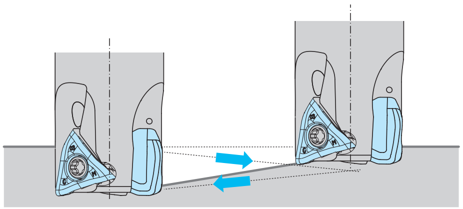
Guide for Ramping (Slant Milling)

Ramping angle should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
Feed rate should be 70% or under of the above cutting conditions.

Formula of the cutting length "L" at Max. ramping angle $L = \dfrac{ap}{\tan RMPX}$



For two-way ramping, the ramping angle should be half of RMPX.

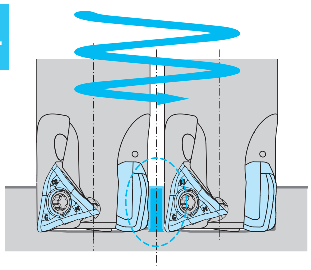


Guide for Helical milling

For helical milling, use between Min. cutting dia. and Max. cutting dia.

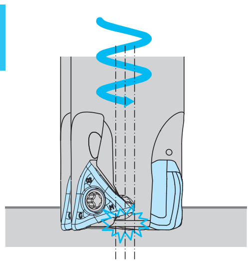
⃠Exceeding Max. Cutting Dia.

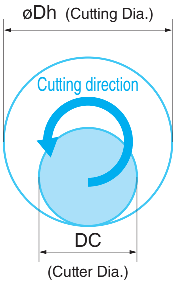
Center core part remains after machining



⃠Under Min. Cutting Dia.

Center core part interferes with toolholder



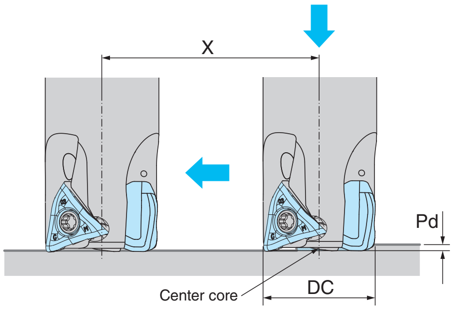


Unit : mm

Description	Min. Cutting Dia.	Max. Cutting Dia.
MEV··· -06- ···	2×DC–5	2×DC–2

For helical milling, use between Min. cutting dia. and Max. cutting dia.
Keep machine depth (h) per rotation less than max. ap (S) in the cutter dimensions chart
Use caution to eliminate incidences caused by producing long chips

Guide for Drilling



Unit : mm

Description	Max. cutting depth Pd	Min. cutting length X for flat bottom surface
MEV··· -06- ···	0.25	DC–3

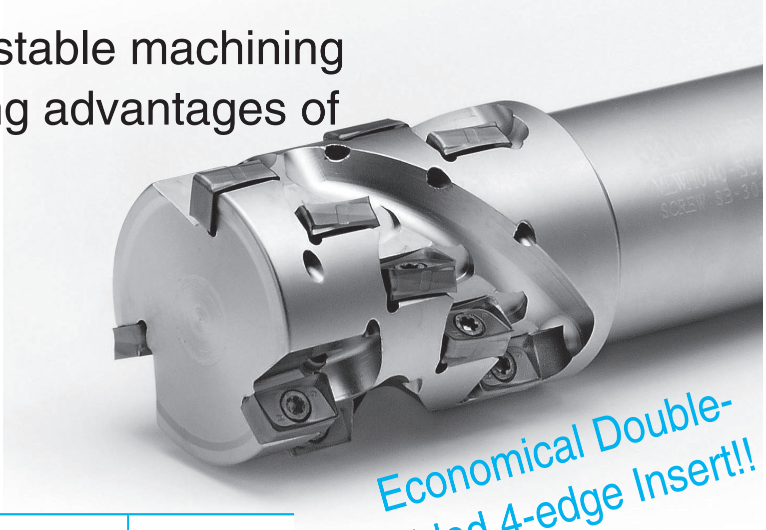
It is recommended to reduce feed by 25% of recommendation until the center core is removed when traversing after drilling
Axial feed rate recommendation per revolution is f < 0.1mm/rev

Shouldering *Slotting Facing
* Only for 2 flute type

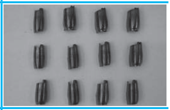
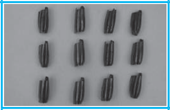
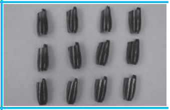
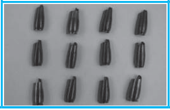
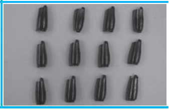
High quality and stable machining with heavy milling

Helical End Mill MEWH

Excellent surface finish and stable machining with toolholder design utilizing advantages of MEW


Economical Double-sided 4-edge Insert!!

Chip Evacuation

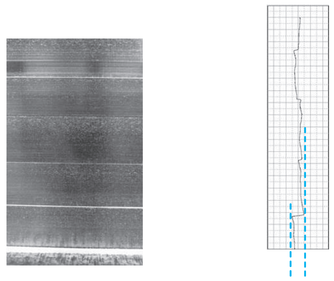
	Chipbreaker	Workpiece Material	fz=0.15mm/t	fz=0.2mm/t
	**GM**	SCM435		
	GM	SS400		
	SM			

Vc=120m/min
apxae=20x15mm
Dry

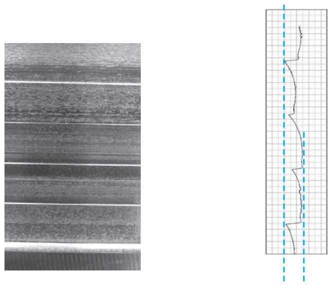
Chips are evacuated constantly to the opposite direction of cutter feed without causing clogging

Surface Finish Comparison (Internal evaluation)

MEWH



Competitor A



Better surface quality than competitor A

SCM435
Vc=120m/min
apxae=45x5mm
fz=0.1mm/t
Dry

● Corner-R(RE) 0.4, 1.0, 1.2, 1.6 and 2.0 added to GM chipbreaker lineup


Marking of 04

LOMU100404ER-GM
LOMU150504ER-GM


08 Has No Dimension Marking

LOMU100408ER-GM
LOMU150508ER-GM


Marking of 10

LOMU150510ER-GM


Marking of 12

LOMU100412ER-GM
LOMU150512ER-GM


Marking of 16

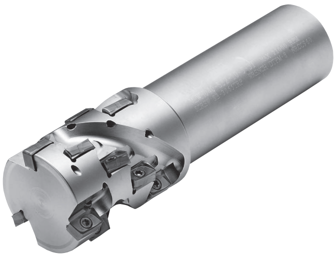
LOMU100416ER-GM
LOMU150516ER-GM


Marking of 20

LOMU100420ER-GM
LOMU150520ER-GM

M
Milling
Insert
Lead Angle 45°~20°
Lead Angle 15°
Lead Angle 0°/2°
High Feed Cutter
Cutter for Finishing
Multi-Function
Slot Mill
Ball-nose Radius
Others

MEWH End Mill (with coolant hole for bottom insert)



Rake Angle	A.R. (MAX.)	R.R.
	+13°	-20°

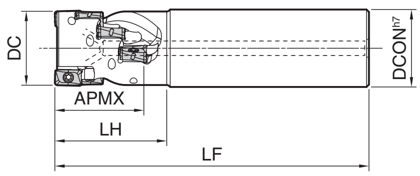


Fig. 1

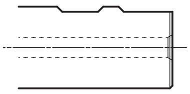


Fig. 3

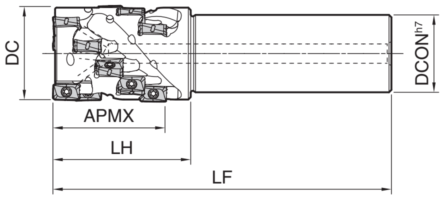


Fig. 2

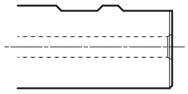


Fig. 4

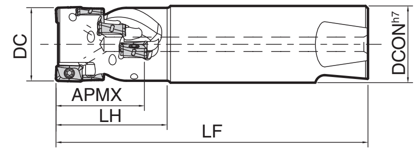


Fig. 5

(X-Treme Shank)

Toolholder Dimensions

Description	Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Coolant Hole	Drawing	Spare Parts			Applicable Inserts ➜ M16
					DC	DCON	LF	LH	APMX			Clamp Screw	Wrench	Anti-seize Compound	
MEWH 025-S25-10-3-2T	●	2	3	6	25	25	120	37	28	Yes	Fig. 1	SB-3065TRP Recommended tightening torque for Insert Clamp 1.2N·m	DTPM-8	P-37	LOMU1004..
032-S32-10-4-2T	●		4	8	32	32	130	46	37						
040-S32-10-5-2T	●		5	10	40		140	57	46		Fig. 2				
040-S32-10-5-3T	●	3		15											
MEWH 040-S32-15-4-2T	●	2	4	8	40	32	160	63	53	Yes	Fig. 2	SB-4090TRP Recommended tightening torque for Insert Clamp 3.5N·m	DTPM-15	P-37	LOMU1505..
050-S42-15-4-2T	●				50	42									
050-S42-15-4-3T	●	3		12											
MEWH 025-W25-10-3-2T	●	2	3	6	25	25	95	37	28	Yes	Fig. 3	SB-3065TRP Recommended tightening torque for Insert Clamp 1.2N·m	DTPM-8	P-37	LOMU1004..
032-W32-10-4-2T	●		4	8	32	32	108	46	37						
040-W32-10-5-2T	●		5	10	40		119	57	46		Fig. 4				
040-W32-10-5-3T	●	3		15											
MEWH 040-W32-15-4-2T	●	2	4	8	40	32	125	63	53	Yes	Fig. 4	SB-4090TRP Recommended tightening torque for Insert Clamp 3.5N·m	DTPM-15	P-37	LOMU1505..
050-W40-15-4-2T	●				50	40	135								
050-W40-15-4-3T	●	3		12											
MEWH 025S25-10-3-2TXT	●	2	3	6	25	25	118	37	28	Yes	Fig. 5	SB-3065TRP Recommended tightening torque for Insert Clamp 1.2N·m	DTPM-8	P-37	LOMU1004..
032S32-10-4-2TXT	●		4	8	32	32	133	46	37						

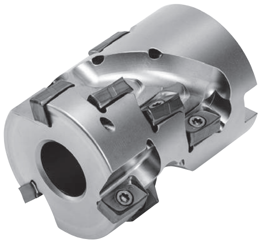
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

MEWH...XT Shank (X-Treme Shank) is for NIKKEN X-Treme chuck.

Recommended Cutting Conditions ➜ **M89**
Applicable chuck for MEWH...XT ➜ **M90**

● : Std. Item

MEWH Shell Mill (without coolant hole)



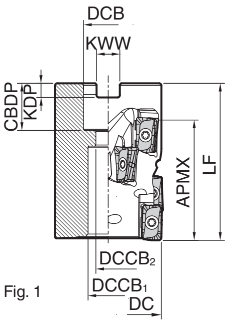


Fig. 1

Rake Angle	A.R. (MAX.)	R.R.
	+13°	-20°

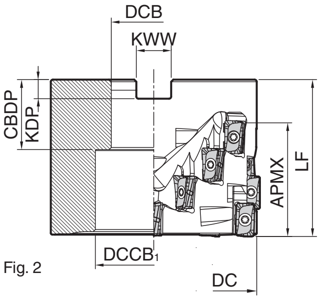
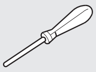
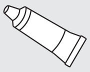
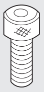


Fig. 2

Toolholder Dimensions

Description	Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)									Drawing	Spare Parts				Applicable Inserts → M16
					DC	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX		Clamp Screw 	Wrench 	Anti-seize Compound 	Mounting bolt 	
MEWH 040R-10-4-3T-M	●	3	4	12	40	16	15	9	53	19	5.6	8.4	37	Fig. 1	SB-3065TRP	DTPM-8	P-37	HH8X25	LOMU1004..
050R-10-5-3T-M	●		5	15	50	22	18	11	64	21	6.3	10.4	46		Recommended tightening torque for Insert Clamp 1.2N·m			HH10X30	
MEWH 050R-15-4-3T-M	●	3	4	12	50	22	18	11	70	21	6.3	10.4	53	Fig. 1	SB-4090TRP	DTPM-15	P-37	HH10X30	LOMU1505..
063R-15-3-3T-M	●		3	9	63	27	20	13	58	24	7	12.4	41					HH12X35	
080R-15-4-4T-M	●	4	4	16	80	32	26	18	70	28	8	14.4	53		Recommended tightening torque for Insert Clamp 3.5N·m			HH16X45	
100R-15-4-5T-M	●	5		20	100	40	55	-	74	33	9	16.4		Fig. 2				-	

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions → **M89**

Applicable Inserts

Description	Applicable Inserts → **M16**			
	 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)	 Non-ferrous Metals
MEWH...-10-...	LOMU1004..ER-GM	LOMU100408ER-SM	LOMU100408ER-GH	LOGT100408FR-AM
MEWH...-15-...	LOMU1505..ER-GM	LOMU150508ER-SM	LOMU150508ER-GH	LOGT150508FR-AM

Recommended Cutting Conditions → **M89**

Guidance of applicable inserts for MEWH

Insert Location Indication	Toolholder Description										
	MEWH...10...					MEWH...15...					
	Corner-R(RE)(mm)					Corner-R(RE)(mm)					
Bottom inserts	0.4	0.8	1.2	1.6	2.0	0.4	0.8	1.0	1.2	1.6	2.0
*Middle inserts	0.4/0.8	0.4/0.8	0.4/0.8	0.4	0.4	0.4~1.6	0.4~1.6	0.4~1.6	0.4~1.6	0.4~1.6	0.4~1.6

* For Middle inserts, it is not recommended to use the insert with larger corner-R(RE) than shown in the table, because it will make finished surface uneven.

● : Std. Item

Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)					
		Toolholder Description	MEGACOAT NANO			CVD Coated Carbide	DLC Coated Carbide	Carbide
		MEWH025~MEWH050 (Helical End Mill)	**PR1535**	**PR1525**	**PR1510**	**CA6535**	**PDL025**	**GW25**
GM	Carbon Steel	0.06~**0.1**~0.2	☆ 120~**180**~250	★ 120~**180**~250	-	-	-	-
	Alloy Steel	0.06~**0.1**~0.14	☆ 100~**160**~220	★ 100~**160**~220	-	-	-	-
	Mold Steel	0.06~**0.08**~0.12	☆ 80~**140**~180	★ 80~**140**~180	-	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.08**~0.12	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.08**~0.1	☆ 150~**200**~250	-	-	★ 180~**240**~300	-	-
	Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.1	★ 90~**120**~150	-	-	-	-	-
	Gray Cast Iron	0.06~**0.1**~0.17	-	-	★ 120~**180**~250	-	-	-
	Nodular Cast Iron	0.06~**0.08**~0.12	-	-	★ 100~**150**~200	-	-	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.1	☆ 20~**30**~50	-	-	★ 20~**30**~50	-	-
	Titanium Alloys	0.06~**0.08**~0.12	☆ 40~**60**~80	-	☆ 30~**50**~70	-	-	-
SM	Carbon Steel	0.06~**0.1**~0.17	☆ 120~**180**~250	★ 120~**180**~250	-	-	-	-
	Alloy Steel	0.06~**0.08**~0.12	☆ 100~**160**~220	★ 100~**160**~220	-	-	-	-
	Mold Steel	0.06~**0.08**~0.12	☆ 80~**140**~180	★ 80~**140**~180	-	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.08**~0.12	★ 100~**160**~200	☆ 100~**160**~200	-	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.08**~0.1	☆ 150~**200**~250	-	-	★ 180~**240**~300	-	-
	Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.1	☆ 90~**120**~150	-	-	-	-	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.1	☆ 20~**30**~50	-	-	★ 20~**30**~50	-	-
	Titanium Alloys	0.06~**0.08**~0.12	★ 40~**60**~80	-	☆ 30~**50**~70	-	-	-
GH	Carbon Steel	0.06~**0.1**~0.2	☆ 120~**180**~250	★ 120~**180**~250	-	-	-	-
	Alloy Steel	0.06~**0.1**~0.14	☆ 100~**160**~220	★ 100~**160**~220	-	-	-	-
	Mold Steel	0.06~**0.08**~0.12	☆ 80~**140**~180	★ 80~**140**~180	-	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.08**~0.12	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.08**~0.1	☆ 150~**200**~250	-	-	☆ 180~**240**~300	-	-
	Stainless Steel (Precipitation Hardening)	0.06~**0.08**~0.1	☆ 90~**120**~150	-	-	-	-	-
	Gray Cast Iron	0.06~**0.1**~0.2	-	-	☆ 120~**180**~250	-	-	-
	Nodular Cast Iron	0.06~**0.08**~0.15	-	-	☆ 100~**150**~200	-	-	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.1	☆ 20~**30**~50	-	-	☆ 20~**30**~50	-	-
	Titanium Alloys	0.06~**0.08**~0.12	☆ 40~**60**~80	-	☆ 30~**50**~70	-	-	-
AM	Aluminum Alloys	0.06~**0.1**~0.2	-	-	-	-	★ 200~**600**~900	☆ 200~**500**~800

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

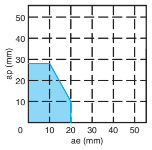
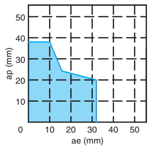
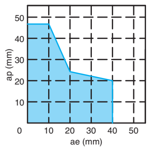
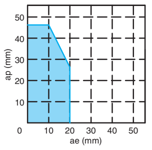
* Machining with coolant is recommended for Stainless Steel, Ni-base heat-resistant alloys and titanium alloys with MEWH.

★ : 1st Recommendation

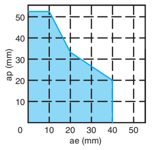
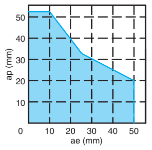
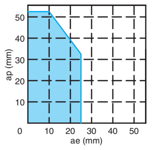
☆ : 2nd Recommendation

Cutting Performance

● LOMU1004 type

Cutting Dia.	Description	2 Flute	Description	3 Flute
		ap x ae		ap x ae
ø25	MEWH025 -S25-10-3-2T		-	-
ø32	MEWH032 -S32-10-4-2T		-	-
ø40	MEWH040 -S32-10-5-2T		MEWH040 -S32-10-5-3T	

● LOMU1505 type

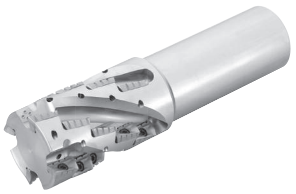
Cutting Dia.	Description	2 Flute	Description	3 Flute
		ap x ae		ap x ae
ø40	MEWH040 -S32-15-4-2T		-	-
ø50	MEWH050 -S42-15-4-2T		MEWH050 -S42-15-4-3T	

<Cutting Conditions>
- Vc=120m/min
- fz=0.08~0.12mm/t
- GM Chipbreaker
- Workpiece Material : SCM435
- Overhang Length
  End mill : Overhang length is "LH" of the dimension list

Shouldering | *Slotting | Facing

* Only for 2 flute type

MECH End Mill (with coolant hole for bottom insert)



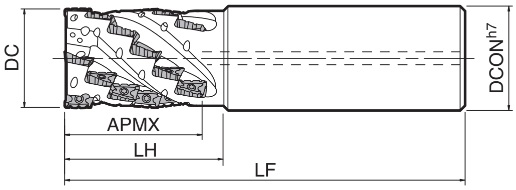


Fig. 1

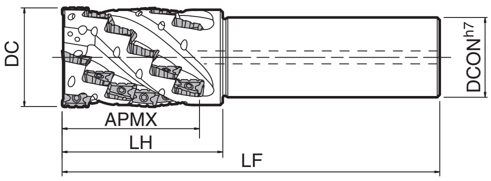


Fig. 2

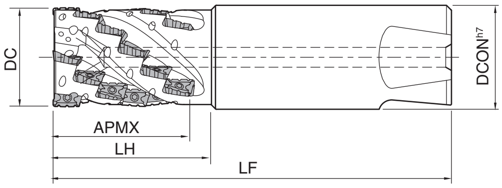


Fig. 3

(X-Treme Shank)

Toolholder Dimensions

Description	Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Rake Angle		Drawing	Spare Parts			Applicable Inserts ➔ M23
					DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.		Clamp Screw	Wrench	Anti-seize Compound	
MECH 025-S25-11-4-2T	●	2	4	8	25	25	120	46	37	+21°	-10°	Fig. 1	SB-2555TRG	DTM-8	P-37	BDMT11T308ER-N2 + BDMT11T308ER-N3
032-S32-11-5-2T	●		5	10	32	32	140	55	46	+23°	-9°					
032-S32-11-5-4T	●	4		20												
040-S32-11-6-4T	●		6	24	40		150	64	55		-8°	Fig. 2				
040-S42-11-6-4T	●					42	160					Fig. 1				
050-S42-11-7-4T	●		7	28	50		172	75	64		-7°	Fig. 2				
050-S42-11-7-6T	●	6		42												
MECH 040-S32-17-4-2T	●	2	4	8	40	32	160	73	59	+19°	-7°	Fig. 2	SB-4070TRN	DTM-15	P-37	BDMT170408ER-N3 + BDMT170408ER-N4
040-S42-17-4-2T	●					42	170					Fig. 1				
050-S42-17-5-4T	●	4	5	20	50		185	88	74		-6°	Fig. 2				
MECH 025S25-11-4-2TXT	●	2	4	8	25	25	127	46	37	+21°	-10°	Fig. 3	SB-2555TRG	DTM-8	P-37	BDMT11T308ER-N2 + BDMT11T308ER-N3
032S32-11-5-2TXT	●	2	5	10	32	32	142	55	46	+23°	-9°					
032S32-11-5-4TXT	●	4	5	20	32	32	142	55	46							

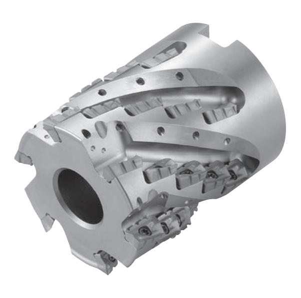
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.
MECH...XT Shank (X-Treme Shank) is for NIKKEN X-Treme chuck.

X-Treme Chuck [NIKKEN]

Description	See Page	Shank Dia. (DCON)	X-Treme Chuck			
			BT		HSK	
			BT40	BT50	HSK63A	HSK100A
4TFR 120-260-R◯◯-XT	**L21**	12.0	NBT40-C12EX-86	NBT50-C12EX-96	HSK63A-C12EX-96	HSK100A-C12EX-96
160-350-R◯◯-XT		16.0	NBT40-C16EX-96	NBT50-C16EX-106	HSK63A-C16EX-101	HSK100A-C16EX-106
200-450-R◯◯-XT		20.0	NBT40-C20EX-96	NBT50-C20EX-116	HSK63A-C20EX-106	HSK100A-C20EX-116
4JER 120-260-R◯◯-XT	**L29**	12.0	NBT40-C12EX-86	NBT50-C12EX-96	HSK63A-C12EX-96	HSK100A-C12EX-96
160-350-R◯◯-XT		16.0	NBT40-C16EX-96	NBT50-C16EX-106	HSK63A-C16EX-101	HSK100A-C16EX-106
200-450-R◯◯-XT		20.0	NBT40-C20EX-96	NBT50-C20EX-116	HSK63A-C20EX-106	HSK100A-C20EX-116
MEWH 025S25-10-3-2TXT	**M87**	25.0	-	NBT50-C25EX-116	-	HSK100A-C25EX-116
032S32-10-4-2TXT		32.0	-	NBT50-C32EX-121	-	HSK100A-C32EX-121
MECH 025S25-11-4-2TXT	**M90**	25.0	-	NBT50-C25EX-116	-	HSK100A-C25EX-116
032S32-11-5-◯TXT		32.0	-	NBT50-C32EX-121	-	HSK100A-C32EX-121

● : Std. Item

MECH Shell Mill (without coolant hole)



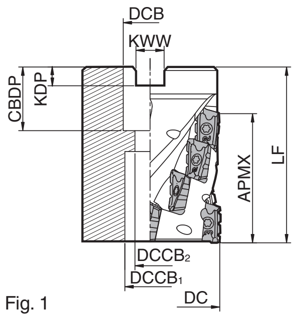


Fig. 1

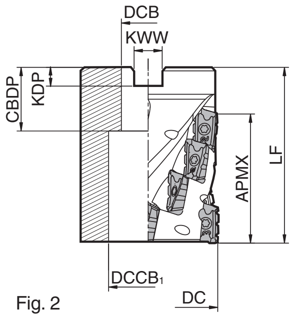


Fig. 2

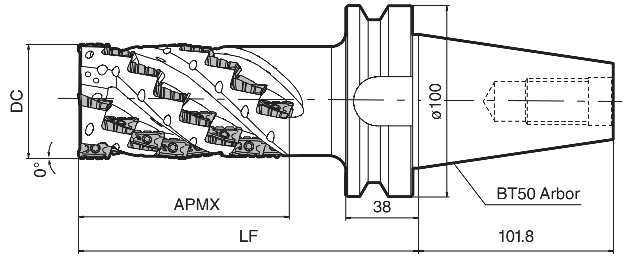
Rake Angle		
Description	A.R. (MAX.)	R.R.
MECH...-11-	+23°	-8°
MECH...-17-	+19°	-7°

Toolholder Dimensions

Description		Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)									Drawing	Spare Parts				Applicable Inserts ➜ M23
						DC	DCB	DCCB₁	DCCB₂	LF	CBDP	KDP	KWW	APMX		Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt	
MECH	**040R-11-4-4T-M**	●	4	4	16	40	16	15	9	50	19	5.6	8.4	37	Fig. 1	SB-2555TRG	DTM-8	P-37	HH8X25	BDMT11T308ER-N2 + BDMT11T308ER-N3
	050R-11-5-6T-M	●	6	5	30	50	22	18	11	63	21	6.3	10.4	46					HH10X30	
MECH	**050R-17-2-4T-M**	●	4	2	8	50	22	18	11	52	21	6.3	10.4	30		SB-4070TRN	DTM-15	P-37	HH10X30	BDMT170408ER-N3 + BDMT170408ER-N4
	050R-17-4-4T-M	●		4	16					78				59					HH10X40	
	063R-17-3-4T-M	●	4	3	12	63	27	20	14	70	24	7	12.4	45					HH12X35	
	080R-17-4-6T-M	●	6	4	24	80	32	26	18	85	28	8	14.4	59					HH16X45	
	100R-17-4-6T-M	●	6	4	24	100	40	56	-	85	30	9	16.4	59	Fig. 2				-	
MECH	**063R-17-3-4T**	●	4	3	12	63	25.4	20	14	70	26	6	9.5	45	Fig. 1	SB-4070TRN	DTM-15	P-37	HH12X35	
	080R-17-4-6T	●	6	4	24	80	31.75	26	18	85	32	8	12.7	59					HH16X45	
	100R-17-4-6T	●	6	4	24	100	38.1	56	-	85	38	10	15.9	59	Fig. 2				-	

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

MECH-BT50 (Integral Arbor type, without coolant hole)



Rake Angle		
Description	A.R. (MAX.)	R.R.
MECH...-11-	+23°	-7°
MECH...-17-	+19°	-7°

Toolholder Dimensions

Description		Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)			Weight (kg)	Spare Parts			Applicable Inserts ➜ M23
						DC	LF	APMX		Clamp Screw	Wrench	Anti-seize Compound	
MECH	**050R11-8-4T-BT50**	●	4	8	32	50	143	73	4.8	SB-2555TRG	DTM-8	P-37	BDMT11T308ER-N2 + BDMT11T308ER-N3
MECH	**050R17-7-4T-BT50**	●	4	7	28	50	173	104	4.9	SB-4070TRN	DTM-15	P-37	BDMT170408ER-N3 + BDMT170408ER-N4
	063R17-7-4T-BT50	●				63			5.9				
	080R17-7-4T-BT50	●				80			7.8				
	100R17-7-6T-BT50	●	6		42	100			10.2				

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

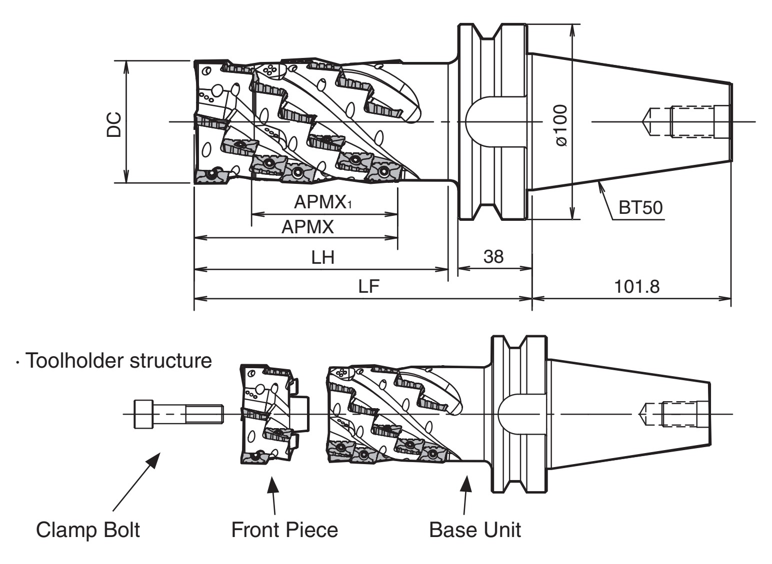
Applicable Inserts

Description	Applicable Inserts ➜ M23					
	 2-Notched	+	 3-Notched	 3-Notched	+	 4-Notched
MECH...-11-	**BDMT 11T308ER-N2**	**+**	**BDMT 11T308ER-N3**	-		
MECH...-17-	-			**BDMT 170408ER-N3**	**+**	**BDMT 170408ER-N4**

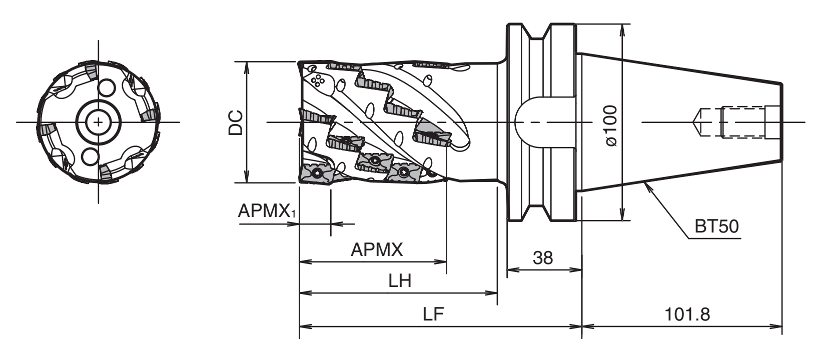
● : Std. Item

Recommended Cutting Conditions ➜ **M95**

MECH-BT50SA (without coolant hole) Arbor Integral Type (Base Unit + 1 Front Piece + Clamp Bolt)



MECH-BT50-A (without coolant hole) Base Unit



Toolholder Dimensions

Description			Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Rake Angle		Weight (kg)
							DC	LF	LH	APMX	APMX₁	A.R.	R.R.	
Arbor Integral Type	**MECH**	**050R11-4T-BT50SA**	MTO	4	8	32	50	143	99	73	55	+23°	-7°	4.8
		063R17-4T-BT50SA	MTO		7	28	63	173	130	104	75	+19°	-7°	5.8
		080R17-4T-BT50SA	MTO				80							7.6
		100R17-6T-BT50SA	MTO	6	7	42	100							9.8
Base Unit	**MECH**	**050R11-4T-BT50-A**	MTO	4	6	24	50	125	81	55	10	+23°	-7°	4.6
		063R17-4T-BT50-A	MTO		5	20	63	143	100	75	16	+19°	-7°	5.4
		080R17-4T-BT50-A	MTO				80							6.8
		100R17-6T-BT50-A	MTO	6	5	30	100							8.5

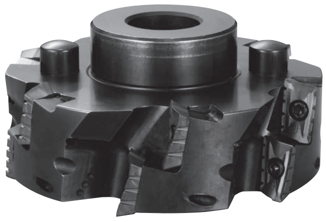
Recommended Cutting Conditions ➡ **M95**

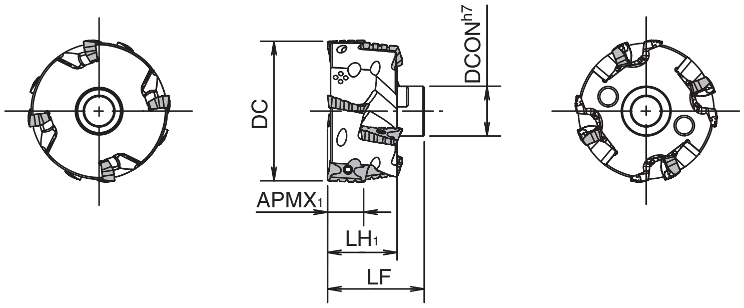
Toolholder structure

End Mill			Base Unit ➡ **M92**		Front Piece (1pc) ➡ **M93**		Clamp Bolt
MECH	**050R11-4T-BT50SA**	=	**MECH050R11-4T-BT50-A**	+	**MECH050R11-4T-F**	+	**HH12X35**
	063R17-4T-BT50SA		**MECH063R17-4T-BT50-A**		**MECH063R17-4T-F**		**HH12X40**
	080R17-4T-BT50SA		**MECH080R17-4T-BT50-A**		**MECH080R17-4T-F**		**HH16X40**
	100R17-6T-BT50SA		**MECH100R17-6T-BT50-A**		**MECH100R17-6T-F**		**HH20X40**

MTO : Made to order

MECH-F (without coolant hole) Front Piece





Toolholder Dimensions

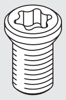
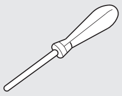
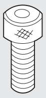
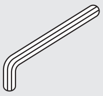
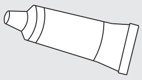
Description		Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Rake Angle		Weight (kg)
						DC	DCON	LF	LH1	APMX1	A.R.	R.R.	
MECH	**050R11-4T-F**	●	4	2	8	50	22	32	18	10	+23°	-7°	0.2
	063R17-4T-F	●				63	22	44	30	16	+19°	-7°	0.4
	080R17-4T-F	●				80	32						0.8
	100R17-6T-F	●	6	2	12	100	45						1.3

Applicable Inserts

End Mill		Base Unit ➔ M92	Front Piece ➔ M93	Applicable Inserts ➔ M23
MECH	**050R11-4T-BT50SA**	**MECH050R11-4T-BT50-A**	**MECH050R11-4T-F**	**BDMT11T308ER-N2** **+** **BDMT11T308ER-N3**
	063R17-4T-BT50SA	**MECH063R17-4T-BT50-A**	**MECH063R17-4T-F**	**BDMT170408ER-N3** **+** **BDMT170408ER-N4**
	080R17-4T-BT50SA	**MECH080R17-4T-BT50-A**	**MECH080R17-4T-F**	
	100R17-6T-BT50SA	**MECH100R17-6T-BT50-A**	**MECH100R17-6T-F**	

· For installation of notched insert, see page ➔ **M95**.

Spare Parts

Description			Spare Parts				
			Clamp Screw	Wrench (for Clamp Screw)	Clamp Bolt	Wrench (for Clamp Bolt)	Anti-seize Compound
							
Arbor Integral Type (Set)	**MECH**	**050R11-4T-BT50SA**	SB-2555TRG	DTM-8	HH12X35	LW-10	P-37
		063R17-4T-BT50SA	SB-4070TRN	DTM-15	HH12X40	LW-10	
		080R17-4T-BT50SA			HH16X40	LW-14	
		100R17-6T-BT50SA			HH20X40	LW-17	
Base Unit	**MECH**	**050R11-4T-BT50-A**	SB-2555TRG	DTM-8	HH12X35	LW-10	
		063R17-4T-BT50-A	SB-4070TRN	DTM-15	HH12X40	LW-10	
		080R17-4T-BT50-A			HH16X40	LW-14	
		100R17-6T-BT50-A			HH20X40	LW-17	
Front Piece	**MECH**	**050R11-4T-F**	SB-2555TRG	-	-	-	
		063R17-4T-F	SB-4070TRN				
		080R17-4T-F					
		100R17-6T-F					

· If you purchased the front piece only, wrench (for clamp screw) / clamp bolt and wrench (for clamp bolt) is not included.

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

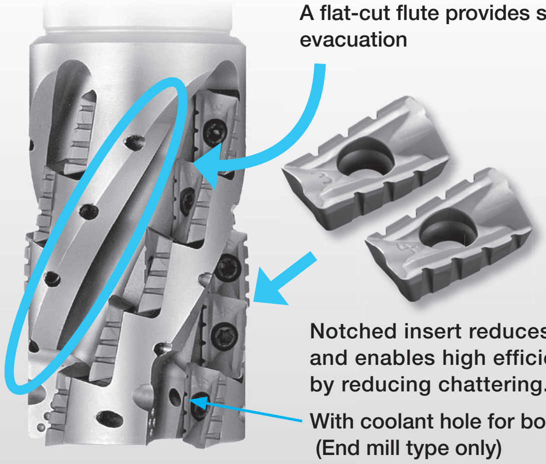
MECH

Smooth Chip Evacuation

Smooth Chip Evacuation

Notched insert breaks chips into small pieces

Workpiece Material : SS400
Vc = 120m/min
apxae = 40mmx10mm
fz = 0.12mm/t
MECH032-S32-11-5-4T



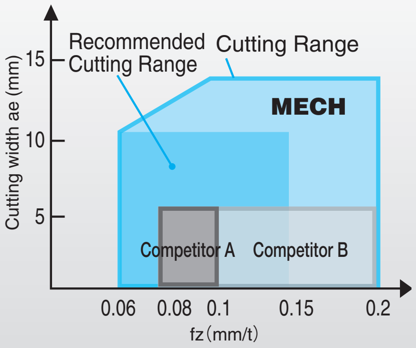
A flat-cut flute provides smooth chip evacuation

Notched insert reduces cutting force, and enables high efficiency machining by reducing chattering.

With coolant hole for bottom insert (End mill type only)

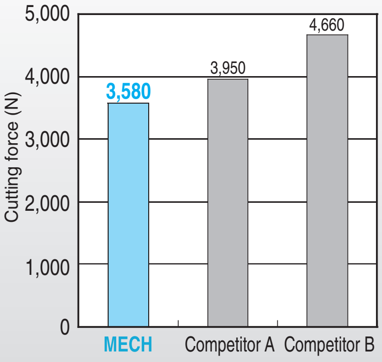
Low Cutting Force

Low Cutting Force due to Notched Inserts



Workpiece Material : S50C
Vc = 120m/min
apxae = 40 mmx5~13mm
fz = 0.06 ~ 0.2mm/t
MECH032-S32-11-5-4T

Cutting Force Comparison (principal force)



Workpiece Material : S50C
Vc = 120m/min
apxae = 40mmx10mm
fz = 0.1mm/t
MECH032-S32-11-5-4T

(Internal evaluation)

Number of Inserts Installed

Description	No. of Flutes	No. of Inserts	No. of Inserts			
			BDMT11T308ER-		BDMT170408ER-	
			 N2	 N3	 N3	 N4
MECH 025-S25-11-4-2T	2	8	4	4	-	-
032-S32-11-5-2T		10	5	5		
032-S32-11-5-4T	4	20	10	10		
040-S32-11-6-4T		24	12	12		
040-S42-11-6-4T						
050-S42-11-7-4T		28	14	14		
050-S42-11-7-6T	6	42	21	21		
MECH 040-S32-17-4-2T	2	8	-	-	4	4
040-S42-17-4-2T						
050-S42-17-5-4T	4	20			10	10
MECH 040R-11-4-4T-M	4	16	8	8	-	-
050R-11-5-6T-M	6	30	15	15		
MECH 050R-17-2-4T-M	4	8	-	-	4	4
050R-17-4-4T-M		16			8	8
063R-17-3-4T-M		12			6	6
080R-17-4-6T-M	6	24			12	12
100R-17-4-6T-M						
MECH 063R-17-3-4T	4	12			6	6
080R-17-4-6T	6	24			12	12
100R-17-4-6T						

Description	No. of Flutes	No. of Inserts	No. of Inserts			
			BDMT11T308ER-		BDMT170408ER-	
			 N2	 N3	 N3	 N4
MECH 050R11-8-4T-BT50	4	32	16	16	-	-
050R17-7-4T-BT50		28	-	-	14	14
063R17-7-4T-BT50						
080R17-7-4T-BT50						
100R17-7-6T-BT50	6	42			21	21
MECH 050R11-4T-BT50SA	4	32	16	16	-	-
063R17-4T-BT50SA	4	28	-	-	14	14
080R17-4T-BT50SA						
100R17-6T-BT50SA	6	42	-	-	21	21
MECH 050R11-4T-BT50-A	4	24	12	12	-	-
063R17-4T-BT50-A	4	20	-	-	10	10
080R17-4T-BT50-A						
100R17-6T-BT50-A	6	30	-	-	15	15
MECH 050R11-4T-F	4	8	4	4	-	-
063R17-4T-F	4	8	-	-	4	4
080R17-4T-F						
100R17-6T-F	6	12	-	-	6	6

Caution when installing Notched Insert

1. Install notched inserts by cutting the insert with the number of marks on the toolholder body.

<Insert Number and Toolholder Marks>

Insert Size	11 type		17 type	
Insert No.	2	3	3	4
Marks				

* Using the cutter with the inserts installed incorrectly will damage the toolholder.

2. When installing notched inserts in flute line, ensure that the number on the insert is the same as the insert in first stage. (Ref. to Fig. 1, 2 and 3)

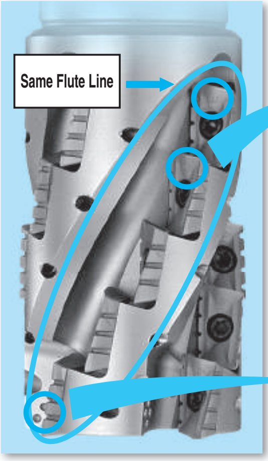


Fig. 1 Same flute line

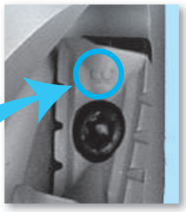


Fig. 2 Insert No.

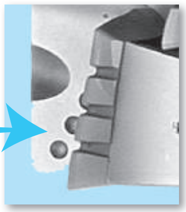


Fig. 3 Marks

Recommended Cutting Conditions (When using a notched insert)

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)			
		MEGACOAT NANO	MEGACOAT		
		PR1535	PR1225	PR1230	PR1210
Carbon Steel	0.08~0.1~0.15	☆ 120~180~250	☆ 120~180~250	★ 120~180~220	-
Alloy Steel	0.08~0.1~0.15	☆ 100~160~220	☆ 100~160~220	★ 100~160~200	-
Mold Steel	0.08~0.1~0.15	☆ 80~140~180	☆ 80~140~180	★ 80~140~160	-
Gray Cast Iron	0.08~0.15~0.18	-	-	-	★ 120~180~250
Nodular Cast Iron	0.08~0.15~0.18	-	-	-	★ 100~150~220
*Titanium Alloys	0.08~0.1~0.15	★ 40~60~80	-	-	☆ 30~50~70

★ : 1st Recommendation ☆ : 2nd Recommendation

* Machining with coolant is recommended for titanium alloys.

1. The recommended cutting conditions above are for notched inserts.
2. If using an insert without notch, the cutting depth (ap) and width (ae) should be 60% or less of those of a notched insert.

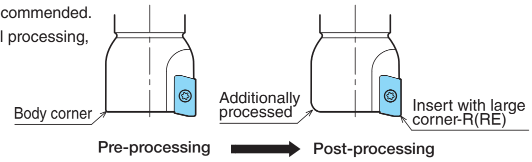
· JA Chipbreaker

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)
		Carbide
		GW25
Aluminum Alloys (Si 13% or less)	0.05~0.3	200~800
Aluminum Alloys (Si 13% and over)	0.05~0.2	200~300

■ When using inserts with corner-R(RE) 1.6 or larger, additional modifications of the cutter body will be necessary. Ref. to the chart below for the recommended modifications. (Additional grind off is not necessary when corner-R(RE) is 1.2mm or less.)

Insert Corner-R(RE) (mm)	Additional Processing Dimension to Body Corner (mm)
1.6	R1.0
2.0	
2.4	R1.2
3.1	R1.6
4.0	R2.5

* Round- shaped additional processing is recommended. When applying chamfer shaped additional processing, do not cut away too much.



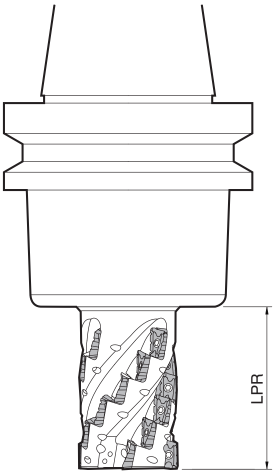
MECH

Cutting Performance (Used Machine: Machining center equivalent to AC15 / 18.5kW)

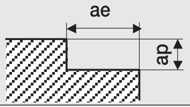
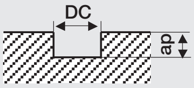
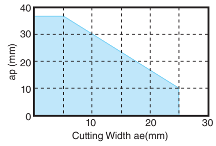
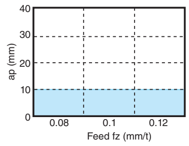
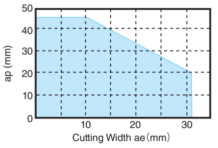
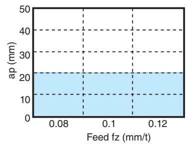
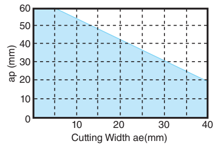
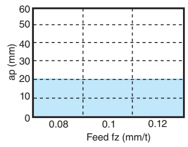
MECH End Mill

Cutting Dia.	Description	Overhang Length LPR (mm)
ø25	**MECH025-S25-11-4-2T**	48
ø32	**MECH032-S32-11-5-2T**	57
	MECH032-S32-11-5-4T	
ø40	**MECH040-S32-11-6-4T**	65
	MECH040-S42-11-6-4T	
ø50	**MECH050-S42-11-7-4T**	76
	MECH050-S42-11-7-6T	
ø40	**MECH040-S32-17-4-2T**	74
	MECH040-S42-17-4-2T	
ø50	**MECH050-S42-17-5-4T**	89

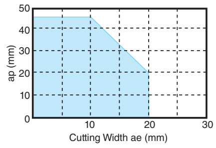
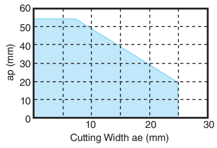
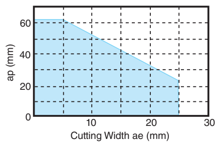
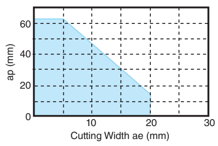
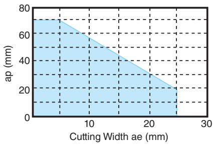
Shape



2 Flute Type (Workpiece Material : S50C)

Description	■ Shouldering	■ Slotting
		
	Cutting Speed : Vc=100~180m/min Feed : fz=0.08~0.15mm/t	Cutting Speed : Vc=100~120m/min Feed : fz=0.08~0.12mm/t
MECH025-S25-11-4-2T		
MECH032-S32-11-5-2T		
MECH040-S32-17-4-2T **MECH040-S42-17-4-2T**		

4 Flute / 6 Flute Type

MECH032-S32-11-5-4T	
MECH040-S32-11-6-4T **MECH040-S42-11-6-4T**	
MECH050-S42-11-7-4T	
MECH050-S42-11-7-6T	
MECH050-S42-17-5-4T	

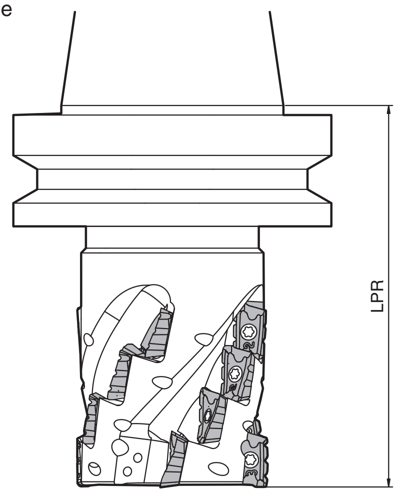
4 Flute / 6 Flute Type are not recommended for Slotting.

MECH Shell Mill

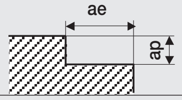
(Workpiece Material : S50C)

Cutting Dia.	Description	Overhang Length LPR (mm)
ø40	**MECH040R-11-4-4T-M**	125
ø50	**MECH050R-11-5-6T-M**	123
	MECH050R-17-2-4T-M	112
	MECH050R-17-4-4T-M	138
ø63	**MECH063R-17-3-4T-□**	115
ø80	**MECH080R-17-4-6T-□**	130
ø100	**MECH100R-17-4-6T-□**	130

Shape

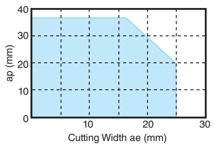


■ Shouldering

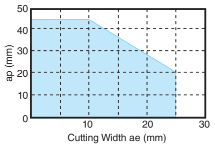


Cutting Speed : Vc=100~180m/min
Feed : fz=0.08~0.15mm/t

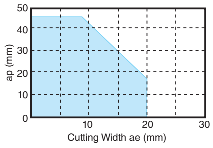
MECH040R-11-4-4T-M



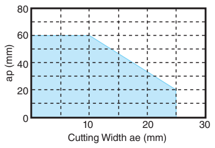
MECH063R-17-3-4T-□



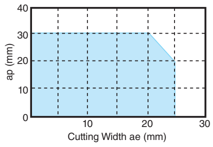
MECH050R-11-5-6T-M



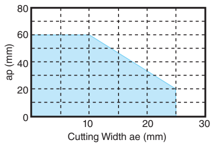
MECH080R-17-4-6T-□



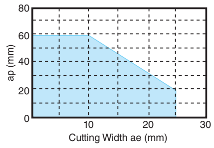
MECH050R-17-2-4T-M



MECH100R-17-4-6T-□



MECH050R-17-4-4T-M



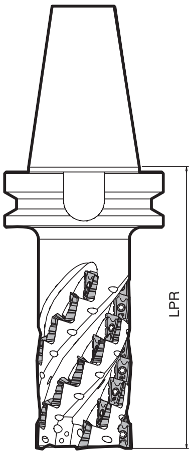
Slotting is not recommended.

MECH-BT50 (Integral Arbor Type)
MECH-BT50SA (Head exchangeable type / Integral Arbor type)

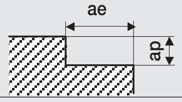
(Workpiece Material : S50C)

Cutting Dia.	Description	Overhang Length LPR (mm)
ø50	**MECH050R11-8-4T-BT50** **MECH050R11-4T-BT50SA**	143
	MECH050R17-7-4T-BT50	173
ø63	**MECH063R17-7-4T-BT50** **MECH063R17-4T-BT50SA**	
ø80	**MECH080R17-7-4T-BT50** **MECH080R17-4T-BT50SA**	
ø100	**MECH100R17-7-6T-BT50** **MECH100R17-6T-BT50SA**	

Shape

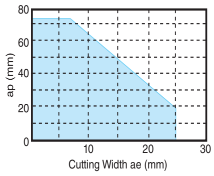


■ Shouldering

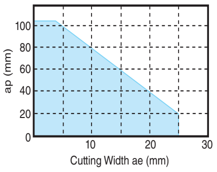


Cutting Speed : Vc=100~180m/min
Feed : fz=0.08~0.15mm/t

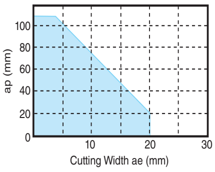
MECH050R11-8-4T-BT50
MECH050R11-4T-BT50SA



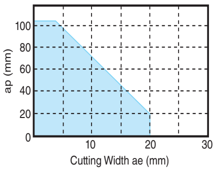
MECH080R17-7-4T-BT50
MECH080R17-4T-BT50SA



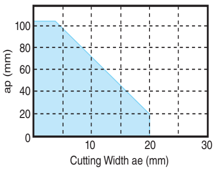
MECH050R17-7-4T-BT50



MECH100R17-7-6T-BT50
MECH100R17-6T-BT50SA



MECH063R17-7-4T-BT50
MECH063R17-4T-BT50SA



Slotting is not recommended.

Helical End Mill for Titanium Alloy Machining

MECHT

Insert Size Combination Improves Roughing Capabilities

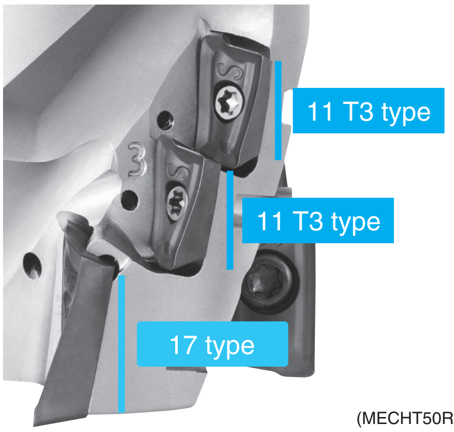
Maintains Stable Machining and Long Tool Life

1 Developed to Reduce Chattering and Chip Recutting Issues

Unique Insert Combination

The larger bottom inserts are positioned to handle larger cutting forces (excluding ø32)

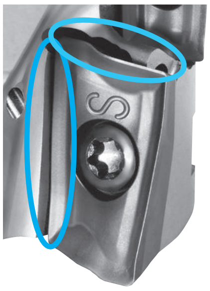
Stable machining with improved fracture resistance



(MECHT50R-1711 type)

New Design for Higher Reliability

Bottom inserts are held in place by double-faced contacts



Holding Surface 1

Wide Holding Surface

Holding Surface 2

Additional Hold in the Axial Direction

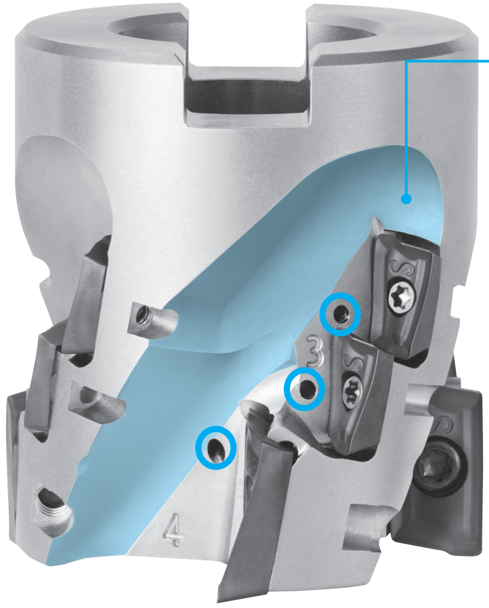
Bore Dia.

Larger bore diameter improves fastening power and reduces chattering

ø50mm Cutter with a ø27mm Bore (Conventional Bore : ø22mm)

Toolholder Hardness Hardened 15% more than conventional holders

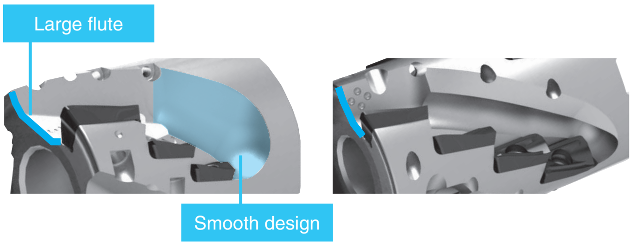
Toolholder Spec Custom ordering available (Custom number of inserts and stages)



Excellent Chip Evacuation

New flute design

Large, smooth flutes prevent chip clogging



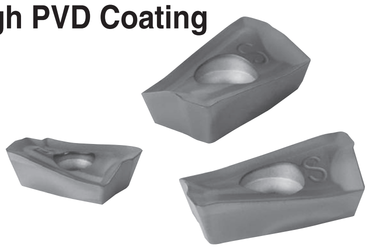
All inserts have coolant holes

Optimized hole diameter controls flow amount and pressure

Smooth chip evacuation as well as superior cooling of the cutting edge

Chips Example

2 Longer Tool Life with Low-resistance JS Chipbreaker and Tough PVD Coating



Low Cutting Force JS Chipbreaker

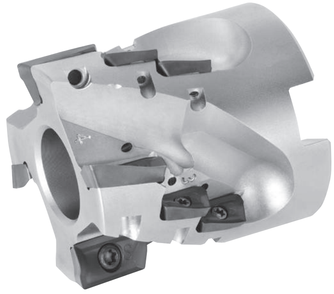
Heat at the cutting edge is suppressed due to sharp cutting performance

Long tool life

Greater Toughness PR1535

Fracture resistant with a tough substrate and high heat-resistant MEGACOAT NANO coating technology

MECHT



End Mill

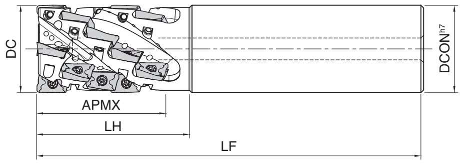


Fig.1

Shell Mill

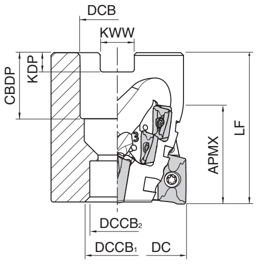


Fig.2

Rake Angle			
Description		A.R. (MAX.)	R.R.
MECHT32...-11-		+23°	-9°
MECHT50...-1711-	1st Stage	+19°	-7°
	2nd Stage or Higher	+23°	-6°
MECHT63...-17-		+19°	-7°
MECHT80...-17-			

Toolholder Dimensions (End Mill)

Description	Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Drawing	Spare Parts		Applicable Inserts	
											Clamp Screw	Wrench	1st Stage	2nd Stage or Higher
					DC	DCON	LF	LH	APMX					
MECHT 32-S32-11-5-4T	●	4	5	20	32	32	140	55	46	Fig.1	SB-2555TRG	DTM-8	BDMT11T3…	[1] BDMT11T308…

Toolholder Dimensions (Shell Mill)

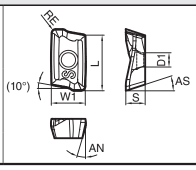
Description	Stock	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)									Drawing	Spare Parts			Applicable Inserts	
															Clamp Screw	Wrench	Mounting bolt	1st Stage	2nd Stage or Higher
					DC	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX						
MECHT50R-1711-3-4T-M	●	4	3	12	50	27	20	14	55	24	7	12.4	34	Fig.2	SB-2555TRG	DTM-8	HH12X40	BDMT1704…	[1] BDMT11T308…
50R-1711-4-5T-M	●	5	4	20					65				43		SB-4070TRN	DTM-15	HH12X50		
MECHT63R-17-4-5T-M	●	5	4	20	63	27	20	14	80	24	7	12.4	60		SB-4070TRN	DTM-15	HH12X65		[1] BDMT170408…
80R-17-4-6T-M	●	6	4	24	80	32	26	17		28	8	14.4					HH16X65		

[1] Use inserts with Corner R of 0.8 or less for the 2nd or higher stages

Machining with coolant is recommended (Internal coolant pressure 1.5 MPa or higher)

Coat Anti-seize Compound (P-37) thinly on portion of taper and thread when insert is fixed.

Applicable Inserts

Insert Handed Insert shows Right-hand		Description		Dimension (mm)					Angle		MEGACOAT NANO
				W1	S	D1	L	RE	AS	AN	PR1535
 Low cutting force		**BDMT**	**11T302ER-JS**	6.7	3.8	2.8	11.0	0.2	18°	13°	●
			11T304ER-JS					0.4			●
			11T308ER-JS					0.8			●
		BDMT	**170404ER-JS**	9.6	4.9	4.4	17.0	0.4	18°	13°	●
			170408ER-JS					0.8			●

General JT chipbreaker and notched insert (only if holder has an even number of inserts) can also be used. For more information, please contact your KYOCERA sales representative.

When using inserts with corner-R(RE) 1.6 or larger, additional modifications of the cutter body will be necessary. (Ref. to **M95**)

Recommended Cutting Conditions

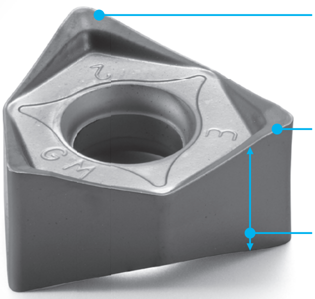
Workpiece Material	Applications	Depth of Cut (mm)		fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)
					MEGACOAT NANO
		ap	ae		PR1535
Titanium Alloys	Shouldering	~Length of Cut (APMX)	~0.5DC	0.1 ~ **0.12** ~ 0.16	30 ~ **40** ~ 60
	Slotting	~0.5DC	1DC	0.05 ~ **0.07** ~ 0.09	30 ~ **40** ~ 50

● : Std. Item

MFWN

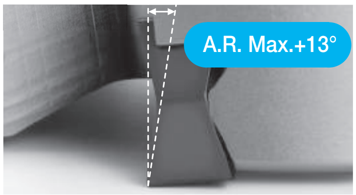
Double-Sided, 6-edge insert, 90˚Cutters
Low cutting force and reduced chattering

6 Advantages

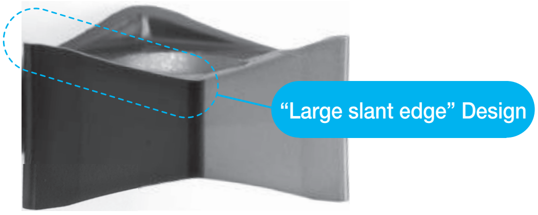


Advantage 1 Sharp cutting with low cutting force

- Sharp cutting by large rake angle



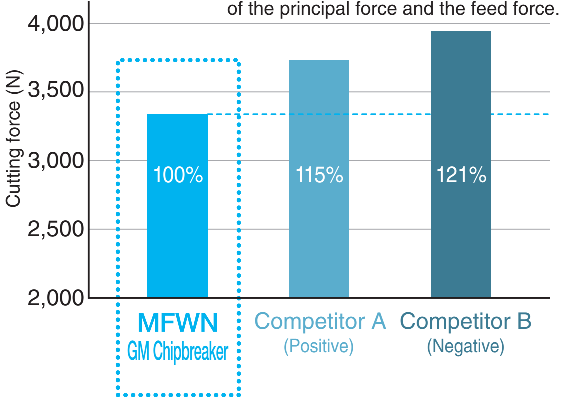
- "Large slant edge" Design reduces shock when cutting edge enters the workpiece



- Cutting Force Comparison
(Internal evaluation)

<Cutting Conditions>
Vc = 180m/min
ap×ae = 7×110mm
fz = 0.2mm/t
Workpiece Material : S50C
ø125mm Cutter

* Cutting force is the resultant force of the principal force and the feed force.



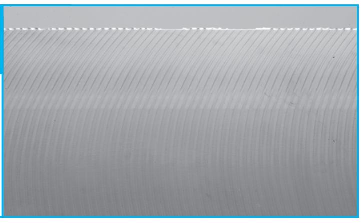
Advantage 2 Reduced chattering

Applicable to long overhang

- Surface Finish Comparison (Internal evaluation)

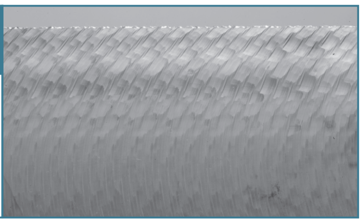
MFWN

No Chattering



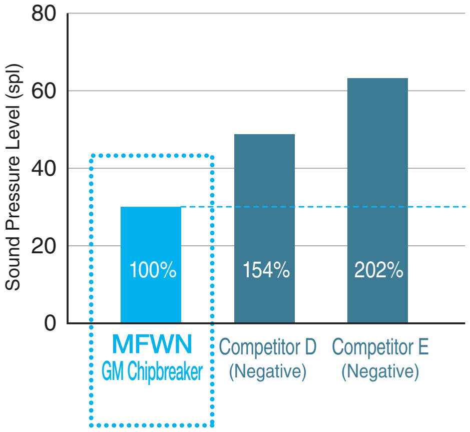
Competitor C

Chattering occurred

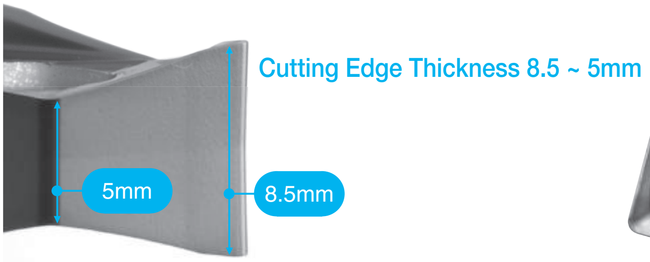


- Machining Noise Comparison (Internal evaluation)

<Cutting Conditions>
Vc = 200m/min
ap×ae = 3×15mm
fz = 0.1mm/t
Workpiece Material : S50C
ø80mm Cutter (7 Flutes)



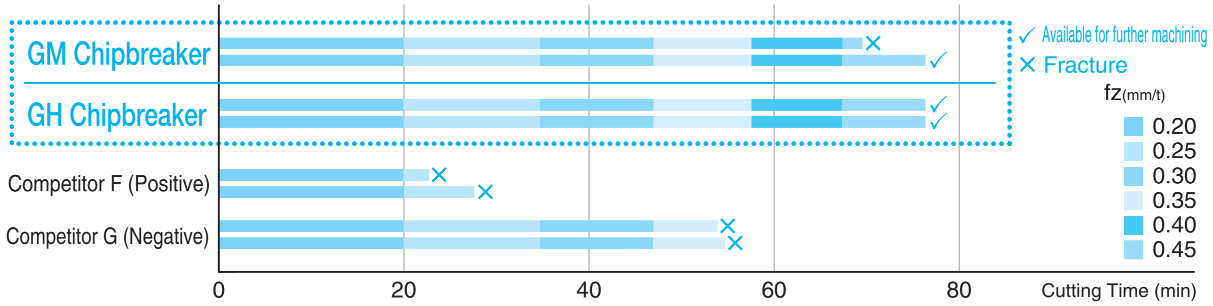
Advantage 3 Superior Fracture Resistance with Thick Edge Design



<Cutting Conditions>

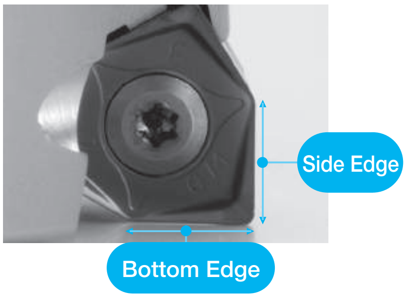
Workpiece Material : SCM440H(38~42HS) Interruption with a slot on the workpiece
Vc = 100m/min apxae = 2×100mm fz = 0.2~0.45 mm/t Dry

● **Fracture Resistance Comparison** (Internal evaluation)



Advantage 4 Neutral

For Vertical Machining as well as Facing
Neutral Inserts are applicable to left-hand cutters (custom order).



Applicable to a wide range of application

Advantage 5

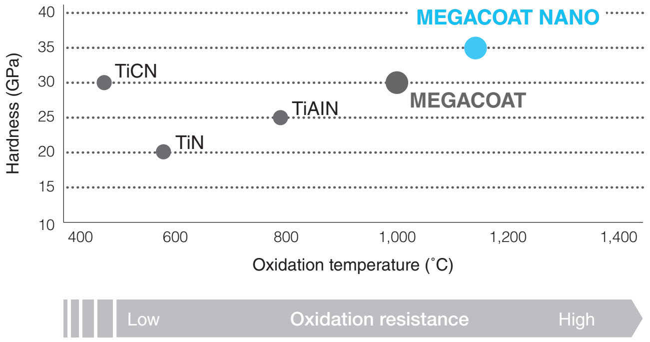
Extended Tool Life by MEGACOAT NANO Technology

PR1525 for steel and stainless steel (austenitic), PR1535 for titanium alloys and stainless steel (precipitation hardening) and PR1510 for cast iron are available.

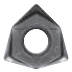
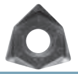
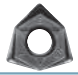
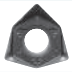
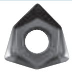
Prevents wear and fracture with high hardness (35GPa) and superior oxidation resistance (oxidation temperature : 1,150˚C)

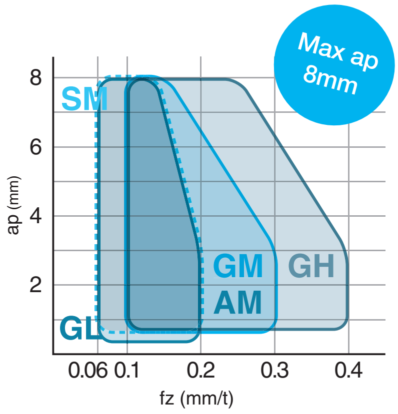
CA6535 (CVD coated carbide) for heat-resistant alloys and stainless steel (martensitic) is available, too.

Properties of Coating

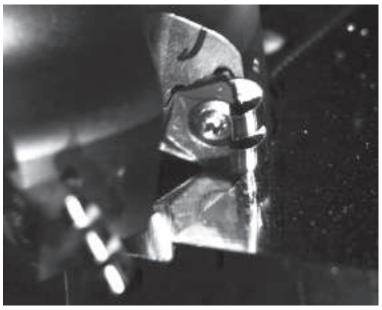


Advantage 6 5 chipbreakers for various applications

Chipbreaker	Applications	Insert
GM	General purpose	
SM	Low cutting force	
GH	For Heavy Milling	
GL	Surface-Finish Oriented	
AM	Non-ferrous Metals	

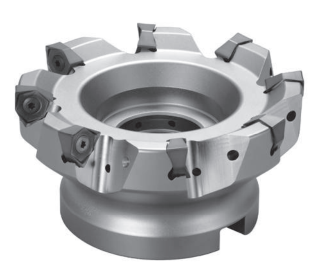


Smooth chip evacuation



Properly curled chips
(The photo was taken by a high speed camera.)

MFWN Face Mill



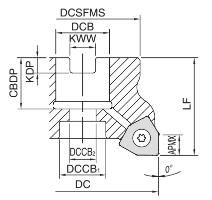


Fig. 1

Rake Angle	A.R.	R.R.	
	(MAX.) +13°	DC=63 -10° DC=80 -9° DC=100 -8°	DC=125 -7.5° DC=160-250 -7°

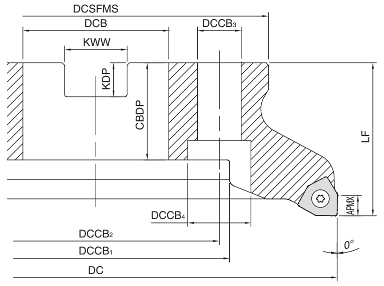


Fig. 4

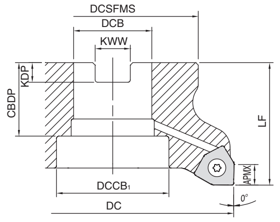


Fig. 2

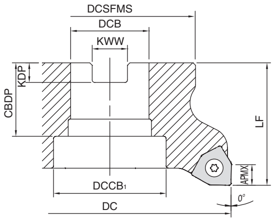


Fig. 3

Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)											Drawing	Weight (kg)	Shim	Max. Revolution (min^{-1})	Coolant Hole
					DC	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	DCCB$_3$	DCCB$_4$					
Metric	Coarse pitch	**MFWN 90063R-3T-M**	●	3	63	47	22	19	11	40	21	6.3	10.4	-	-	Fig. 1	0.5	Yes	14,000	Yes
		90080R-4T-M	●	4	80	60	27	20	13	50	24	7	12.4				1.0		12,000	
		90100R-5T-M	●	5	100	70	32	46	-		30	8	14.4			Fig. 2	1.3		10,500	
		90125R-6T-M	●	6	125	87	40	55		63	33	9	16.4				2.5		9,500	
		90160R-8T-M	●	8	160	102		68	66.7		32			14	20	Fig. 4	3.8		8,000	No
		90200R-10T-M	●	10	200	142	60	110	101.6		40	14	25.7	18	26		6.0		7,500	
		90250R-12T-M	●	12	250												8.4		6,500	
	Fine pitch	**MFWN 90063R-4T-M**	●	4	63	47	22	19	11	40	21	6.3	10.4	-	-	Fig. 1	0.5	No	16,000	Yes
		90080R-5T-M	●	5	80	60	27	20	13	50	24	7	12.4				1.0		13,500	
		90100R-7T-M	●	7	100	70	32	46	-		30	8	14.4			Fig. 2	1.3		12,000	
		90125R-8T-M	●	8	125	87	40	55		63	33	9	16.4				2.6		10,500	
		90160R-10T-M	●	10	160	102		68	66.7		32			14	20	Fig. 4	3.9		9,000	No
		90200R-12T-M	●	12	200	142	60	110	101.6		40	14	25.7	18	26		6.3		8,000	
		90250R-14T-M	●	14	250												8.7		7,000	
	Extra fine pitch	**MFWN 90063R-5T-M**	●	5	63	47	22	19	11	40	21	6.3	10.4	-	-	Fig. 1	0.5	No	16,000	Yes
		90080R-7T-M	●	7	80	60	27	20	13	50	24	7	12.4				1.1		10,500	
		90100R-9T-M	●	9	100	70	32	46	-		30	8	14.4			Fig. 2	1.3		9,500	
		90125R-12T-M	●	12	125	87	40	55		63	33	9	16.4				2.6		8,000	
		90160R-14T-M	●	14	160	102		68	66.7		32			14	20	Fig. 4	3.9		7,000	No
Bore Dia. Inch spec	Coarse pitch	**MFWN 90080R-4T**	●	4	80	60	25.4	20	13	50	27	6	9.5	-	-	Fig. 1	1.0	Yes	12,000	Yes
		90100R-5T	●	5	100	70	31.75	46	-		34	8	12.7			Fig. 2	1.3		10,500	
		90125R-6T	●	6	125	87	38.1	55		63	38	10	15.9				2.6		9,500	
		90160R-8T	●	8	160	102	50.8	72				11	19.1			Fig. 3	3.9		8,000	No
		90200R-10T	●	10	200	142	47.625	110	101.6		40	14	25.4	18	26	Fig. 4	6.3		7,500	
		90250R-12T	●	12	250												8.7		6,500	
	Fine pitch	**MFWN 90080R-5T**	●	5	80	60	25.4	20	13	50	27	6	9.5	-	-	Fig. 1	1.0	No	13,500	Yes
		90100R-7T	●	7	100	70	31.75	46	-		34	8	12.7			Fig. 2	1.4		12,000	
		90125R-8T	●	8	125	87	38.1	55		63	38	10	15.9				2.7		10,500	
		90160R-10T	●	10	160	102	50.8	72				11	19.1			Fig. 3	4.0		9,000	No
		90200R-12T	●	12	200	142	47.625	110	101.6		40	14	25.4	18	26	Fig. 4	6.6		8,000	
		90250R-14T	●	14	250												8.9		7,000	
	Extra fine pitch	**MFWN 90080R-7T**	●	7	80	60	25.4	20	13	50	27	6	9.5	-	-	Fig. 1	1.1	No	10,500	Yes
		90100R-9T	●	9	100	70	31.75	46	-		34	8	12.7			Fig. 2	1.3		9,500	
		90125R-12T	●	12	125	87	38.1	55		63	38	10	15.9				2.7		8,000	
		90160R-14T	●	14	160	102	50.8	72				11	19.1			Fig. 3	4.1		7,000	No
		90200R-16T	●	16	200	142	47.625	110	101.6		40	14	25.4	18	26	Fig. 4	6.7		6,500	
		90250R-18T	●	18	250												9.1		5,500	

*APMX : 8mm

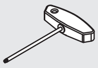
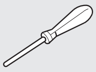
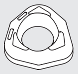
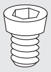
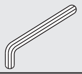
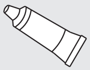
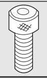
Applicable Inserts ➔ **M21**

Max. Revolution

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

● : Std. Item

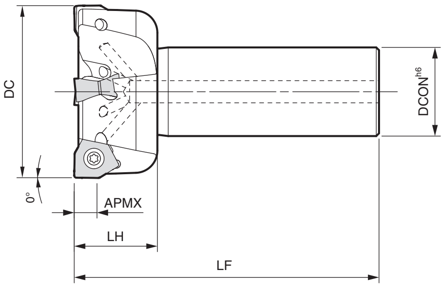
Spare Parts

	Description	Spare Parts							
		Clamp Screw	Wrench		Shim	Shim Screw	Wrench	Anti-seize Compound	Mounting bolt
			TTW	DTM					
									
Coarse pitch	**MFWN 90063R-3T-M**	SB-50140TR	TTW-15	-	MFWN-90	SPW-7050	LW-5	P-37	HH10X30
	MFWN 90080R-4T(-M)								HH12X35
	MFWN 90100R-5T(-M) ~ **90250R-12T(-M)**	Recommended tightening torque for Insert Clamp 4.2N · m			Recommended tightening torque for Shim Clamp 6.0N · m				-
Fine pitch	**MFWN 90063R-4T-M**	SB-50140TR	TTW-15	-	-	-	-	P-37	HH10X30
	MFWN 90080R-5T(-M)								HH12X35
	MFWN 90100R-7T(-M) ~ **90250R-14T(-M)**	Recommended tightening torque for Insert Clamp 4.2N · m							-
Extra fine pitch	**MFWN 90063R-5T-M**	SB-50140TR	TTW-15	-	-	-	-	P-37	HH10X30
	MFWN 90080R-7T(-M)	SB-40140TRN	-	DTM-15					HH12X35
	MFWN 90100R-9T(-M) ~ **90250R-18T(-M)**	Recommended tightening torque for Insert Clamp 3.5N · m							-

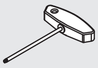
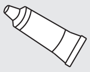
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➡ **M104**

MFWN with cylindrical shank (with Coolant Hole)



Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)					Rake Angle		Max. Revolution (min^{-1})	Coolant Hole	Spare Parts		
			DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	Anti-seize Compound
														
MFWN 90050R-S32-3T	●	3	50	32	110	30	8	+13°	-12°	18,500	Yes	SB-50140TR	TTW-15	P-37
90063R-S32-4T	●	4	63						-10°	16,000		Tightening Torque 4.2N · m		
90080R-S32-5T	●	5	80						-9°	13,500				

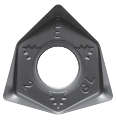
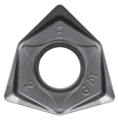
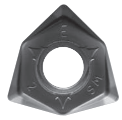
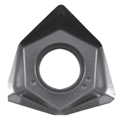
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Applicable Inserts ➡ **M21**

■ Max. Revolution

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Applicable Inserts

Description	Applicable Inserts ➡ **M21**				
	 Surface-Finish Oriented (Precision Class)	 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)	 Non-ferrous Metals
MFWN90…	**WNEU 080608EN-GL**	**WNMU 0806..EN-GM**	**WNMU 080608EN-SM**	**WNMU 080608EN-GH**	**WNGT 080608FN-AM**

● : Std. Item

MFWN

How to mount an insert

1. Be sure to remove dust and chips from the insert mounting pocket.
2. After applying anti-seize compound on portion of taper and thread, attach the screw to the front end of the wrench. While lightly pressing the insert against the constraint surfaces, put the screw into the hole of the insert and tighten. (Ref. to Fig. 1)
3. When tightening the screw, make sure that the wrench is parallel to the screw.
   Remember that the screw hole of the toolholder for Extra fine pitch is inclined to the bearing surface. (Ref. to Fig. 2 and Fig. 3)
4. Be careful not to tighten the screw with excessive torque.
   Recommended tightening torque is 4.2N·m for M5 screw (SB-50140TR) and 3.5N·m for M4 screw (SB-40140TRN).
5. After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the toolholder or between the insert side surfaces and the constraint surface of the toolholder. If there is any clearance, remove the insert and mount it again according to the above steps.
6. To change the cutting edge of the insert, turn the insert counterclockwise (Ref. to Fig. 4). The insert corner identification number is stamped on the top surface of the insert.


Fig. 1

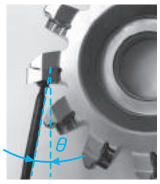


Fig. 2

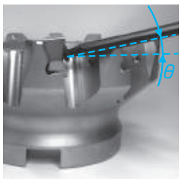


Fig. 3

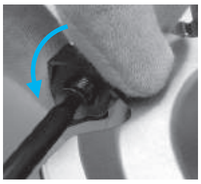


Fig. 4

How to replace a shim (for coarse pitch)

1. Be sure to remove dust and chips from the insert mounting pocket.
2. The shim must be mounted in the proper direction. While aligning the surface of the shim with the mark on it to the corresponding constraint surface (Ref. to Fig. 1) and lightly pressing the shim toward the constraint surface (Ref. to Fig. 2), insert the screw into the hole of the shim and tighten (Ref. to Fig. 3). When tightening the screw, make sure that the screw is vertical to the bearing surface (Recommended tightening torque is 6.0N·m).
3. After tightening the screw, make sure that there is no clearance between the shim seat surface and the bearing surface. If there is any clearance, remove the insert and mount it again according to the above steps.

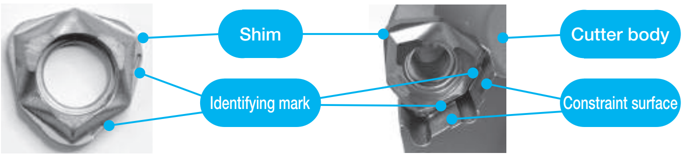


Fig. 1
Fig. 2

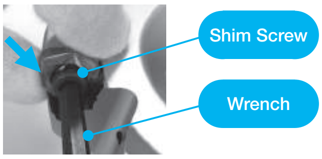


Fig. 3

◆ Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t) ( ):TN620M	Recommended Insert Grades (Cutting Speed Vc : m/min)							
			Cermet	MEGACOAT (PVD Coated Carbide)				CVD Coated Carbide	DLC Coated Carbide	Carbide
			TN620M	**PR1535**	**PR1525**	**PR1510**	**PR015S**	**CA6535**	**PDL025**	**GW25**
GM	Carbon Steel	0.1~**0.2**~0.3 (0.06~**0.10**~0.15)	★ 200~**250**~300	☆ 120~**180**~250	★ 120~**180**~250	-	-	-	-	-
	Alloy Steel	0.1~**0.2**~0.3 (0.06~**0.10**~0.15)	★ 180~**220**~250	☆ 100~**160**~220	★ 100~**160**~220	-	-	-	-	-
	Mold Steel	0.1~**0.15**~0.25 (0.06~**0.10**~0.13)	★ 150~**180**~220	☆ 80~**140**~180	★ 80~**140**~180	-	-	-	-	-
	Stainless Steel (Austenitic related)	0.1~**0.15**~0.25	-	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-	-	-
	Stainless Steel (Martensitic related)	0.1~**0.15**~0.25	-	☆ 150~**200**~250	-	-	-	☆ 180~**240**~300	-	-
	Stainless Steel (Precipitation Hardening)	0.1~**0.15**~0.25	-	★ 90~**120**~150	-	-	-	-	-	-
	Gray Cast Iron	0.1~**0.2**~0.3	-	-	-	★ 120~**180**~250	-	-	-	-
	Nodular Cast Iron	0.1~**0.15**~0.25	-	-	-	★ 100~**150**~200	-	-	-	-
	Ni-base heat-resistant alloys	0.1~**0.12**~0.2	-	☆ 20~**30**~50	-	-	-	★ 20~**30**~50	-	-
SM *1GL	Carbon Steel	0.06~**0.12**~0.2 (0.06~**0.08**~0.12)	★ 200~**250**~300	☆ 120~**180**~250	☆ 120~**180**~250	-	-	-	-	-
	Alloy Steel	0.06~**0.12**~0.2 (0.06~**0.08**~0.12)	★ 180~**220**~250	☆ 100~**160**~220	☆ 100~**160**~220	-	-	-	-	-
	Mold Steel	0.06~**0.08**~0.15 (0.06~**0.08**~0.10)	★ 150~**180**~220	☆ 80~**140**~180	☆ 80~**140**~180	-	-	-	-	-
	Stainless Steel (Austenitic related)	0.06~**0.12**~0.2	-	★ 100~**160**~200	☆ 100~**160**~200	-	-	-	-	-
	Stainless Steel (Martensitic related)	0.06~**0.12**~0.2	-	☆ 150~**200**~250	-	-	-	★ 180~**240**~300	-	-
	Stainless Steel (Precipitation Hardening)	0.06~**0.12**~0.2	-	☆ 90~**120**~150	-	-	-	-	-	-
	Gray Cast Iron	0.06~**0.12**~0.2	-	-	-	☆ 120~**180**~250	-	-	-	-
	Nodular Cast Iron	0.06~**0.08**~0.15	-	-	-	☆ 100~**150**~200	-	-	-	-
	Ni-base heat-resistant alloys	0.06~**0.1**~0.15	-	☆ 20~**30**~50	-	-	-	☆ 20~**30**~50	-	-
	Titanium Alloys	0.06~**0.08**~0.15	-	★ 40~**60**~80	-	-	-	-	-	-
*2GH	Carbon Steel	0.2~**0.3**~0.4	-	☆ 120~**180**~250	☆ 120~**180**~250	-	-	-	-	-
	Alloy Steel	0.2~**0.3**~0.4	-	☆ 100~**160**~220	☆ 100~**160**~220	-	-	-	-	-
	Mold Steel	0.15~**0.2**~0.3	-	☆ 80~**140**~180	☆ 80~**140**~180	-	-	-	-	-
	Stainless Steel (Austenitic related)	0.2~**0.25**~0.3	-	☆ 100~**160**~200	☆ 100~**160**~200	-	-	-	-	-
	Stainless Steel (Martensitic related)	0.2~**0.25**~0.3	-	☆ 150~**200**~250	-	-	-	☆ 180~**240**~300	-	-
	Stainless Steel (Precipitation Hardening)	0.2~**0.25**~0.3	-	☆ 90~**120**~150	-	-	-	-	-	-
	Gray Cast Iron	0.2~**0.3**~0.4	-	-	-	☆ 120~**180**~250	-	-	-	-
	Nodular Cast Iron	0.15~**0.2**~0.3	-	-	-	☆ 100~**150**~200	-	-	-	-
	Ni-base heat-resistant alloys	0.15~**0.2**~0.25	-	☆ 20~**30**~50	-	-	-	☆ 20~**30**~50	-	-
	Hard Materials (60HRC or less)	0.05~**0.1**~0.2	-	-	-	-	★ 50~**80**~100	-	-	-
AM	Non-ferrous metals	0.1~**0.2**~0.3	-	-	-	-	-	-	★ 200~**600**~900	☆ 200~**500**~800

- The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
- Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

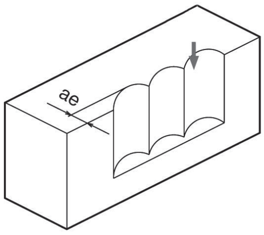
★ : 1st Recommendation
☆ : 2nd Recommendation

*1. GL Chipbreaker is recommended for Surface finish oriented milling.
*2. GH Chipbreaker : Fine pitch ⇒fz≤0.3 (mm/t)
Extra fine pitch ⇒Not recommended

Applicable chipbreaker

Cutter Type	Chipbreaker			
	GM	SM (GL)	GH	AM
Coarse pitch (with shim)	●	●	●	●
Fine pitch (without shim)	●	●	△ (Feed rate is recommended fz=0.3mm/t or under)	●
Extra fine pitch (without shim)	●	●	Not recommended	Not recommended

Vertical milling (Plunging)



Cutting Dia.	Max. Width of Cut (ae)
All items	8mm

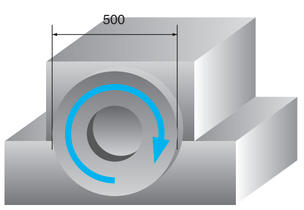
Cutter type and chipbreaker selection

Milling Purpose	Cutter Type			Chipbreaker				
	Coarse pitch	Fine pitch	Extra fine pitch	GM	SM	GH	GL	AM
General milling for steel and alloy steel		●		●				
Steel and alloy steel (at chattering due to low rigidity machine or poor clamping power)	●				●			
Productivity oriented (Running cost decrease) (ap=4mm and over, fz=0.25mm/t and over)	●					●		
Surface finish oriented	●	●					●	
General milling of stainless steel		●			●			
Stainless Steel (at chattering due to low rigidity machine or poor clamping power)	●				●			
Cast Iron (for processing efficiency improvement)			●	●				
Cast Iron (ap=4mm and over, fz=0.25mm/t and over)	●					●		
General milling of aluminum alloys		●						●
Aluminum Alloys (at chattering due to low rigidity machine or poor clamping power)	●							●

Case Studies

FC300

- Machine Part
- Vc=170m/min
- apxae=2.5x130mm
- fz=0.183mm/t (Vf=500mm/min)
- Wet
- MFWN90160R-8T (8 Flutes)
- WNMU080608EN-GM (PR1510)



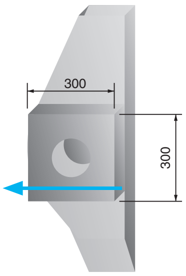
PR1510	Chip Evacuation Rate = 163cc/min
Competitor A (Positive Cutter)	Chip Evacuation Rate = 68cc/min

Competitor A proceeded machining under low cutting conditions, as the workpiece was slipping because of the unstable chucking.
With MFWN, stable machining was possible at higher cutting conditions.

(User Evaluation)

Manganese Steel

- Construction machine part
- Vc=150m/min
- apxae=1x100mm
- fz=0.2mm/t (Vf=668mm/min)
- Dry
- MFWN90100R-7T (7 Flutes)
- WNMU080608EN-GM (PR1525)



PR1525	Machining efficiency : 2 pcs/edge
Competitor B (Negative Cutter) (Vertical inserts)	1 pc/edge

Despite instability with the long overhang of the workpiece, MFWN doubled tool life, improving the efficiency by 150%.

(User Evaluation)

Low Cutting Force 90° Milling Cutter with Double-sided 6-Edge Inserts

MFWN Mini

Introducing Economical Small Diameter MFWN Series Milling Cutters
Additional Fine Pitch, Small Diameter Toolholders Available

1 MFWN Mini Uses Cost-Efficient 6-Edge Inserts

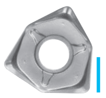
Smaller insert design technology maintains original MFWN cutting performance

Can be used up to 5mm D.O.C.

Smaller Insert Size

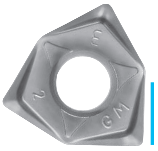
MFWN Mini
05 Size

NEW



D.O.C. ~5mm

MFWN
08 Size



D.O.C. ~8mm

Increased Versatility

Large small-diameter lineup

High-efficiency machining with fine pitch styles

1 ~ 3 additional flutes

Expanded lineup of smaller diameters

Face Mill ø50
End Mill ø25 - ø40

NEW

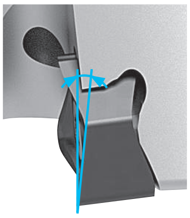
2 Inherits Previous MFWN Series Design Elements with Fracture-Resistant Inserts and Low Cutting Forces

❶ Low Cutting Force and High Chattering-Resistance

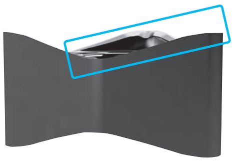
Sharp cutting by large rake angle

"Large slant edge" Design reduces shock when cutting edge enters the workpiece

A.R. Max +11°



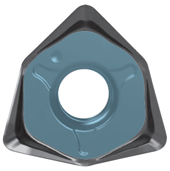
"Large slant edge" Design



❷ Superior Fracture Resistance with Thick Edge Design

Stable Clamping Strength with Unique Insert Face Design

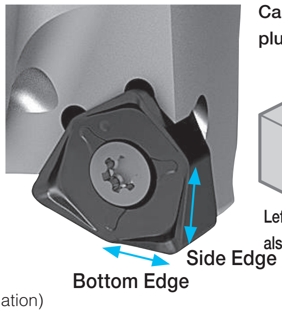
Cutting Edge Thickness : 5.2mm
(3.1mm at the thinnest point)



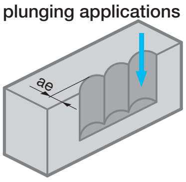
Optimized seating surface

❸ Neutral Inserts for Various Uses

Symmetrical side and bottom cutting edges provide a wide range of machining applications

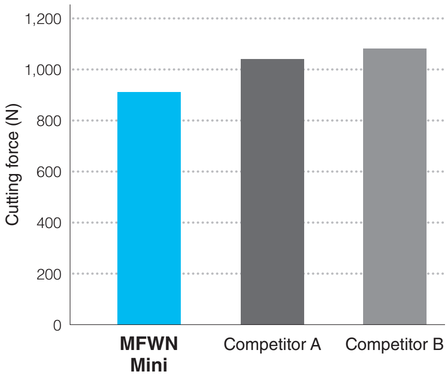


Can be used for plunging applications



Left-handed Toolholders are also Available (Custom Order)

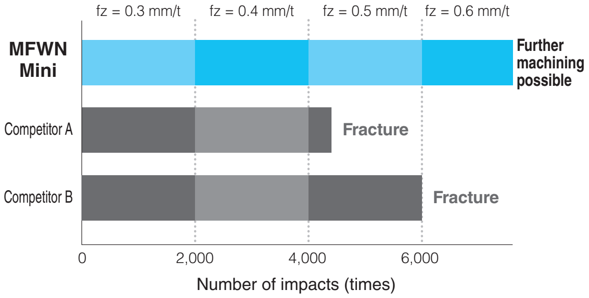
Cutting Force Comparison (Internal evaluation)



Cutting Conditions : Vc = 150 m/min, fz = 0.15 mm/t,
ap × ae = 1.5 ×35 mm, Dry Cutting Dia.ø63 Workpiece Material : SCM440

Fracture Resistance Comparison (Internal evaluation)

*Not recommended for fz = 0.4 mm/t and above



Cutting Conditions : Vc = 120 m/min, ap × ae = 1.5 × 30 mm, Dry
Cutting Dia.ø63 Workpiece Material : Mold Steel 37~43HRC

MFWN Mini Face Mill

	A.R.	R.R.
Rake Angle	(MAX.) +11°	øD = 50 -9° øD = 63 -8° øD = 80-125 -7°

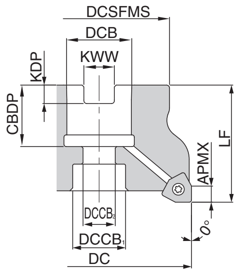


Fig.1

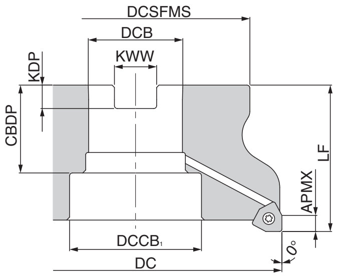


Fig.2

Toolholder Dimensions

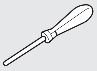
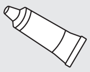
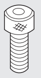
Description				Stock	No. of Inserts	Dimension (mm)									Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min⁻¹)
						DC	DCSFMS	DCB	DCCB₁	DCCB₂	LF	CBDP	KDP	KWW				
Metric	Fine pitch	MFWN	90050R-05-5T-M	●	5	50	48	22	17.5	11	40	21	6.3	10.4	Yes	Fig.1	0.4	13,800
			90063R-05-6T-M	●	6	63			18								0.5	12,300
			90080R-05-7T-M	●	7	80	70	27	20	13	50	24	7	12.4			1.2	10,900
			90100R-05-8T-M	●	8	100	78	32	45	-		30	8	14.4		Fig.2	1.6	9,700
			90125R-05-11T-M	●	11	125	89	40	55		63	33	9	16.4			2.8	8,700
	Extra fine pitch	MFWN	90050R-05-6T-M	●	6	50	48	22	17.5	11	40	21	6.3	10.4		Fig.1	0.4	13,800
			90063R-05-7T-M	●	7	63			18								0.5	12,300
			90080R-05-9T-M	●	9	80	70	27	20	13	50	24	7	12.4			1.2	10,900
			90100R-05-11T-M	●	11	100	78	32	45	-		30	8	14.4		Fig.2	1.5	9,700
			90125R-05-14T-M	●	14	125	89	40	55		63	33	9	16.4			2.7	8,700
Bore Dia. Inch spec	Fine pitch	MFWN	90080R-05-7T	●	7	80	70	25.4	20	13	50	27	6	9.5		Fig.1	1.3	10,900
			90100R-05-8T	●	8	100	78	31.75	45	-		34	8	12.7		Fig.2	1.6	9,700
			90125R-05-11T	●	11	125	89	38.1	55		63	38	10	15.9			2.9	8,700
	Extra fine pitch	MFWN	90080R-05-9T	●	9	80	70	25.4	20	13	50	27	6	9.5		Fig.1	1.2	10,900
			90100R-05-11T	●	11	100	78	31.75	45	-		34	8	12.7		Fig.2	1.6	9,700
			90125R-05-14T	●	14	125	89	38.1	55		63	38	10	15.9			2.8	8,700

*APMX : 5mm

■ Max. Revolution

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page **M109**.
Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Spare Parts

Description			Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
						
Fine pitch	MFWN	90050R-05-5T-M	SB-3065TRP	DTPM-8	P-37	HH10×30
		90063R-05-6T-M				HH10×30
		90080R-05-7T(-M)	Recommended tightening torque for Insert Clamp 1.2N·m			HH12×35
		90100R-05-8T(-M)				-
		90125R-05-11T(-M)				
Extra fine pitch	MFWN	90050R-05-6T-M	SB-3065TRP	DTPM-8	P-37	HH10×30
		90063R-05-7T-M				HH10×30
		90080R-05-9T(-M)	Recommended tightening torque for Insert Clamp 1.2N·m			HH12×35
		90100R-05-11T(-M)				-
		90125R-05-14T(-M)				

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

MFWN Mini End Mill

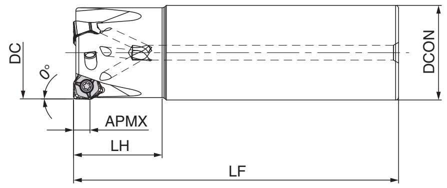


Fig.1

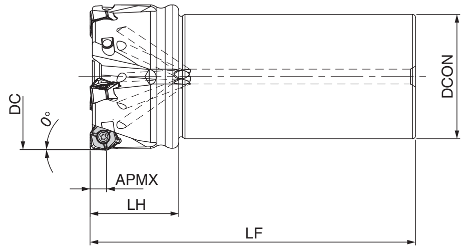


Fig.2

Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Max. Revolution (min-1)	Spare Parts		
			DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.				Clamp Screw	Wrench	Anti-seize Compound
MFWN 90025R-S25-05-2T	●	2	25	25	120	32	5	+11°	-14.5°	Yes	Fig.1	19,500	SB-3065TRP	DTPM-8	P-37
90032R-S32-05-3T	●	3	32	32	130	40			-12°			17,200			
90040R-S32-05-4T	●	4	40		150	50			-10°		Fig.2	15,400			
90050R-S32-05-5T	●	5	50		110	30			-9°			13,800			
90063R-S32-05-6T	●	6	63						-8°			12,300			
90080R-S32-05-7T	●	7	80						-7°			10,900			

*APMX : 5mm

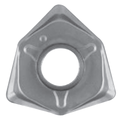
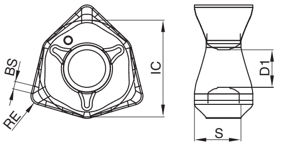
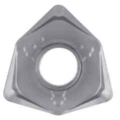
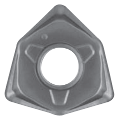
■ **Max. Revolution**

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page **M109**.
Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Applicable Inserts

Classification of usage						
P	Carbon Steel / Alloy Steel	☆	★			
	Mold Steel	☆	★			
M	Stainless Steel (Austenitic related)	★	☆			
	Stainless Steel (Martensitic related)	★				
	Stainless Steel (Precipitation Hardening)	★				
K	Gray Cast Iron			★		
	Nodular Cast Iron			★		
N	Non-ferrous Metals					
S	Heat-resistant Alloys	★				
	Titanium Alloys	★				
H	Hard Materials				★	

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
□ : Finishing / 2nd Choice
(In case hardness is 45HRC or under)

Insert		Description	Dimension (mm)					MEGACOAT (PVD Coated Carbide)			
			IC	S	D1	BS	RE	PR1535	PR1525	PR1510	PR015S
 General purpose	 BS RE IC D1 S	**WNMU 050408EN-GM**	8.8	4.2	3.4	0.7	0.8	●	●	●	
 Low cutting force		**WNMU 050408EN-SM**	8.8	4.2	3.4	0.7	0.8	●	●	●	
 Tough Edge		**WNMU 050408EN-GH**	8.8	4.2	3.4	0.7	0.8	●	●	●	●

● : Std. Item

M
Milling
Insert
Lead Angle 45°~20°
Lead Angle 15°
Lead Angle 0°/2°
High Feed Cutter
Cutter for Finishing
Multi-Function
Slot Mill
Ball-nose Radius
Others

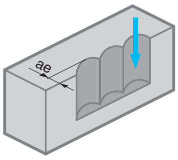
◆ Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)			
			MEGACOAT NANO			MEGACOAT HARD
			PR1535	PR1525	PR1510	PR015S
GM	Carbon Steel	0.1 – **0.2** – 0.25	☆ 120 – **180** – 250	★ 120 – **180** – 250	-	-
	Alloy Steel		☆ 100 – **160** – 220	★ 100 – **160** – 220	-	-
	Mold Steel	0.1 – **0.15** – 0.2	☆ 80 – **140** – 180	★ 80 – **140** – 180	-	-
	Stainless Steel (Austenitic related)	0.1 – **0.15** – 0.2	☆ 100 – **160** – 200	☆ 100 – **160** – 200	-	-
	Stainless Steel (Martensitic related)		☆ 150 – **200** – 250	-	-	-
	Stainless Steel (Precipitation Hardening)		★ 90 – **120** – 150	-	-	-
	Gray Cast Iron	0.1 – **0.2** – 0.25	-	-	★ 120 – **180** – 250	-
	Nodular Cast Iron	0.1 – **0.15** – 0.2	-	-	★ 100 – **150** – 200	-
	Ni-base heat-resistant alloys	0.1 – **0.12** – 0.16	☆ 20 – **30** – 50	-	-	-
SM	Carbon Steel	0.06 – **0.12** – 0.2	☆ 120 – **180** – 250	☆ 120 – **180** – 250	-	-
	Alloy Steel		☆ 100 – **160** – 220	☆ 100 – **160** – 220	-	-
	Mold Steel	0.06 – **0.08** – 0.15	☆ 80 – **140** – 180	☆ 80 – **140** – 180	-	-
	Stainless Steel (Austenitic related)	0.06 – **0.12** – 0.2	★ 100 – **160** – 200	☆ 100 – **160** – 200	-	-
	Stainless Steel (Martensitic related)		☆ 150 – **200** – 250	-	-	-
	Stainless Steel (Precipitation Hardening)		☆ 90 – **120** – 150	-	-	-
	Gray Cast Iron	0.06 – **0.12** – 0.2	-	-	☆ 120 – **180** – 250	-
	Nodular Cast Iron	0.06 – **0.08** – 0.15	-	-	☆ 100 – **150** – 200	-
	Ni-base heat-resistant alloys	0.06 – **0.08** – 0.15	★ 20 – **30** – 50	-	-	-
	Titanium Alloys	0.06 – **0.08** – 0.15	★ 40 – **60** – 80	-	☆ 40 – **60** – 80	-
GH	Carbon Steel	0.15 – **0.2** – 0.3	☆ 120 – **180** – 250	☆ 120 – **180** – 250	-	-
	Alloy Steel		☆ 100 – **160** – 220	☆ 120 – **160** – 220	-	-
	Mold Steel	0.15 – **0.2** – 0.25	☆ 80 – **140** – 180	☆ 80 – **140** – 180	-	-
	Stainless Steel (Austenitic related)	0.15 – **0.2** – 0.25	☆ 100 – **160** – 200	☆ 100 – **160** – 200	-	-
	Stainless Steel (Martensitic related)		☆ 150 – **200** – 250	-	-	-
	Stainless Steel (Precipitation Hardening)		☆ 90 – **120** – 150	-	-	-
	Gray Cast Iron	0.15 – **0.2** – 0.3	-	☆ 120 – **180** – 250	☆ 120 – **180** – 250	-
	Nodular Cast Iron	0.15 – **0.2** – 0.25	-	☆ 100 – **150** – 200	☆ 100 – **150** – 200	-
	Ni-base heat-resistant alloys	0.1 – **0.15** – 0.2	☆ 20 – **30** – 50	-	-	-
	Hardened Material (60 HRC or less)	0.05 – **0.08** – 0.16	-	-	-	★ 50 – **80** – 100

The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.
When using GH chipbreaker in fine pitch cutters, recommended feed is fz≤0.2 (mm/t).
GH chipbreaker is not recommended for extra fine pitch cutters.

★ : 1st Recommendation
☆ : 2nd Recommendation

Vertical Milling (Plunging)



Available for Vertical Milling (Plunging)

Cutting Dia.	Maximum width of cut (ae)
All Description	5 mm

Ramping and helical milling are not recommended due to interference between workpiece and flank face

Applicable chipbreaker

Cutter type	Chipbreaker		
	GM	SM	GH
Fine pitch	✓	✓	✓
Extra fine pitch	✓	✓	(Feed rate is recommended fz=0.2mm/t or under)

How to mount an insert

1. Completely eliminate chips and dust from the insert mounting side.
2. Clamp Screw
   ·Apply anti-seize compound on portion of taper and thread of clamp screw.
   ·After mounting a clamp screw on the top edge of wrench, tighten the screw while keeping the insert pushed against the shim seat surface and holder surface (Fig.1)
3. When tightening the screw, make sure that the wrench is parallel to the screw.
   Recommended tightening torque . . . 1.2N·m
4. After tightening, check that there is no gap between the insert and the surface of the shim, or between the side surface of insert and the holder surface. If there is a gap, remount the insert using the directions above.

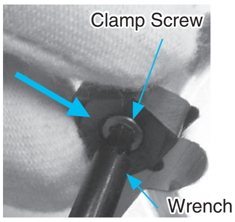


Fig. 1

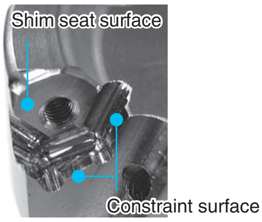


Fig. 2

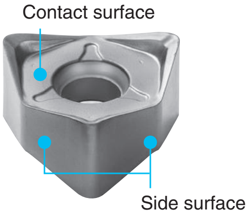


Fig. 3

Cutting Edge Angle 88˚, High Efficiency Cutter

MFSN88

Economical Double-sided 8-edge Insert

Reduces Chattering with a Low Cutting Force Design

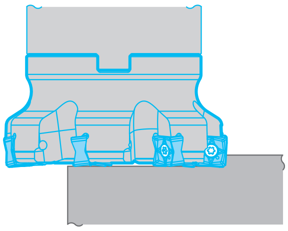
Suitable for Shoulder Roughing

Applicable to Various Types of Machining with Product Lineup from ø32

1 Economical Double-sided 8-edge Insert Suitable for Shoulder Roughing

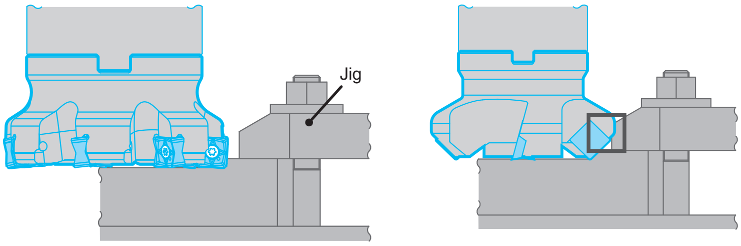
Cost reduction in approximately 90˚corner cutting

Shoulder Roughing **Cost reduction by switching from 90˚ cutter with positive inserts**



Facing Without Interfering with Fixtures

MFSN88 Conventional 45˚ Cutter

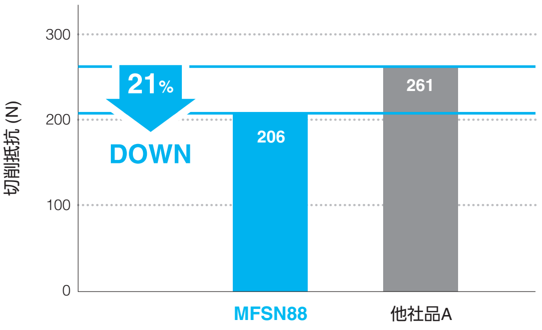


See page **M113** for unmachined corner portion

2 Reduces Chattering with Low Cutting Force Design

Chatter Resistant Medium to Roughing Machining Range

Cutting Force Comparison (Internal evaluation)



Cutting force is thrust force

Cutting Conditions : Vc = 200 m/min, ap = 3 mm, fz = 0.15 mm/t
Cutter Dia.ø63 Workpiece Material : S50C

3 Extended Tool Life by MEGACOAT NANO Technology Insert Lineup Also Contains Cermet Grade

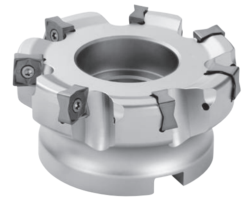
Insert grade and chipbreaker lineup for various machining application

1st Recommendation
(General purpose)
GM Chipbreaker

Tough Edge
GH Chipbreaker

For Stainless Steel
SM Chipbreaker

MFSN88 Face Mill



Rake Angle	A.R.	R.R.	
	(MAX.) +10°	DC=50 : -12° DC=63 : -10° DC=80 : -9°	DC=100 : -8° DC=125 : -7.5° DC=160 : -7°

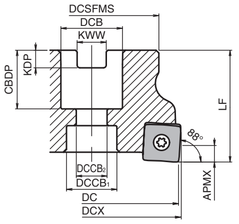


Fig. 1

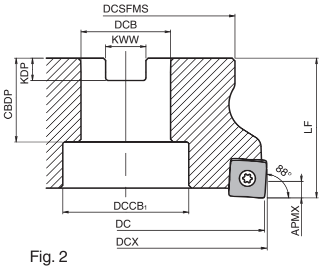


Fig. 2

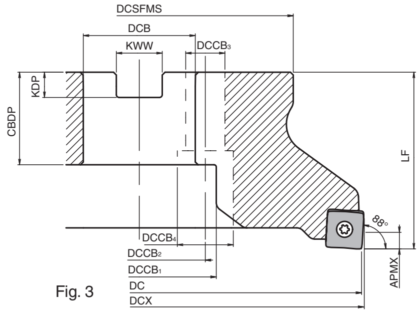


Fig. 3

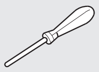
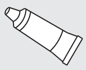
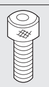
Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)												Drawing	Weight (kg)	Shim
					DC	DCX	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	DCCB3	DCCB4			
Metric	Fine pitch	**MFSN 88050R-4T-M-G**	●	4	50	52	48	22	17.5	11	40	21	6.3	10.4	-	-	Fig. 1	0.3	No
		88063R-5T-M-G	●	5	63	65			18									0.4	
		88080R-6T-M-G	●	6	80	82	70	27	20	13	50	24	7	12.4				1.1	
		88100R-7T-M-G	●	7	100	102	78	32	45	-		30	8	14.4			Fig. 2	1.4	
		88125R-9T-M-G	●	9	125	127	89	40	55		63	33	9	16.4				2.4	
		88160R-11T-M-G	●	11	160	162	110								14	20	Fig. 3	4.2	
	Extra fine pitch	**MFSN 88050R-5T-M-G**	●	5	50	52	48	22	17.5	11	40	21	6.3	10.4	-	-	Fig. 1	0.3	No
		88063R-7T-M-G	●	7	63	65			18									0.4	
		88080R-9T-M-G	●	9	80	82	70	27	20	13	50	24	7	12.4				1.1	
		88100R-11T-M-G	●	11	100	102	78	32	45	-		30	8	14.4			Fig. 2	1.4	
		88125R-13T-M-G	●	13	125	127	89	40	55		63	33	9	16.4				2.5	
		88160R-15T-M-G	●	15	160	162	110								14	20	Fig. 3	4.3	
Bore Dia. Inch spec	Fine pitch	**MFSN 88080R-6T-G**	●	6	80	82	70	25.4	20	13	50	27	6	9.5	-	-	Fig. 1	1.1	No
		88100R-7T-G	●	7	100	102	78	31.75	45	-		34	8	12.7			Fig. 2	1.5	
		88125R-9T-G	●	9	125	127	89	38.1	55		63	38	10	15.9				2.5	
		88160R-11T-G	●	11	160	162	110	50.8	70				11	19.1				4.1	
	Extra fine pitch	**MFSN 88080R-9T-G**	●	9	80	82	70	25.4	20	13	50	27	6	9.5	-	-	Fig. 1	1.1	No
		88100R-11T-G	●	11	100	102	78	31.75	45	-		34	8	12.7			Fig. 2	1.5	
		88125R-13T-G	●	13	125	127	89	38.1	55		63	38	10	15.9				2.6	
		88160R-15T-G	●	15	160	162	110	50.8	70				11	19.1				4.3	

*APMX : 5mm (GM (Coated Carbide), SM, GH Chipbreaker), 3mm (GM (Cermet))

Applicable Inserts ➡ **M112**

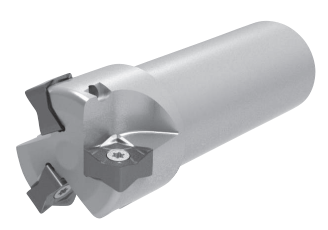
Spare Parts (common to Metric / Inch spec)

Description		Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
					
Fine pitch	**MFSN 88050R-4T-M-G**	SB-4090TRP Recommended tightening torque for Insert Clamp 3.5N·m	DTPM-15	P-37	HH10X30
	88063R-5T-M-G				HH10X30
	88080R-6T(-M)-G				HH12X35
	88100R-7T(-M)-G				-
	88125R-9T(-M)-G				
	88160R-11T(-M)-G				
Extra fine pitch	**MFSN 88050R-5T-M-G**	SB-4090TRP Recommended tightening torque for Insert Clamp 3.5N·m	DTPM-15	P-37	HH10X30
	88063R-7T-M-G				HH10X30
	88080R-9T(-M)-G				HH12X35
	88100R-11T(-M)-G				-
	88125R-13T(-M)-G				
	88160R-15T(-M)-G				

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

MFSN88 End Mill



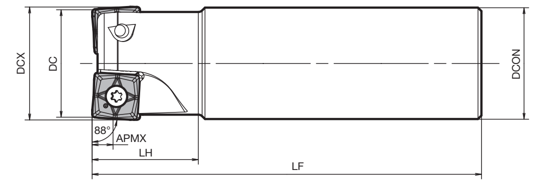


Fig. 1

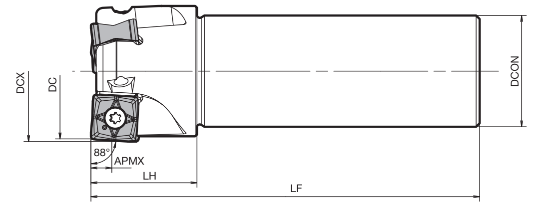
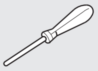
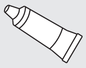


Fig. 2

Toolholder Dimensions

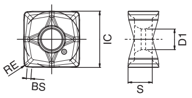
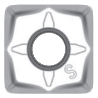
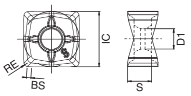
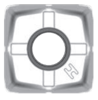
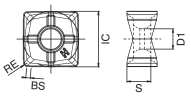
Description		Stock	No. of Inserts	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
				DC	DCX	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.		Clamp Screw	Wrench	Anti-seize Compound
															
MFSN	**88032R-S32-2T-G**	●	2	32	34	32	110	30	*5	10°	-15.5°	Fig. 1	SB-4090TRP Tightening Torque 3.5N·m	DTPM-15	P-37
	88040R-S32-3T-G	●	3	40	42						-13°	Fig. 2			

*APMX : 5mm (GM (Coated Carbide), SM, GH Chipbreaker), 3mm (GM (Cermet))

Applicable Inserts

Classification of usage		TN620M	PR1535	PR1525	PR1510	PR015S
P	Carbon Steel / Alloy Steel	■	☆	★		
	Mold Steel	■	☆	★		
M	Stainless Steel (Austenitic related)		★	☆		
	Stainless Steel (Martensitic related)		★			
	Stainless Steel (Precipitation Hardening)		★			
K	Gray Cast Iron				★	
	Nodular Cast Iron				★	
N	Non-ferrous Metals					
S	Ni-base heat-resistant alloys		★			
	Titanium Alloys		★			
H	Hard Materials					★

★ : Roughing / 1st Choice
☆ : Roughing / 2nd Choice
■ : Finishing / 1st Choice
☐ : Finishing / 2nd Choice

Insert		Description	Dimension (mm)					Cermet	MEGACOAT (PVD Coated Carbide)			
			IC	S	D1	BS	RE	TN620M	PR1535	PR1525	PR1510	PR015S
 General purpose		**SNMU 130508EN-GM**	13	5.51	4.7	1.0	0.8	●	●	●	●	
 Low cutting force		**SNMU 130508EN-SM**							●	●	●	
 Tough Edge (For Heavy Milling)		**SNMU 130508EN-GH**							●	●	●	●

Recommended Cutting Conditions ➡ **M113**

● : Std. Item

◆ Recommended Cutting Conditions

Coated Carbide

Chipbreaker	Workpiece Material	Feed (fz : mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)			
			MEGACOAT (PVD Coated Carbide)			
			PR1535	PR1525	PR1510	PR015S
GM	Carbon Steel	0.1~**0.2**~0.3	☆ 120~**180**~250	★ 120~**180**~250	-	-
	Alloy Steel	0.1~**0.2**~0.3	☆ 100~**160**~220	★ 100~**160**~220	-	-
	Mold Steel	0.1~**0.15**~0.25	★ 80~**140**~180	★ 80~**140**~180	-	-
	Stainless Steel (Austenitic related)	0.1~**0.15**~0.25	☆ 100~**150**~200	☆ 100~**150**~200	-	-
	Stainless Steel (Martensitic related)	0.1~**0.15**~0.25	☆ 100~**150**~200	-	-	-
	Stainless Steel (Precipitation Hardening)	0.1~**0.15**~0.25	★ 90~**120**~150	-	-	-
	Gray Cast Iron	0.1~**0.2**~0.3	-	-	★ 120~**180**~250	-
	Nodular Cast Iron	0.1~**0.15**~0.25	-	-	★ 100~**150**~200	-
	Ni-base heat-resistant alloys	0.1~**0.12**~0.2	☆ 20~**30**~50	-	-	-
SM	Carbon Steel	0.06~**0.12**~0.2	-	☆ 120~**180**~250	-	-
	Alloy Steel	0.06~**0.12**~0.2	-	☆ 100~**160**~220	-	-
	Mold Steel	0.06~**0.08**~0.15	-	☆ 80~**140**~180	-	-
	Stainless Steel (Austenitic related)	0.06~**0.12**~0.2	★ 100~**150**~200	☆ 100~**150**~200	-	-
	Stainless Steel (Martensitic related)	0.06~**0.12**~0.2	★ 100~**150**~200	-	-	-
	Stainless Steel (Precipitation Hardening)	0.06~**0.12**~0.2	☆ 90~**120**~150	-	-	-
	Gray Cast Iron	0.06~**0.12**~0.2	-	-	☆ 120~**180**~250	-
	Nodular Cast Iron	0.06~**0.1**~0.15	-	-	☆ 100~**150**~200	-
	Ni-base heat-resistant alloys	0.06~**0.08**~0.15	★ 20~**30**~50	-	-	-
	Titanium Alloys	0.06~**0.08**~0.15	★ 40~**60**~80	-	-	-
GH	Carbon Steel	0.15~**0.25**~0.35	-	☆ 120~**180**~250	-	-
	Alloy Steel	0.15~**0.25**~0.35	-	☆ 100~**160**~220	-	-
	Mold Steel	0.1~**0.2**~0.3	-	☆ 80~**140**~180	-	-
	Gray Cast Iron	0.15~**0.25**~0.35	-	-	☆ 120~**180**~250	-
	Nodular Cast Iron	0.1~**0.2**~0.3	-	-	☆ 100~**150**~200	-
	Hard Materials (60HRC or less)	0.05~**0.1**~0.2	-	-	-	★ 50~**80**~100

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

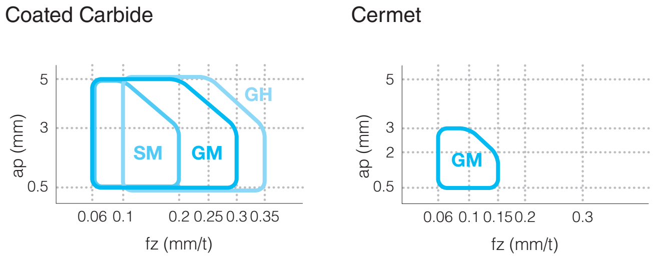
★ : 1st Recommendation
☆ : 2nd Recommendation

Cermet

Chipbreaker	Workpiece Material	Feed (fz : mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)
			Cermet
			TN620M
GM	Carbon Steel	0.06~**0.12**~0.15	★ 200~**250**~300
	Alloy Steel	0.06~**0.12**~0.15	★ 180~**220**~250
	Mold Steel	0.06~**0.1**~0.13	★ 150~**180**~220

★ : 1st Recommendation

Applicable Chipbreaker Range


Coated Carbide
Cermet

Applicable chipbreaker

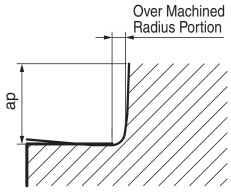
Cutter Type	Chipbreaker		
	GM	SM	GH
Fine pitch	✓	✓	✓
Extra fine pitch	✓	✓	(Feed rate is recommended fz=0.2mm/t or under)

Not Available for vertical milling (plunging).

Reference Data of Over Machined Radius Portion

ap	1 mm	2 mm	3 mm	4 mm	5 mm
Over Machined Radius Portion	0.12 mm	0.24 mm	0.27 mm	0.31 mm	0.34 mm

Over machined radius portion to 90°cutter



4-edge Face Mills with Vertical Inserts for Heavy Milling

MFLN

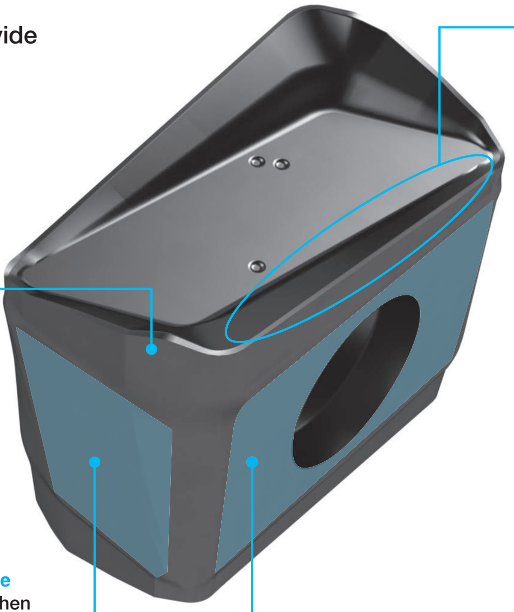
Tough 4-edge Vertical Inserts Provide High Reliability on Heavy Milling at Large Depths of Cut and High Feed Rates

Three Cutting Edge Angles (including MFLN45/MFLN70) Optimized for Various Machining Applications

1 Tough and Reliable Inserts for Stable Heavy Milling

22 mm long inserts offer increased rigidity

Tangentially mounted inserts provide
2 cutting edges on both sides

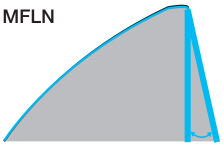


Obtuse Edge Design

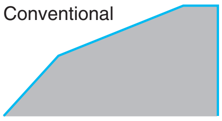
Increases the cutting edge angle only at the tip to maintain both strength and sharpness

Cross-section view of cutting edge (Image)

MFLN



Conventional

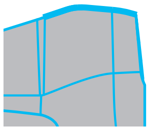


Corner Chamfer

(only available on MFLN90)

Both general corner-R type and chamfered corner type available

Prevents chattering and insert fracturing



Convex cutting edge ridge

Reduced impact forces when entering the workpiece

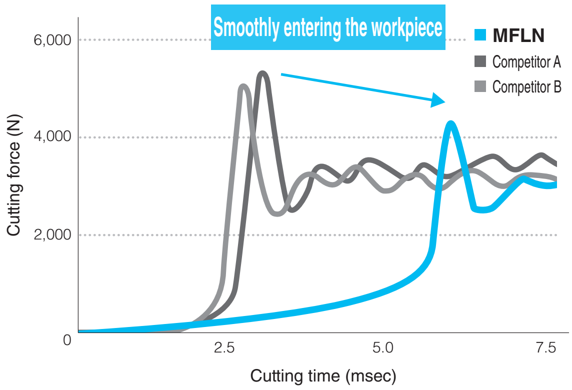
Wide Flat Mounting Surface

Hold an insert firmly in heavy milling

Tangentially mounted inserts increase rigidity

Cutting Forces when Entering the Workpiece (Internal evaluation)

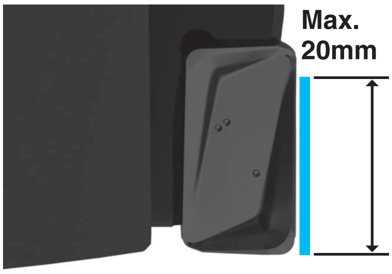
MFLN90 (Insert : Chamfered corner type)



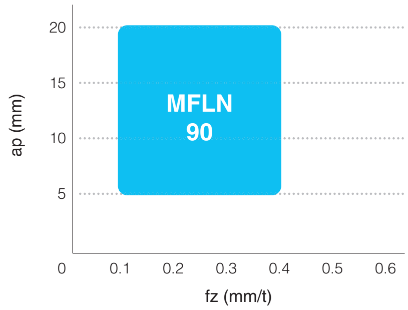
Cutting Conditions : Vc = 150 m/min, ap × ae = 5 × 75 mm, fz = 0.3 mm/t
ø125 (1 insert), Dry Workpiece Material : S50C

2 For Large Depths of Cut and High Feed Rates

MFLN90
(Cutting edge angle 90°)



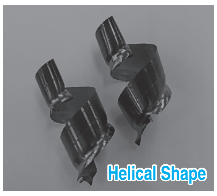
Applicable Range



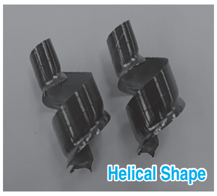
Chip Comparison (Internal evaluation)

Helix-shaped chips prevent chip recutting and provide stable machining at high feed rates.

MFLN90 Stable

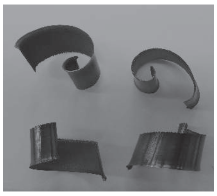


fz = 0.3 mm/t

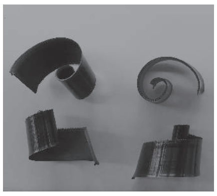


fz = 0.4 mm/t

Competitor A Unstable

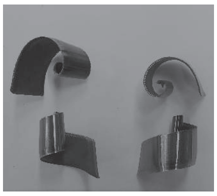


fz = 0.3 mm/t

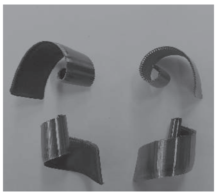


fz = 0.4 mm/t

Competitor B Unstable



fz = 0.3 mm/t



fz = 0.4 mm/t

Cutting Conditions : Vc = 150 m/min, ap × ae = 10 × 100 mm, fz = 0.3, 0.4 mm/t, ø125 (1 insert), Dry Workpiece Material : S50C

3 Stable machining and long tool life with MEGACOAT NANO

MEGACOAT NANO coating technology with high hardness (35Gpa) and excellent oxidation resistance (oxidation temperature: 1,150 °C) improves wear resistance and chipping resistance.

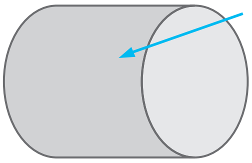
PR1525 : 1st recommendation for wear resistance. Great for scale removal and cast iron machining

PR1535 : Defect resistant, tough substrate for stable machining

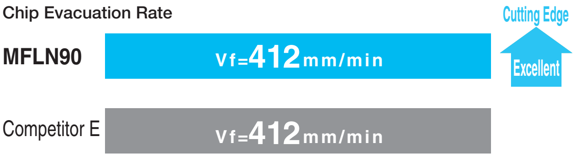
Case Studies

Roll material, Alloy steel

Vc = 120 m/min
ap = 10 mm
fz = 0.27 mm/t Dry
MFLN90200R-8T-M (ø200-8 flutes)
LOGU2216PAER-GM PR1525



Chip Evacuation Rate

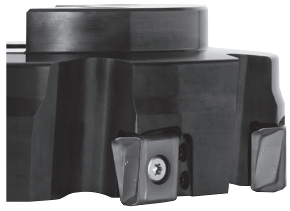


MFLN maintained good cutting edge condition and during scale removing.

(User Evaluation)

MFLN90

MFLN90 Cutting edge angle 90°



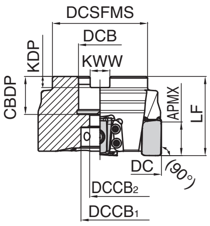


Fig.1

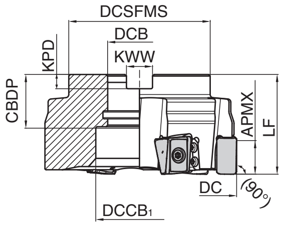


Fig.2

Rake Angle	A.R.	Max. +4.5°
	R.R.	-16.5°~-13.5°
Applicable Inserts	LOGU221616ER-GM LOGU2216PAER-GM	

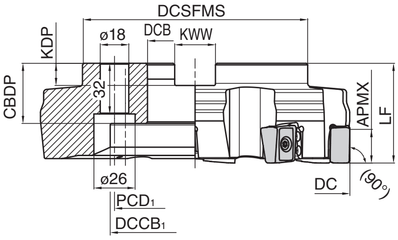


Fig.3

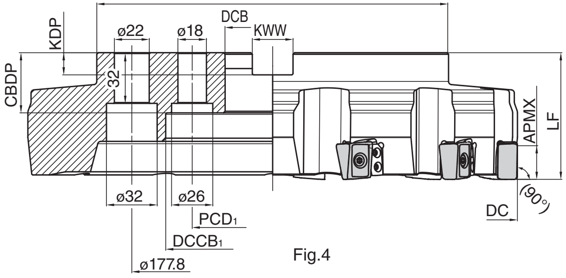


Fig.4

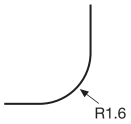
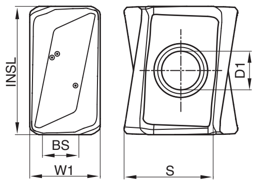
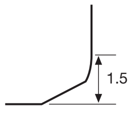
Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)											Coolant Hole	Drawing	Weight (kg)
				DC	DCSFMS	DCB	DCCB₁	DCCB₂	LF	CBDP	KDP	KWW	APMX	PCD₁			
Metric	**MFLN 90080R-4T-M**	●	4	80	60	27	24	13	50	24	7	12.4	20	-	Yes	Fig.1	1.0
	90100R-4T-M	●		100	70	32	45	-		30	8	14.4				Fig.2	1.5
	90125R-6T-M	●	6	125	89	40	55		63	33	9	16.4					2.9
	90160R-7T-M	●	7	160	110		90							66.7	No	Fig.3	4.5
	90200R-8T-M	●	8	200	142	60	132			38	14	25.7		101.6			6.9
	90250R-10T-M	●	10	250			172										10.3
	90315R-12T-M	MTO	12	315	222		205		80							Fig.4	20.9
Bore Dia. Inch spec	**MFLN 90080R-4T**	●	4	80	60	25.4	24	13	50	27	6	9.5	20	-	Yes	Fig.1	1.0
	90100R-4T	●		100	70	31.75	45	-		34	8	12.7				Fig.2	1.6
	90125R-6T	●	6	125	89	38.1	55		63	38	10	15.9					3.0
	90160R-7T	●	7	160	110	50.8	90				11	19.1			No		4.6
	90200R-8T	●	8	200	142	47.625	132				14	25.4		101.6		Fig.3	7.2
	90250R-10T	●	10	250			172										10.5
	90315R-12T	MTO	12	315	222		205		80							Fig.4	21.8

Applicable Inserts

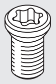
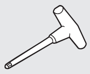
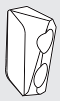
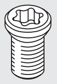
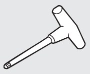
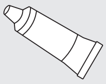
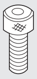
Classification of usage ★ : 1st Recommendation ☆ : 2nd Recommendation	P	Carbon Steel / Alloy Steel	☆	★
		Mold Steel	☆	★
	K	Gray Cast Iron	☆	★
		Nodular Cast Iron	☆	★

Applicable Toolholders
➡ **M40**
M41
M116

Insert			Description	Dimension (mm)					MEGACOAT NANO		Applicable Toolholders
				W1	S	D1	INSL	BS	PR1535	PR1525	
 Corner-R			**LOGU 221616ER-GM**	12.5	16.6	6.8	22.8	6.3	●	●	MFLN90.. MFLN70.. MFLN45..
 Corner Chamfer			**LOGU 2216PAER-GM**	12.5	16.9	6.8	22.8	4.8	●	●	MFLN90..

● : Std. Item
MTO : Made to order

● Spare Parts

Description	Spare Parts						
	Clamp Screw	Wrench	Shim	Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
							
MFLN ○○080R-4T(-M)	SB-60200TRP	TTP-20	MAP-2216	SB-40140TR	DTM-15	P-37	HH12X35
○○100R-4T(-M) ~ **○○315R-12T(-M)**	Recommended tightening torque for Insert Clamp 6.0 N·m			Recommended tightening torque for Shim Clamp 3.5 N·m			–

◆ Recommended Cutting Conditions

	Workpiece Material	D.O.C. (mm)		fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)	
					MEGACOAT NANO	
		Width of Cut (≤ 0.5×DC)	Width of Cut (>0.5×DC)		PR1535	PR1525
MFLN 90	Carbon Steel	~18	~15	0.1 - **0.2** - 0.4	☆ 80 – **120** – 150	★ 100 – **150** – 180
	Alloy Steel				☆ 80 – **120** – 150	★ 100 – **150** – 180
	Mold Steel				☆ 70 – **100** – 120	★ 80 – **120** – 150
	Gray Cast Iron	~20	~18	0.1 - **0.2** - 0.4	☆ 80 – **120** – 150	★ 100 – **150** – 180
	Nodular Cast Iron				☆ 80 – **120** – 150	★ 100 – **150** – 180

The table above provides recommendations based on product specifications.Before using the product, check the machine's specifications such as power. ★ : 1st Recommendation ☆ : 2nd Recommendation

The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

Dry machining is recommended.

● About Applicable Insert

	LOGU221616ER-GM (Corner-R)	LOGU2216PWER-GM (Corner Chamfer)
MFLN 90	✓	✓

● Max. Revolution for Each Cutting Diameter

Cutting Dia. DC (mm)	Max. Revolution (min^{-1})
ø80	5,970
ø100	4,780
ø125	3,820
ø160	2,990
ø200	2,390
ø250	1,910
ø315	1,520

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

How to mount an insert

1. Completely eliminate chips and dust from the insert mounting side.
2. After mounting a clamp screw on the top edge of wrench, tighten the screw while keeping the insert pushed against the shim seat surface and holder surface(Fig.1,2)
3. Make sure that the identification on the top of the insert is the same in each pocket.(Fig.3)
4. Tighten the wrench (TTP-20) in while holding parallel to the clamp screw.
5. Tighten the insert clamp screw at an appropriate torque. (Recommended torque: 6.0 N·m)
6. After tightening, check that there is no gap between the insert and the surface of the shim, or between the side surface of insert and the holder surface. If there is a gap, remount the insert using the directions above.

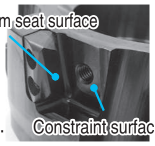


Fig.1

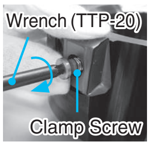


Fig.2

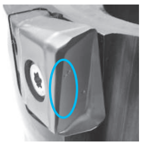


Fig.3

How to replace a shim

1. Completely eliminate chips and dust from the shim mounting side.
2. Coat medium strength screw locking adhesive on the screws.
3. Tighten the screw keeping the shim pushed against the pocket surface of toolholder.
4. After tightening both screws temporarily, tighten them with appropriate torque. (Recommended torque:3.5 N·m)
5. Please check that there is no gap between the shim and the pocket surfaces of toolholder.

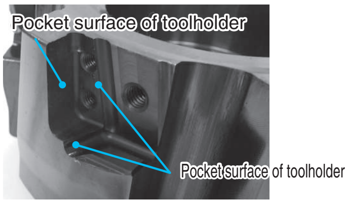


Fig.1

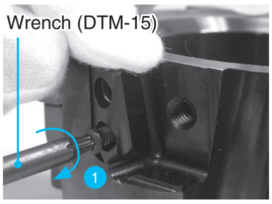


Fig.2

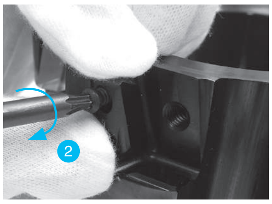
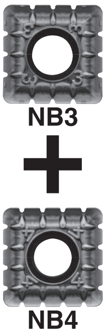


Fig.3

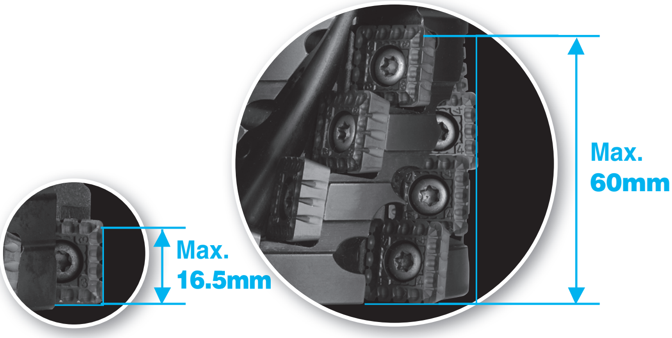

Fig.4

Face Mill for Heavy Milling MSRS90



● **Wide selection of cutting edge length according to cutting conditions**

4-stage type (ø80, ø100) is added to the standard lineup as well as 1-stage and 2-stage types.

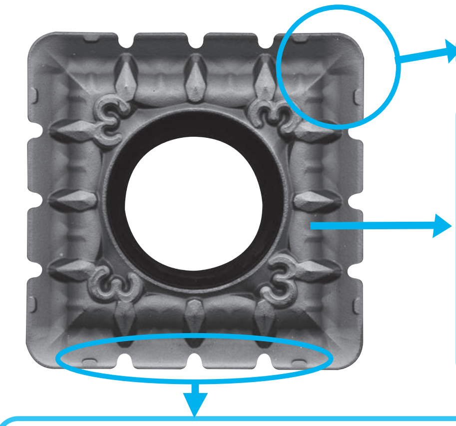


● **High efficiency, low cutting force and stable machining without chatter**

● **Neutral and corner-R insert**

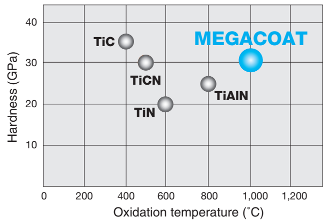
Applicable to shouldering (cutting edge angle : 90˚),
high feed milling (cutting edge angle : 30˚), plunging, and side cutter.

Custom-ordered milling cutter with high performance notched neutral inserts provides various applications



Neutral insert with corner-R is available to various applications

Long tool life : MEGACOAT

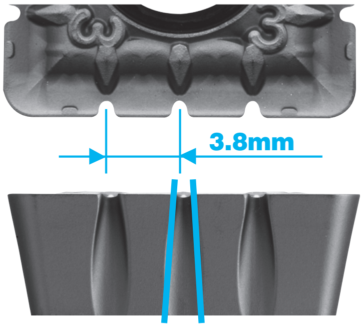


High hardness and high oxidation resistance long tool life : MEGACOAT

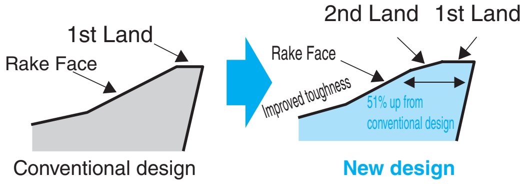
Notched insert SPMT180616EN

The notched insert breaks chips into small pieces and reduces cutting force.

The second land near the cutting edge improves edge strength.



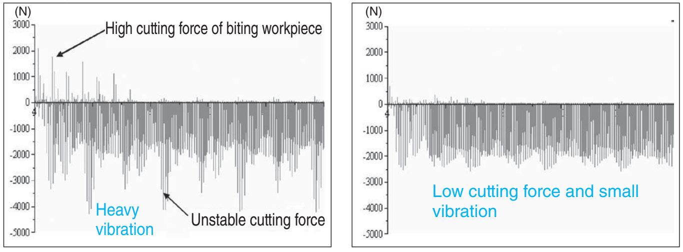
For neutral (Right / Left) hand
Applicable for various cutting edge angle.
Cutting edge length : 18mm



Edge preparation

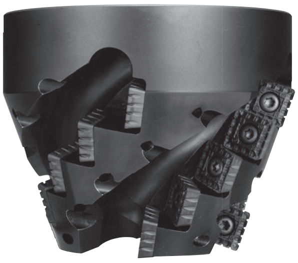
● **Low cutting force (Notched insert benefit)**

Cutting Force Comparison (Internal evaluation)

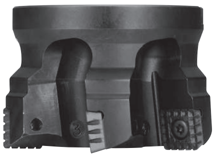


Competitor A　　**MSRS90**

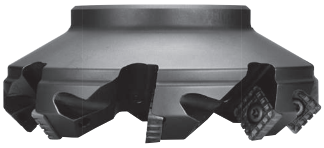
Notched insert realizes lower cutting force and smaller vibration



Tapered cutter



Vertical Milling (Plunging) cutter



45˚ Face Mill

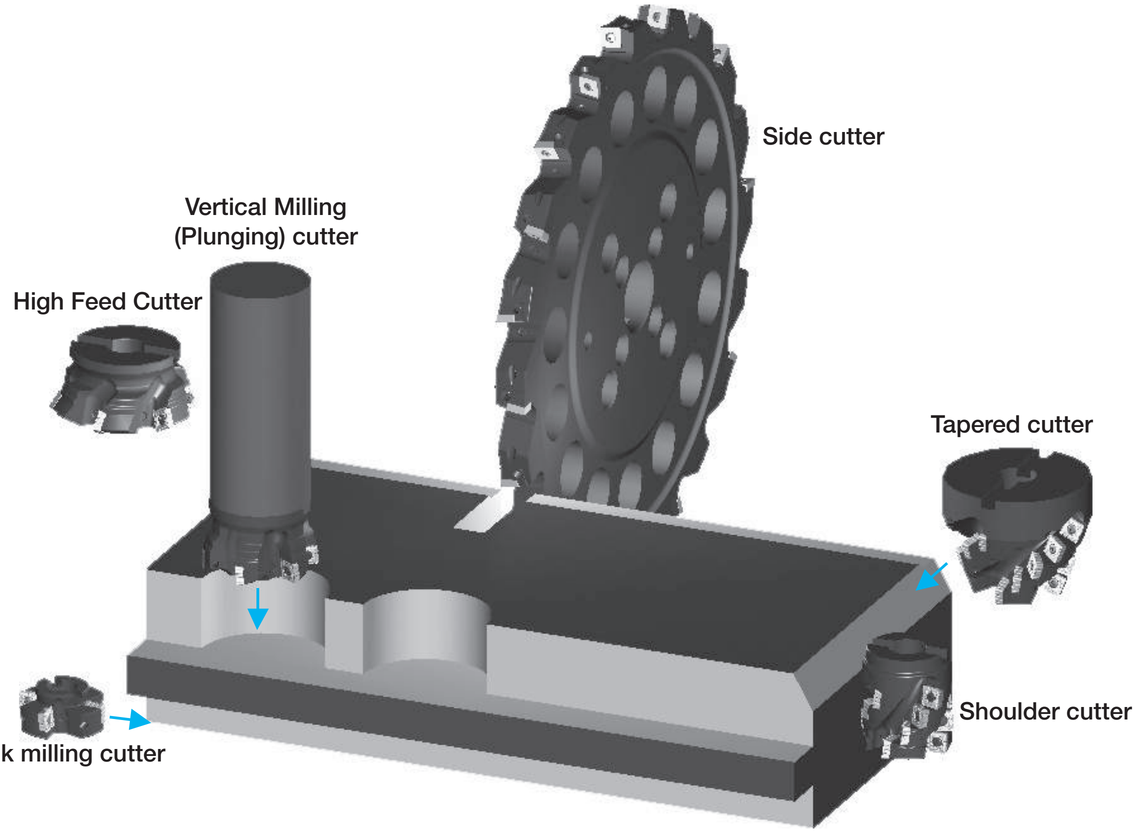
High Feed Cutter

Shoulder cutter

Applicable Inserts : Available for various applications

Applications	Chipbreaker selection	3-Notched		4-Notched		Without notch
General purpose	Standard	 NB3	+	 NB4		
Low Cutting Force	Low Cutting Force	 NB3P	+	 NB4P		
Edge Strength Oriented	Without notch (Usable with notched inserts)	( NB3	or	) NB4	+	

Various expansive possibilities (Custom-ordered and standard milling cutter)

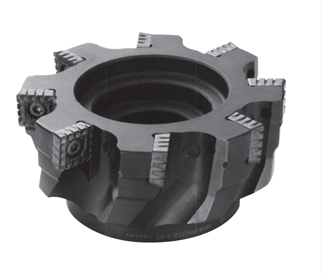


Shaft length determination

The custom-ordered milling cutter can be customized for your requirements such as diameter, cutting edge angle, number of insert stages.

MSRS90

MSRS90



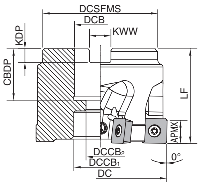


Fig. 1

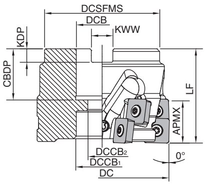


Fig. 2

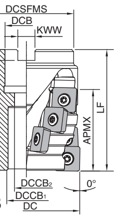


Fig. 3

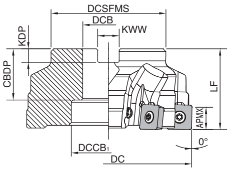


Fig. 4

Rake Angle	
A.R.	R.R.
+7°	-10°

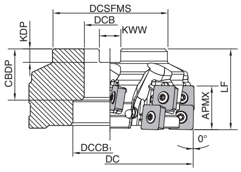


Fig. 5

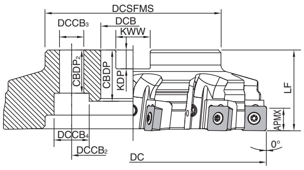


Fig. 6

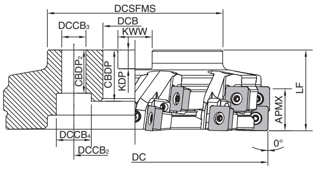


Fig. 7

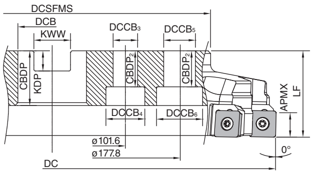


Fig. 8

Toolholder Dimensions

Description		Stock	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)															Drawing	Weight (kg)
						DC	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX	$DCCB_3$	$DCCB_4$	$DCCB_5$	$DCCB_6$	$CBDP_2$		
Metric	**MSRS 90080R-1-4T-M**	●	4	4	1	80	70	27	20	13	60	24	7	12.4	16.5	-	-	-	-	-	Fig. 1	1.3
	90080R-2-4T-M	●	8		2										31						Fig. 2	1.1
	90080R-4-4T-M	●	16		4						85				60						Fig. 3	1.4
	90100R-1-6T-M	●	6	6	1	100	85	32	45	-	70	30	8	14.4	16.5						Fig. 1	2.2
	90100R-2-6T-M	●	12		2										31						Fig. 2	2.0
	90100R-4-6T-M	MTO	24		4						90				60						Fig. 3	3.1
	90125R-1-8T-M	●	8	8	1	125		40	55		60	33	9	16.4	16.5						Fig. 4	2.6
	90125R-2-8T-M	MTO	16		2										31						Fig. 5	2.4
	90160R-1-8T-M	●	8	8	1	160	110			66.7					16.5	14	20	-	-	28	Fig. 6	4.2
	90160R-2-8T-M	MTO	16		2										31						Fig. 7	4.0
	90200R-1-10T-M	●	10	10	1	200	140	60	-	101.6		40	14	25.7	16.5	18	26	-	-	32	Fig. 6	6.7
	90200R-2-10T-M	MTO	20		2										31						Fig. 7	6.6
	90250R-1-12T-M	●	12	12	1	250									16.5						Fig. 6	12.6
	90250R-2-12T-M	MTO	24		2										31						Fig. 7	12.5
	90315R-1-14T-M	●	14	14	1	315	220			-					16.5	17	27	22	32	25	Fig. 8	16.1
	90315R-2-14T-M	MTO	28		2										31						-	16.0
Bore Dia. Inch spec	**MSRS 90080R-1-4T**	●	4	4	1	80	70	31.75	27	18	60	32	8	12.7	16.5	-	-	-	-	-	Fig. 1	1.4
	90080R-2-4T	●	8		2										31						Fig. 2	1.2
	90080R-4-4T	●	16		4						85				60						Fig. 3	1.5
	90100R-1-6T	●	6	6	1	100	85	38.1	39	21	70	38	10	15.9	16.5						Fig. 1	2.3
	90100R-2-6T	●	12		2										31						Fig. 2	2.1
	90100R-4-6T	MTO	24		4						90				60						Fig. 3	3.2
	90125R-1-8T	●	8	8	1	125			55	-	60				16.5						Fig. 4	2.6
	90125R-2-8T	MTO	16		2										31						Fig. 5	2.4
	90160R-1-8T	●	8	8	1	160	100	50.8	70				11	19.1	16.5						Fig. 4	4.3
	90160R-2-8T	MTO	16		2										31						Fig. 5	4.1
	90200R-1-10T	●	10	10	1	200	130	47.625	-	101.6			14	25.4	16.5	18	26	-	-	32	Fig. 6	6.7
	90200R-2-10T	MTO	20		2										31						Fig. 7	6.6
	90250R-1-12T	●	12	12	1	250									16.5						Fig. 6	12.6
	90250R-2-12T	MTO	24		2										31						Fig. 7	12.5
	90315R-1-14T	●	14	14	1	315	220			-					16.5	17	27	22	32	25	Fig. 8	16.1
	90315R-2-14T	MTO	28		2										31						-	16.0

● : Std. Item
MTO : Made to order

Applicable Inserts

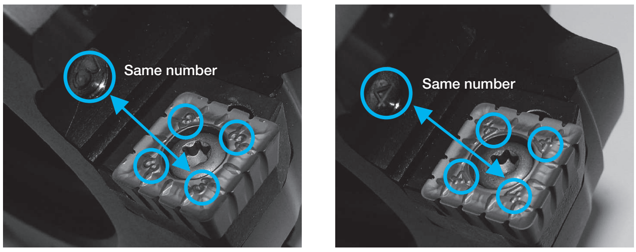
Description	Applicable Inserts ➔ **M28**				
	 3-Notched	 4-Notched	 3-Notched / Low cutting force	 4-Notched / Low cutting force	 Without notch
MSRS90…	**SPMT 180616EN-NB3**	**SPMT 180616EN-NB4**	**SPMT 180616EN-NB3P**	**SPMT 180616EN-NB4P**	**SPMT 180616EN-V**

Caution when installing Notched Insert

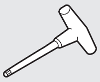
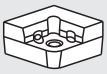
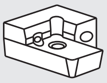
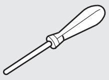
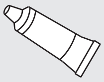
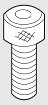
It is important to install the appropriate notched insert into the correct position. If it is installed in incorrect position, the tool cannot cut the workpiece and it may damage the toolholder body. For MSRS90, Notched Insert location indicator is marked at insert installed pocket of the cutter body.

Description		No. of Inserts	No. of Flutes	No. of Stages	No. of Inserts	
					Notched	
					NB3(P)	NB4(P)
MSRS	**90100R-1-6T**	6	6	1	3	3
	90100R-2-6T	12		2	6	6
	90100R-4-6T	24		4	12	12

When installing the inserts, match the number on the top surface of insert to the number of the cutter body.



Spare Parts

Description		Spare Parts							
		Clamp Screw	Wrench	Cartridge		Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt
				MAP-1806M 	MAP-1806S  (Bottom edge only)				
Without cartridge	**MSRS 90080R-○-4T**	SB-60120TR	TT-25L	-	-	-	-	P-37	HH16X45
	90100R-○-6T								HH20X55
	90125R-○-8T								-
With cartridge	**MSRS 90160R-○-8T**			MAP-1806M*1	MAP-1806S*2	SB-40140TR	DT-15		
	~								
	90315R-○-14T	Recommended tightening torque for Insert Clamp 7.5N·m		Recommended tightening torque for Cartridge Clamp 3.5N·m					
Without cartridge	**MSRS 90080R-○-4T-M**			-	-	-	-		HH12X35
	90100R-○-6T-M								-
	90125R-○-8T-M								
With cartridge	**MSRS 90160R-○-8T-M**			MAP-1806M*1	MAP-1806S*2	SB-40140TR	DT-15		-
	~								
	90315R-○-14T-M			Recommended tightening torque for Cartridge Clamp 3.5N·m					

Notes) *1 : MAP-1806M is only for the bottom edge (1st stage) of MSRS90..R-1.
*2 : MAP-1806S is only for the bottom edge (1st stage) of MSRS90..R-2... Use it only for the bottom edge (1st stage).

How to attach the cartridge : You need to tighten 2 clamp screws to fix the cartridge. Tighten the slant screw first and then tighten the other screw.

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Cutting Speed Vc (m/min)	
	Standard NB3+NB4	Low Cutting Force NB3P+NB4P	MEGACOAT	
			PR1230	**PR1210**
Soft Steel	0.1~0.2~0.25	0.1~0.2~0.25	★ 120~150~220	☆ 120~150~220
Carbon Steel	0.1~0.2~0.25	0.1~0.2~0.25	★ 100~150~200	☆ 100~150~200
Alloy Steel	0.1~0.15~0.2	0.1~0.15~0.2	★ 100~150~200	☆ 100~150~200
Mold Steel	0.1~0.15~0.2	0.1~0.12~0.15	★ 100~150~180	☆ 100~150~180
Gray Cast Iron	0.1~0.2~0.3	0.1~0.2~0.25	☆ 100~180~250	★ 100~180~250
Nodular Cast Iron	0.1~0.2~0.25	0.1~0.18~0.2	☆ 100~180~220	★ 100~180~220
Stainless Steel	Not recommended			
Aluminum / Copper	Not recommended			

★ : 1st Recommendation ☆ : 2nd Recommendation

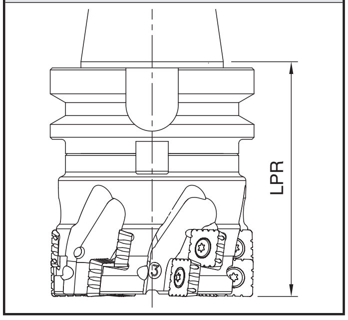
MSRS90

Cutting Conditions (Shouldering)

In case of MSRS90100R-1-6T

Workpiece Material	Overhang Length LPR(mm)	Cutting Conditions		ap × ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Cast Iron	Less than 120mm	180	0.2	15 × 80	826
	120~200mm	180	0.2	15 × 40	413
	201mm and over	230	0.1	15 × 40	263
Carbon Steel	Less than 120mm	150	0.2	15 × 80	689
	120~200mm	150	0.2	15 × 40	344
	201mm and over	200	0.1	15 × 40	229

Overhang Length LPR(mm)



In case of MSRS90100R-2-6T

Workpiece Material	Overhang Length LPR(mm)	Cutting Conditions		ap × ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Cast Iron	Less than 120mm	180	0.2	30 × 50	1,032
	120~200mm	180	0.2	30 × 30	619
	201mm and over	230	0.1	30 × 25	329
Carbon Steel	Less than 120mm	150	0.2	30 × 50	861
	120~200mm	150	0.2	30 × 30	517
	201mm and over	200	0.1	30 × 25	287

In case of MSRS90100R-4-6T

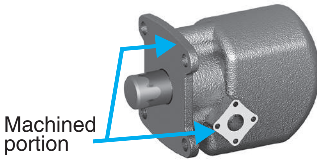
Workpiece Material	Overhang Length LPR(mm)	Cutting Conditions		ap × ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Cast Iron	Less than 140mm	180	0.2	60 × 20	826
	140~200mm	180	0.2	60 × 10	413
	201mm and over	230	0.1	60 × 10	263
Carbon Steel	Less than 140mm	150	0.2	60 × 20	689
	140~200mm	150	0.2	60 × 10	344
	201mm and over	200	0.1	60 × 10	229

Case Studies

FCD450

Industrial parts
·Vc=150m/min
·ap x ae=6 x 65mm
·fz=0.15mm/t
(Vf=430mm/min)

MSRS90100R-1-6T (ø100 ·6 flutes)
SPMT180616EN-NB3/NB4
(PR1210)



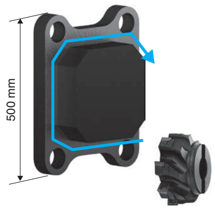
MSRS90(PR1210)	Chip Evacuation Rate = 258cc/min
Competitor B	107cc/min

· MSRS90 more than doubled the machining efficiency compared with competitor B.
· Competitor B machined with 2 passes (ap x ae=3 x 65mm).
MSRS90 machined with only 1 pass.
· Cutting time was reduced. (User Evaluation)

SCM420

Construction machine part
·Vc=200m/min
·ap x ae=10 x 50mm
·fz=0.1mm/t
(Vf=400mm/min)

MSRS90125R-1-8T (ø125 ·8 flutes)
SPMT180616EN-NB3/NB4
(PR1230)



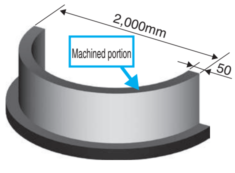
MSRS90(PR1230)	Chip Evacuation Rate = 200cc/min
Competitor C	153cc/min

· MSRS90 improved the machining efficiency to 1.3 times that of competitor C.
· Competitor C machined with ap x ae=5 x 50mm
· Tool cost is reduced to 1/3 although competitor C is expensive using 2-corner insert.
MSRS90 reduced machining cost as well as improved machining efficiency. (User Evaluation)

Mold Steel

Shipbuilding parts
·Vc=150m/min
·ap x ae=10 x 10~50mm
·fz=0.1mm/t
(Vf=240mm/min)

MSRS90160R-1-8T (ø160 ·8 flutes)
SPMT180616EN-NB3/NB4
(PR1230)



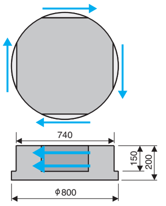
MSRS90(PR1230)	Chip Evacuation Rate = 120cc/min
Competitor D	60cc/min

· MSRS90 more than doubled the machining efficiency compared with competitor D.
· Competitor D machined with ap x ae=5 x 10~50mm
⇒ Low cutting force of MSRS90 enabled twice as large ap as that of competitor.
· It can double the ap as well as increase the cutting speed (Vc=100⇒150).
⇒ Machining efficiency was improved by MSRS90 (by achieving reduction in cutting time). (User Evaluation)

Alloy Steel

Power generation parts
·Vc=160m/min
·ap x ae=10 x 0~20mm
·fz=0.15mm/t
(Vf=500mm/min)

MSRS90125R-1-8T(ø125 ·8 flutes)
SPMT180616EN-NB3/NB4
(PR1230)



MSRS90(PR1230)	12 surfaces/edge
Competitor E	8 surfaces/edge

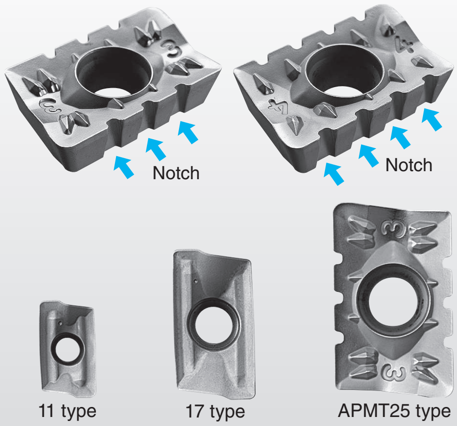
· MSRS90 showed 1.5 times longer tool life than that of competitor E.
· Competitor E machined with 2 passes on a side (ap x ae=12 x 0 to 10mm).Competitor E was poor in feed rate (Vf=400mm/min). ⇒ Machining efficiency was improved by MSRS90 (by achieving reduction in cutting time).
· Although competitor E is load due to high cutting force. MSRS90 operates fairly quietly. (User Evaluation)

Heavy Milling Cutter MSR

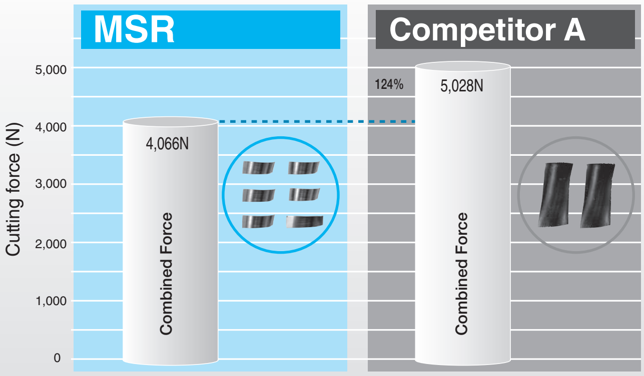
Notched insert reduces cutting force, and enables high feed rates by reducing chattering.
Improved chip evacuation and low cutting force with the special chipbreaker.
Enables heavy milling and deep cutting, and also drastically improves machining efficiency. (Reduction of cutting time)

Notched Insert

Size Comparison (Full-Scale)

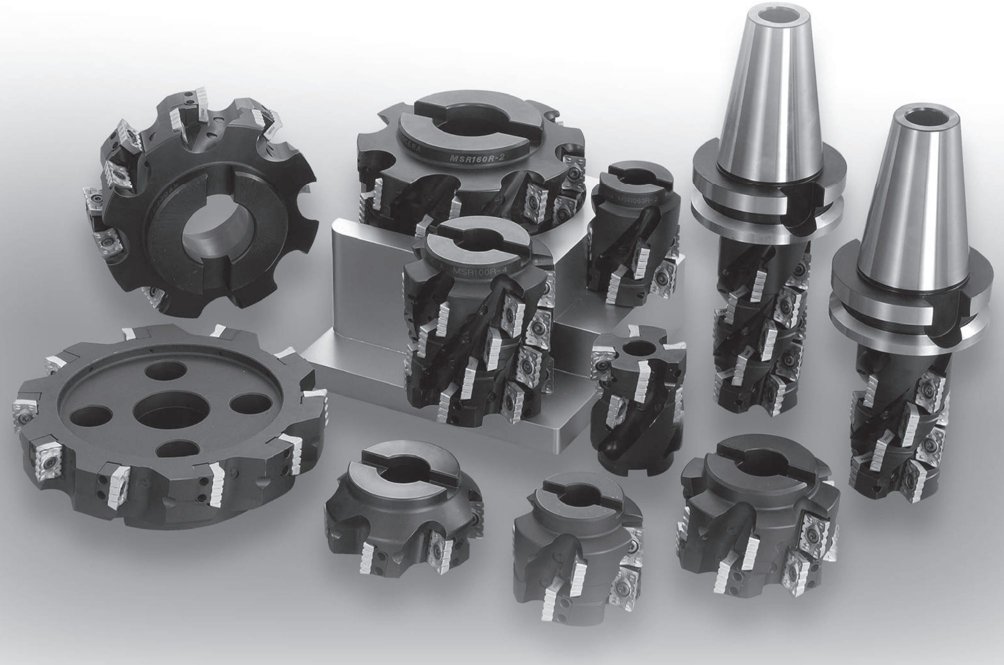


Cutting Force Comparison



* The exclusive notched chipbreaker provides low cutting force and good chip evacuation.

(Internal evaluation)



MSR

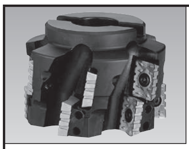
Shouldering | *Slotting | Facing

* Not recommended for 4 stages type

MSR

Rake Angle

ø63~ø80	ø100~
A.R. : +9°	A.R. : +9°
R.R. : -8°	R.R. : -5°



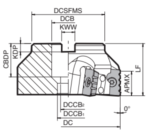


Fig. 1

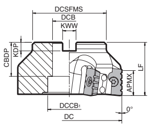


Fig. 2

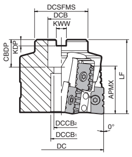


Fig. 3

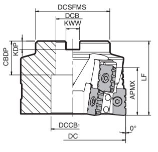


Fig. 4

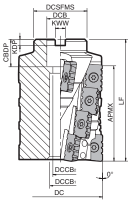


Fig. 5

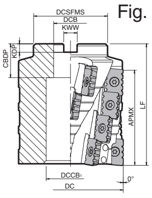


Fig. 6

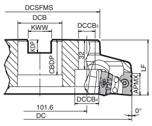


Fig. 7

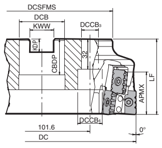


Fig. 8

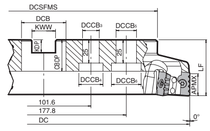


Fig. 9

Spare Parts (Bore Dia. : common to Metric type / Inch type)

Description	Spare Parts					
	Clamp Screw	Wrench	Shim	Clamp Screw	Wrench	Anti-seize Compound
MSR 063R-○□	SB-60120TR	TT-25L	-	-	-	P-37
MSR 080R-○□ ~ **315R-○□**			MAP-2506	SB-40140TR	DT-15	
	for Insert Clamp		for Shim Clamp			

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Toolholder Dimensions (Metric)

Description	Stock	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)														Drawing	Weight (kg)
					DC	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	DCCB$_3$	DCCB$_4$	DCCB$_5$	DCCB$_6$		
MSR 063R-1M	●	4	4	1	63	50	27	20	14	65	22	7.2	12.4	23.5	-	-	-	-	Fig. 1	0.7
063R-2M	●	8		2						85				45					Fig. 3	0.9
080R-1M	●	4	4	1	80	55	27	20	14	50	22	7.2	12.4	23.5	-	-	-	-	Fig. 1	1.0
080R-2M	●	8		2						70				45					Fig. 3	1.5
080R-4M	●	16		4						115				90					Fig. 5	2.5
100R-1M	●	6	6	1	100	70	32	42	-	50	28	8	14.4	23.5	-	-	-	-	Fig. 2	1.5
100R-2M	●	12		2						70				45					Fig. 4	2.0
100R-4M	●	24		4						115				90					Fig. 6	3.2
125R-1M	●	6	6	1	125	85	40	58	-	60	30	9	16.4	23.5	-	-	-	-	Fig. 2	3.4
125R-2M	●	12		2						70				45					Fig. 4	3.7
125R-4M	●	24		4						115				90					Fig. 6	6.0
160R-1M	●	8	8	1	160	100	40	68	-	60	30	10	16.4	23.5	-	-	-	-	Fig. 2	6.1
160R-2M	●	16		2						70				45					Fig. 4	6.8
200R-1M	●	10	10	1	200	130	60	-	-	60	38	15	25.4	23.5	18	26	-	-	Fig. 7	7.0
200R-2M	●	20		2						80				45					Fig. 8	9.9
250R-1M	●	12	12	1	250	130	60	-	-	60	38	15	25.4	23.5	18	26	-	-	Fig. 7	10.3
250R-2M	●	24		2						80				45					Fig. 8	14.2
315R-1M	MTO	14	14	1	315	230	60	-	-	60	35	15	25.4	23.5	17	27	22	32	Fig. 9	15.5

· Shim is not available for MSR063R (DC=63).
· Mounting bolt (HH12X35) is included for MSR063R / MSR080R.
· It is not recommended using only top edge part (under ap=30mm) for 4 stages type. If ap is small, use 1 stage or 2 stages type.
· Deep slotting is not recommended for this cutter.

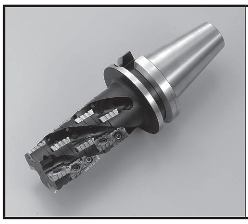
Toolholder Dimensions (Bore Dia. : Inch spec)

Description	Stock	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)														Drawing	Weight (kg)
					DC	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	DCCB$_3$	DCCB$_4$	DCCB$_5$	DCCB$_6$		
MSR 063R-1	●	4	4	1	63	50	25.4	20	14	65	26	6	9.5	23.5	-	-	-	-	Fig. 1	0.8
063R-2	●	8		2						85				45					Fig. 3	1.0
080R-1	●	4	4	1	80	55	25.4	20	14	50	26	6	9.5	23.5	-	-	-	-	Fig. 1	1.1
080R-2	●	8		2						70				45					Fig. 3	1.6
080R-2-31.75	●					70	31.75	27	18		32	8	12.7						Fig. 3	1.7
080R-4	●	16		4		55	25.4	20	14	115	26	6	9.5	90					Fig. 5	2.6
080R-4-31.75	●					70	31.75	27	18		32	8	12.7						Fig. 5	2.7
100R-1	●	6	6	1	100	70	31.75	42	-	50	32	8	12.7	23.5	-	-	-	-	Fig. 2	1.6
100R-2	●	12		2						70				45					Fig. 4	2.2
100R-4	●	24		4						115				90					Fig. 6	3.6
125R-1	●	6	6	1	125	85	38.1	54	-	60	38	10	15.9	23.5	-	-	-	-	Fig. 2	3.5
125R-2	●	12		2						70				45					Fig. 4	3.8
125R-4	●	24		4						115				90					Fig. 6	6.1
160R-1	●	8	8	1	160	100	50.8	68	-	60	38	11	19.0	23.5	-	-	-	-	Fig. 2	5.8
160R-2	●	16		2						70				45					Fig. 4	6.4
160R-4	●	32		4						115				90					Fig. 6	10.7
200R-1	●	10	10	1	200	130	47.625	-	-	60	38	14	25.4	23.5	18	26	-	-	Fig. 7	7.5
200R-2	●	20		2						80				45					Fig. 8	10.4
250R-1	●	12	12	1	250	130	47.625	-	-	60	38	14	25.4	23.5	18	26	-	-	Fig. 7	10.9
250R-2	●	24		2						80				45					Fig. 8	14.7
315R-1	MTO	14	14	1	315	220	47.625	-	-	60	35	14	25.4	23.5	17	27	22	32	Fig. 9	16.0

· Shim is not available for MSR063R (DC=63).
· Mounting bolt (HH12X40) is included for MSR063R and MSR080R. Mounting bolt (HH16X45) is included for MSR080R-○-31.75.
· It is not recommended using only top edge part (under ap=30mm) for 4 stages type. If ap is small, use 1 stage or 2 stages type.
· Deep slotting is not recommended for this cutter.

● : Std. Item
MTO : Made to order

MSR-BT50



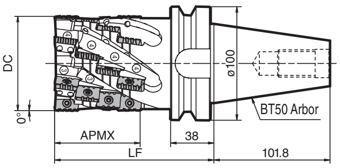


Fig. 1

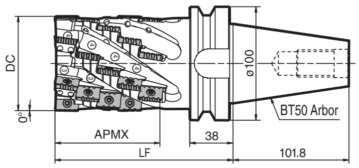


Fig. 2

Toolholder Dimensions (BT50 Integral Arbor type)

Description		Stock	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)			Rake Angle		Drawing	Weight (kg)	Spare Parts					
						DC	LF	APMX	A.R.	R.R.			Clamp Screw	Wrench	Shim	Clamp Screw	Wrench	Anti-seize Compound
MSR	063R-BT50-4	●	16	4	4	63	160	90	+9°	-8°	Fig. 1	5.7	SB-60120TR for Insert Clamp	TT-25L	-	-	-	P-37
	063R-BT50-5	●	20		5		180	111			Fig. 2	6.2						
	080R-BT50-4	●	16	4	4	80	160	90			Fig. 1	6.9			MAP-2506	SB-40140TR for Shim Clamp	DT-15	
	080R-BT50-5	●	20		5		180	111			Fig. 2	7.4						
	100R-BT50-4	●	24	6	4	100	160	90	+9°	-5°	Fig. 1	9.6						
	100R-BT50-5	●	30		5		180	111			Fig. 2	10.5						

·Shim is not available for MSR063R (DC=63).
· It is not recommended using only top edge part (under ap=30mm) for 4 stages / 5 stages type. If ap is small, use previous page's 1 stage type or 2 stages type.
· Deep slotting is not recommended for this cutter.

Applicable Inserts

Description	Applicable Inserts ➔ **M22** (Handed Insert shows Right-hand)			
	 3-Notched	 4-Notched	 3-Notched / Low cutting force	 4-Notched / Low cutting force
MSR… **MSR…M**	**APMT 2506○○ER-NB3** +	**APMT 2506○○ER-NB4**	**APMT 250616ER-NB3P** +	**APMT 250616ER-NB4P**
For custom-ordered cutter	**APMT 250616EL-NB3** +	**APMT 250616EL-NB4**	-	

Recommended Cutting Conditions ➔ **M126**

Caution when installing Notched Insert

It is important to install the appropriate notched insert into the correct position. If it is installed in incorrect position, the tool cannot cut the workpiece and it may damage the toolholder body. For MSR, Notched Insert location indicator is marked at insert installed area.

Please bear the following in mind when installing inserts to toolholders.
(Indication is marked near the insert pocket for MSR.)

1. (3) is for APMT2506 ○○ ER-NB3
2. (4) is for APMT2506 ○○ ER-NB4

(No. of Inserts - Example)

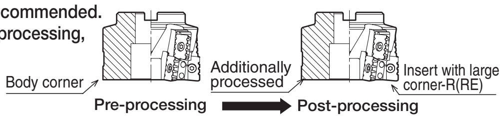
Description		No. of Inserts	No. of Flutes	No. of Inserts Notched NB3	No. of Inserts Notched NB4
MSR	100R-1	6	6	3	3
	100R-2	12		6	6
	100R-4	24		12	12

Caution when installing the Insert with Corner-R(RE) 4.0

When using inserts with corner-R(RE) 4.0mm, additional modifications of the cutter body will be necessary. Ref. to the table below for the recommended modifications.

Insert Corner-R(RE) (mm)	Additional Processing Dimension to Body Corner (mm)
4.0	R2.0

* Round- shaped additional processing is recommended. When applying chamfer shaped additional processing, do not cut away too much.



● : Std. Item

Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc : m/min)	
	Low Cutting Force	General purpose	MEGACOAT	
	NB3P+NB4P	NB3+NB4	**PR1230**	**PR1210**
Carbon Steel	0.15	0.2	★ 100~**150**~200	-
Cast Iron	0.15	0.2	-	★ 100~**150**~200
Stainless Steel	Not recommended			
Aluminum / Copper	Not recommended			

* For MSR, cutting speed should be carefully adjusted depending on the length of toolholder protruding from the end of machine spindle. ★ : 1st Recommendation ☆ : 2nd Recommendation

- When the overhang length of toolholder is small, ➡ set the cutting speed to slightly higher than the recommended cutting conditions.
- When the overhang length of toolholder is long, ➡ set the cutting speed to slightly lower than the recommended cutting conditions.

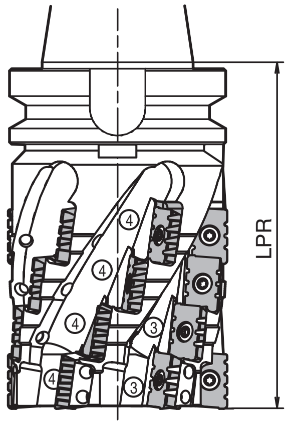
Cutting Conditions

1) Shouldering

In case of MSR100R-1

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 100mm	150	0.2	20 x 80	920
	100~200mm	150	0.2	20 x 40	460
	201mm and over	100	0.2	20 x 30	228
Cast Iron	Less than 100mm	180	0.2	20 x 80	1,100
	100~200mm	180	0.2	20 x 40	550
	201mm and over	120	0.2	20 x 30	276

Overhang Length LPR (mm)



In case of MSR100R-2

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 130mm	150	0.2	40 x 40	920
	130~230mm	150	0.2	40 x 20	460
	231mm and over	100	0.2	40 x 20	304
Cast Iron	Less than 130mm	180	0.2	40 x 40	1,100
	130~230mm	180	0.2	40 x 20	550
	231mm and over	120	0.2	40 x 20	368

In case of MSR100R-4

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 180mm	150	0.2	75 x 20	863
	180~280mm	150	0.2	75 x 10	431
	281mm and over	100	0.2	75 x 10	285
Cast Iron	Less than 180mm	180	0.2	75 x 20	1,035
	180~280mm	180	0.2	75 x 10	518
	281mm and over	120	0.2	75 x 10	345

2) Slotting

● In case of MSR100R-1

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 100mm	150	0.2	7 x 100	403
	100~200mm	120	0.2	4 x 100	184
	201mm and over	100	0.2	3 x 100	114
Cast Iron	Less than 100mm	180	0.2	14 x 100	966
	100~200mm	150	0.2	7 x 100	403
	201mm and over	120	0.2	4 x 100	184

● In case of MSR100R-2

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 130mm	150	0.2	7 x 100	403
	130~230mm	120	0.2	4 x 100	184
	231mm and over	100	0.2	3 x 100	114
Cast Iron	Less than 130mm	180	0.2	14 x 100	966
	130~230mm	150	0.2	7 x 100	403
	231mm and over	120	0.2	4 x 100	184

● In case of MSR160R-1

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 100mm	150	0.2	5 x 160	384
	100~200mm	120	0.2	3 x 160	182
	201mm and over	100	0.2	2 x 160	102
Cast Iron	Less than 100mm	180	0.2	10 x 160	928
	100~200mm	150	0.2	5 x 160	384
	201mm and over	120	0.2	4 x 160	243

● In case of MSR160R-2

Workpiece Material	Overhang Length LPR (mm)	Cutting Conditions		ap x ae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Carbon Steel	Less than 130mm	150	0.2	5 x 160	384
	130~230mm	120	0.2	3 x 160	182
	231mm and over	100	0.2	2 x 160	102
Cast Iron	Less than 130mm	180	0.2	10 x 160	928
	130~230mm	150	0.2	5 x 160	384
	231mm and over	120	0.2	4 x 160	243

Notes) MSR...-4 (No. of stage)
Slotting is not recommended.

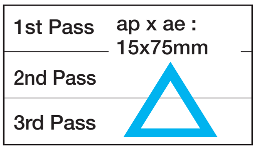
Q&A

Q-1 What cutting conditions are recommended in most cases for MSR?

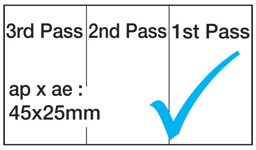
A-1 Vc=150m/min,fz=0.2mm/t,
larger cutting depth and smaller cutting width

In case of MSR100R-2

e.g.) Load meter 120%



e.g.) Load meter 90%



Q-2 Required equipment for MSR?

A-2 Max. spindle revolution is 4,000min^{-1} or under. BT50 or larger.

* MSR is not only for Double column machining center. The reason why not recommended for high RPM spindle machine is its less torque.
* Although MSR works with BT40 shank, maximum available fz is about 0.1mm/tooth.

Q-3 What are the points to remember in case of less power machine?

A-3 Do not use large size cutters. ⇒ ø63 or ø80 is recommended.
Please increase cutting speed and decrease feed rate.
Set up conditions to get the largest available torque by checking torque curve of the machine.
Tried under condition of Vc=150m/min, enough torque was not gained because of high gear.
In this case, it has to be prioritized using Vc which can exert enough torque as Vc=120m/min.
* Machine torque curve will be prioritized.

Q-4 In case of unstable workpiece.

A-4 Decrease feed ratio at the start machining the workpiece.

* Almost all cases of moving workpiece happens when start machining.

◎ Effective for increasing cutting speed and decrease feed rate.
Vc=150m/min,fz=0.2mm/t
↓
Vc=200m/min,fz=0.15mm/t

Q-5 What is the tool life?

A-5 Chip weight : 700kg/Corner (Result by PR660)
Cutting time : 90min (calculated value)
Cutting distance : 65m (calculated value)
How great 1,000cc/min? ⇒ About 7.8kg chips removed per minute
Tool life time=700kg (Chip weight)÷7.8kg (Chip evacuation amount per 1min)=90min
Cutting distance=90min (Time by the end of tool life)x717mm/min (Table feed ratio per 1min)=65m
* In case of cutting Vc=150m/min, apxae : 20x70mm, Vf=717mm/min.
* Tool : MSR100R-2 (6 flutes)

Q-6 How to reduce chattering.

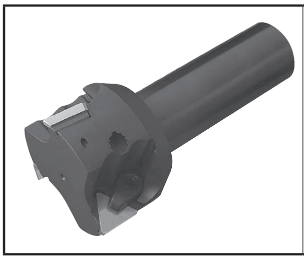
A-6 **In chattering occurs, then the following conditions are recommended.**
⇒ Reduce cutting speed and increase feed rate.

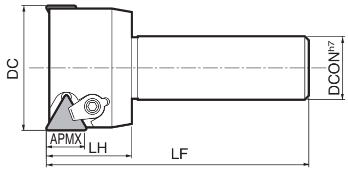
In case of Steel	In case of Cast Iron
· Vc = 80m/min	· Vc = 80m/min
· fz = 0.25mm/t	· fz = 0.35mm/t

MTP90

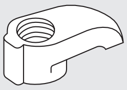
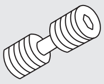
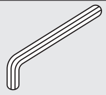
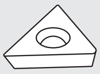
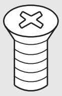
Shouldering Slotting Facing

MTP90 with cylindrical shank





Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)					Rake Angle		Spare Parts				
			DC	DCON	LF	LH	APMX	A.R.	R.R.	Clamp	Clamp screw	Wrench	Shim	Shim Screw
														
MTP 9050	▲	3	50	32	130	43	18	+8°	0°	CP-8W	W8X18	LW-4	KPT-42	SP3X8
9063	▲	3	63											

Applicable Inserts

Description	Applicable Inserts ➜ **M14**		
			
MTP 90...	TPMR 2204PDER-H	TPKR 2204PDER-S	TPKN 2204PDTR 2204PDFR

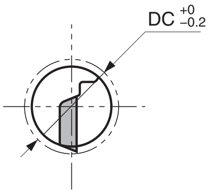
Recommended Cutting Conditions

Workpiece Material	Feed fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)			
		Cermet	MEGACOAT		Carbide
		TN100M	**PR1225**	**PR1210**	**KW10**
Carbon Steel	~0.25	★ 120~200	★ 120~250	-	-
Alloy Steel	~0.25	★ 100~180	★ 100~220	-	-
Mold Steel	~0.20	★ 100~180	★ 80~180	-	-
Stainless Steel	~0.20	☆ 120~200	★ 120~220	-	-
Cast Iron	~0.25	-	-	★ 100~220	☆ 80~150
Non-ferrous Metals	~0.20	-	-	-	★ 100~300

★ : 1st Recommendation ☆ : 2nd Recommendation

▲ : To be replaced by a new product

DMC End Mill



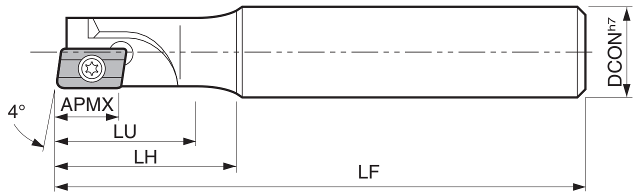


Fig. 1

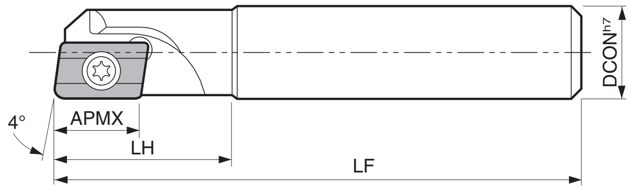
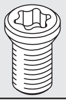
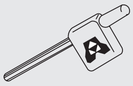


Fig. 2

Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
			DC	DCON	LF	LH	LU	APMX	A.R.	R.R.		Clamp Screw	Wrench	
														
DMC 810-S16	●	1	10	16	90	27	16	8.5	+3°	-11°	Fig. 1	SB-2545TR	FT-8	
811-S16	●		11							-10°				
812-S16	●		12			31	20		+5°					
814-S16	●		14		100	33.5	25		+6°	-8°				
815-S16	●		15											
816-S16	●	2	16			31				-4°				
820-S20	●	3	20	20	120	36	30		+8°	-6°				
DMC 810	●	1	10	10	70	20	-	8.5	+3°	-6°	Fig. 2	SB-2545TR	FT-8	
812	●		12	12	80	25				-5°				
DMC 020	●	2	20	20	110	30	-	11.0	+5°	0°	Fig. 2	SB-3060TR	FT-10	

Applicable Inserts

Description	Applicable Inserts ➡ **M24**	
		
DMC8○○(-S○○)	NDCT 090204TR 090204FR	NDMM 090204ER-SP
DMC020	NDCT 120208TR 120208FR	NDMM 120204ER-SP 120208ER-SP

Recommended Cutting Conditions ➡ **M131**

● : Std. Item

DMC-SX End Mill

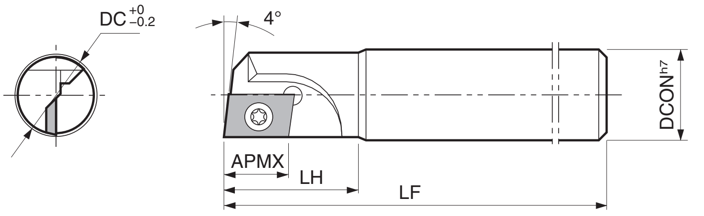


Fig. 1

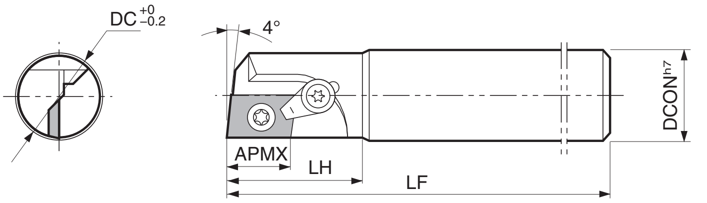
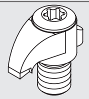
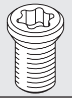
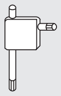


Fig. 2

Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)					Rake Angle		Drawing	Spare Parts		
											Clamp Set	Clamp Screw	Wrench
			DC	DCON	LF	LH	APMX	A.R.	R.R.				
DMC 316SXT	●	1	16	16	90	30	14.0	+3°	-3°	Fig. 1	-	SB-4060TR	FT-15
320SX	●		20	20	110					Fig. 2	CPS-2TR	SB-4065TR	
325SX	●	2	25	25	120	40			-2°				
332SX	●		32	32	130				0°				
340SX	●		40	32	150								
DMC 320SX-200	●	1	20	20	200	50	14.0	+3°	-3°	Fig. 1	-	SB-4065TR	FT-15
325SX-220	●	2	25	25	220	60			-2°				
332SX-250	●		32	32	250	80			0°				

Applicable Inserts

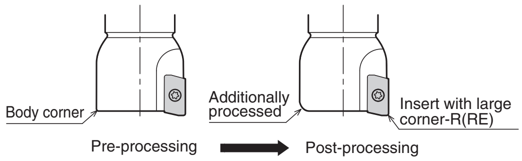
Description	Applicable Inserts ➡ **M24**		
			
DMC 316SXT	NDCW 150302TR	NDCT 150308TR	NDMM 150304ER-SP
320SX	150304TR	150308FR	150308ER-SP
325SX	150308TR	(NDCT 150308TRX)	
332SX	150320TR		
340SX	150330TR		
DMC 320SX-200	150340TR		
325SX-220	(NDCW 150308TRX)		
332SX-250	(NDCW 150308FRX)		

( ) insert is also attachable, however toolholder will be out from insert bottom. (Ref. to lower section of **M133**)

■When using inserts with corner-R(RE) 2.0 or larger, additional modifications of the cutter body will be necessary. Additional modifications for the body will be necessary. Ref. to the chart below for the recommended modifications. (Additional grind off is not necessary when corner-R(RE) is 0.8mm or less.)

Insert Corner-R(RE) (mm)	Additional Processing Dimension to Body Corner (mm)
2.0	R1.0
3.0	R1.6
4.0	R2.0

* Round- shaped additional processing is recommended.
When applying chamfer shaped additional processing, do not cut away too much.



DMC / DMC-SX Recommended Cutting Conditions

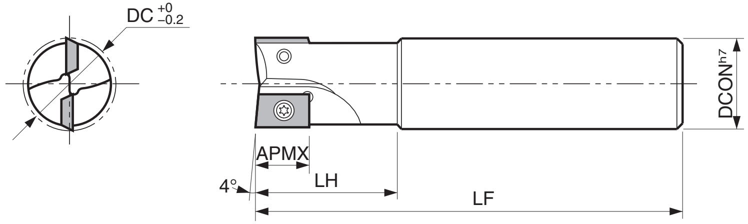
Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)		Max. ap (mm)		
		Cermet	Carbide			
		TN100M	**KW10**	Cutting Dia. (DC)	Slotting (ap)	Shouldering (apxae)
Carbon Steel	~0.2	★ 120~200		~ø12	2	6x2
				ø14~	3	9x3
Alloy Steel	~0.2	★ 100~180		~ø12	2	6x2
				ø14~	3	9x3
Mold Steel	~0.15	★ 100~180		~ø12	2	6x2
				ø14~	3	9x3
Stainless Steel	~0.15	☆ 120~200		~ø12	1.5	4x2
				ø14~	2	6x2
Cast Iron	~0.2		★ 80~150	~ø12	2	6x2
				ø14~	3	9x3
Non-ferrous Metals	~0.2		★ 100~300	~ø12	2	6x2
				ø14~	3	9x3

·Use DMC8○○with ap=6mm MAX. for shouldering.

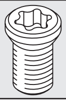
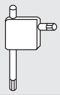
★ : 1st Recommendation ☆ : 2nd Recommendation

● : Std. Item

DMC-H End Mill (High Rake)



Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
			DC	DCON	LF	LH	APMX		A.R.	R.R.		Clamp Screw 	Wrench 	
DMC 316H	●	1	16	16	90	30	14.0		+5°	-3.5°	-	SB-4060TR	FT-15	
320H	●		20	20	110				+6°	-2°				
325H	●	2	25	25	120	40			+8°			SB-4065TR		
332H	●		32	32	130					0°				
340H	●		40		150									

Applicable Inserts

Description	Applicable Inserts ➡ **M24**			Applicable Inserts ➡ **M29**
				
DMC 316H	NDMM 150304ER-SP 150308ER-SP	NDCT 150308TRX	NDCW 150308TRX 150308FRX	NDCW 150302FRX-NE 150302FRX (PCD)
320H				
325H				
332H				
340H				

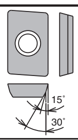
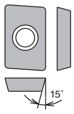
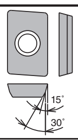
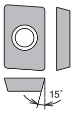
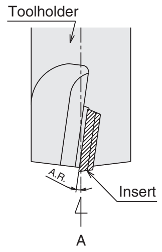
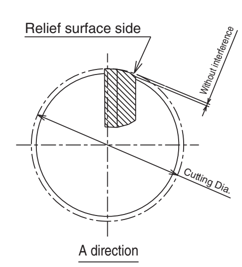
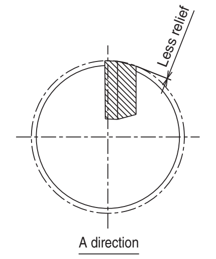
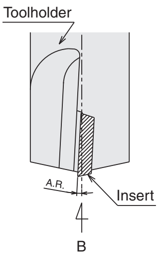
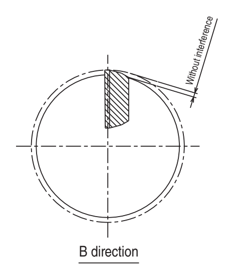
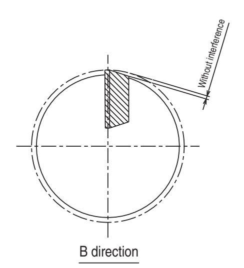
● : Std. Item

◆ DMC-H Recommended Cutting Conditions

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)				Max. ap (mm)		
		Cermet	Carbide	PCD				
		TN100M	**KW10**	**KPD230 (KPD001)**	**KPD010**	Cutting Dia. (DC)	Slotting (ap)	Shouldering (apxae)
Carbon Steel	~0.2	★ 120~200				~ø20	4	8x4
						ø25~	8	14x6
Alloy Steel	~0.2	★ 100~180				~ø20	4	8x4
						ø25~	8	13x6
Mold Steel	~0.15	★ 100~180				~ø20	3	5x2
						ø25~	6	10x3
Stainless Steel	~0.15	☆ 120~200				~ø20	3	6x2
						ø25~	6	13x3
Cast Iron	~0.2		★ 80~150			~ø20	4	8x4
						ø25~	6	14x6
Non-ferrous Metals	~0.2		★ 100~300	★ 300~500	☆ 300~500	~ø20	4	8x4
						ø25~	6	14x6

★ : 1st Recommendation ☆ : 2nd Recommendation

· Above inserts are also applicable to DMC○○○SX, but the conventional NDCW1503○○TR insert is not applicable for this end mill.

Insert Description / Toolholder Description	NDCT...TRX NDCW...(T/F)RX 	NDCW...TR NDCT...(T/F)R 	Insert Description / Toolholder Description	NDCT...TRX NDCW...(T/F)RX 	NDCW...TR NDCT...(T/F)R 
DMC-H 	No interference of relief surface 	Less relief ap must be under 5mm. 	DMC-SX 	No interference of relief surface 	No interference of relief surface 

High Efficiency Milling Cutter for Finishing Aluminum Alloys

MFAH

Low Cutting Force Minimizes Burrs and Chipping for High Quality Machining

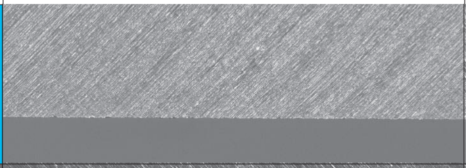
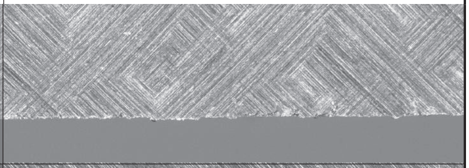
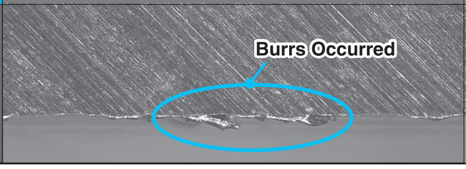
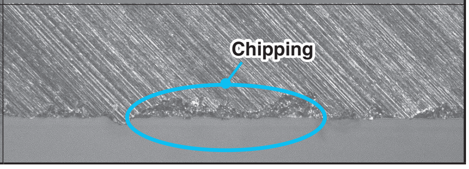
Easily Adjust Blade Runout

2 Body Types and 3 Inserts for a Variety of Milling Applications

1 Low Cutting Force Minimizes Burrs for High Quality Machining

Large True Rake Angle and Dual Cutting Edge Insert Designs

Burr and Chipping Comparison (Internal evaluation)

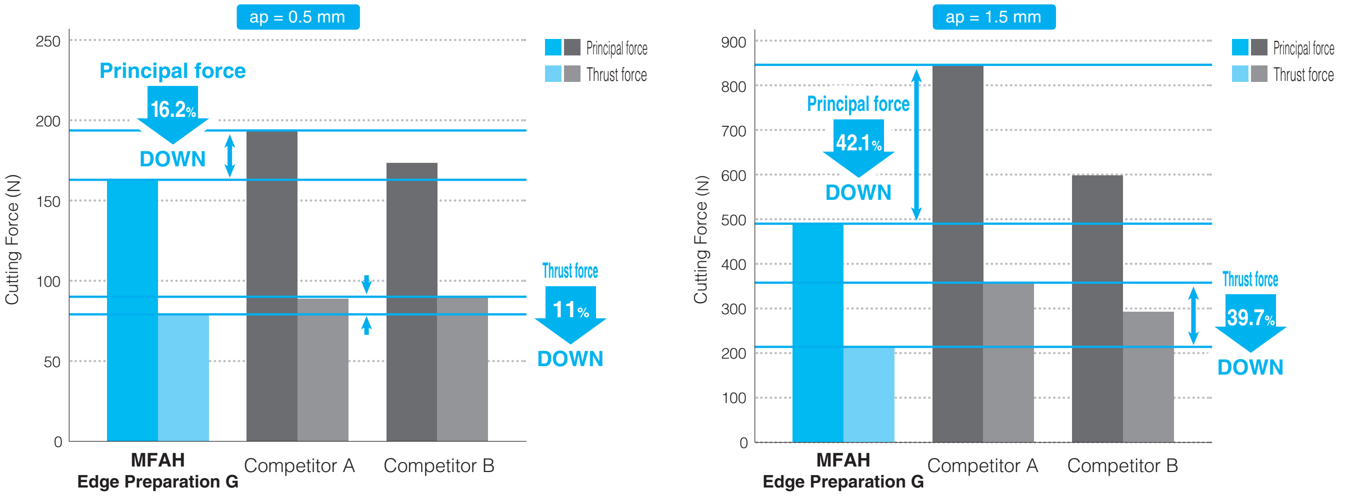
	Finishing (Burrs More Likely) ap = 0.5 mm, ae = 55 mm, fz = 0.05 mm/t	**Roughing** (Chipping More Likely) ap = 1.5 mm, ae = 55 mm, fz = 0.15 mm/t
MFAH Edge Preparation G (Dual Cutting Edge)		
Competitor A (R0.8)		

Cutting Conditions : Vc = 2,500 m/min, Wet, Cutter Dia. ø80
MFAH080RS-10T-SF, ENET0905PAER-G KPD001
Workpiece Material : ADC12

2 Low Cutting Force Design

Low Cutting Force, Reduced Chattering and High Efficiency Machining

Cutting Force Comparison (Internal evaluation)



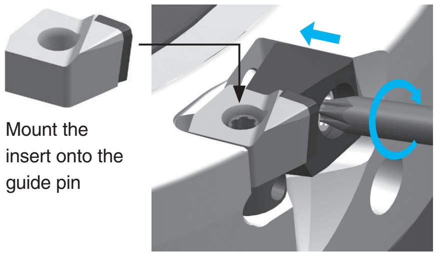
Cutting Conditions : Vc = 2,500 m/min, ae = 55 mm, fz = 0.1 mm/t, Wet, Cutter Dia. ø80
MFAH080RS-10T-SF ENET0905PAER-G KPD001 Workpiece Material : ADC12

3 Adjustable Blade Runout

■ Easily Install Inserts and Adjust Blade Runout

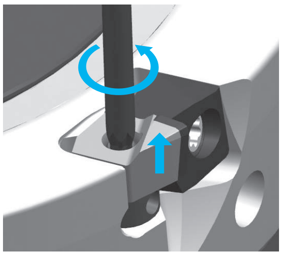
Easy Insert Installment

Guide Pin Allows for Easier Positioning



Easily Adjust Blade Runout

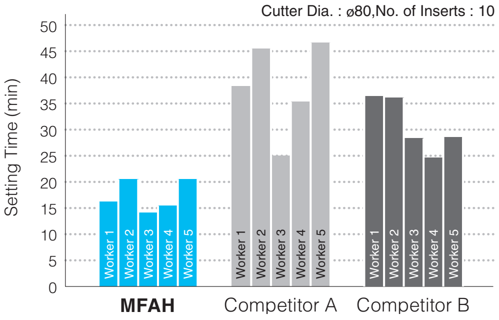
Adjustable from Both the Front and Outer Periphery



Unique Design for Easily Adjusting from the Front

Blade Runout Setting Time Comparison (Internal evaluation)

* Operation Time of 5 Workers Comparison



The MFAH can drastically shorten the setting time

4 Large Tooling Lineup

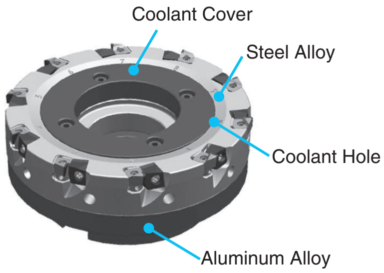
Steel Body and Light-weight Hybrid Body with Internal Coolant Available

3 Different Edge Designs Offer a Variety of Machining Applications

· **Cutter Body**

Steel Body

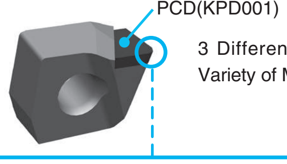
ø50~ø125



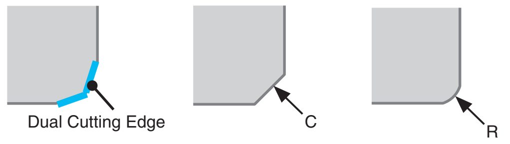
Light-weight Hybrid Body

ø80~ø315

· **Insert (Edge Design)**



3 Different Edge Designs Offer a Variety of Machining Applications



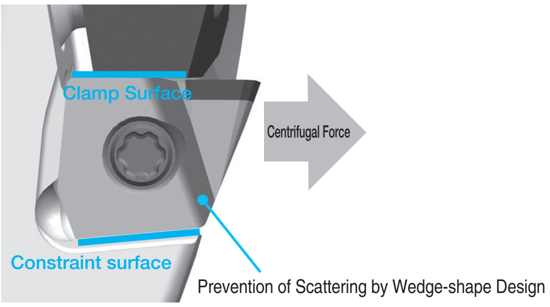
ENET0905PAER-G	ENET0905PAER-C	ENET0905PAER-R
Minimizes Burrs and Chipping	Low cutting force	Tough Edge
* 1st Recommendation	* Low Rigidity Workpiece etc.	* High Interruption Workpiece etc.

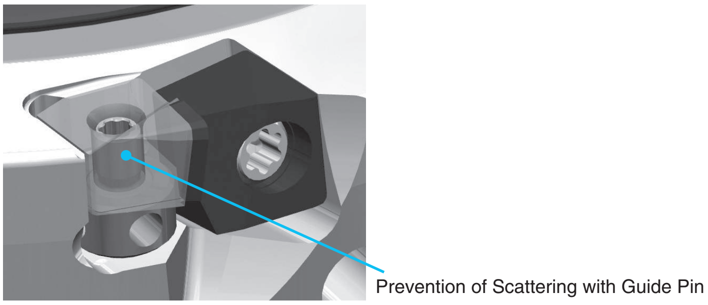
5 Safety Enhancements during High-speed Revolution

■ Scattering Prevention Mechanism

1 Prevention of Scattering by Wedge-shape Design
New wedge-shape feature holds insert firmly in place and reduces chattering

2 Prevention of Scattering with Guide Pin
Guide pins improve safety during high-speed rotation





MFAH (Light-weight Hybrid Body)

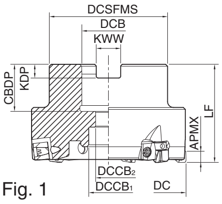


Fig. 1

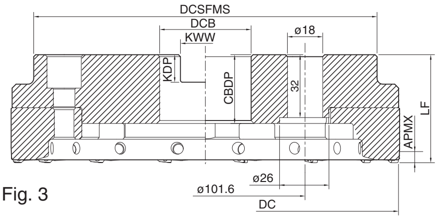


Fig. 3

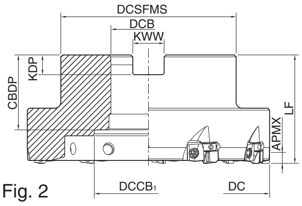


Fig. 2

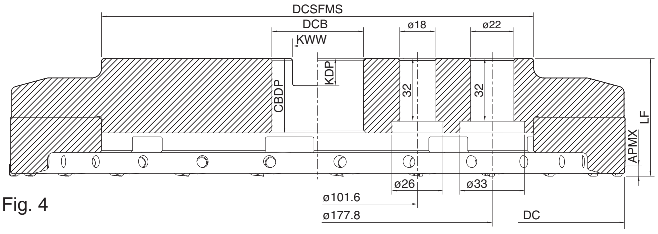


Fig. 4

Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)										Coolant Hole	Drawing	Max. Revolution (min^{-1})	Weight (kg)	Arbor Bolt (Attachment)	Coolant Cover (Attachment)	Coolant Cover (sold separately)
					DC	DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX							
Metric	MFAH	080RA-6T-M-SF	●	6	80	62	27	20	13	50	27	7.0	12.4	4.6	Yes	Fig. 1	14,600	0.82	HH12X35HC	-	-
		080RA-10T-M-SF	●	10														0.78			
		100RA-8T-M27-SF	●	8	100	62	27	20	13		24						13,000	1.20	HH12X35HC	-	-
		100RA-12T-M27-SF	●	12														1.15			
		100RA-8T-M-SF	●	8		85	32	42	-		30	8.0	14.4			Fig. 2		1.32	HF16X48HC	-	-
		100RA-12T-M-SF	●	12														1.27			
		125RA-10T-M27-SF	●	10	125	60	27	20	13		24	7.0	12.4			Fig. 1	11,400	1.80	HH12X35H	CC-125-MFAH	-
		125RA-16T-M27-SF	●	16														1.73			
		125RA-10T-M-SF	●	10		94	40	55	-	55	33	9.0	16.4			Fig. 2		2.1	HF20X53HA		
		125RA-16T-M-SF	●	16														2.1			
		160RA-12T-M-SF	●	12	160	125	40	57									8,000	3.5		CC-160-MFAH	-
		160RA-20T-M-SF	●	20														3.4			
		200RA-16T-M-SF	MTO	16	200	175	60	126			35	14.0	25.7			Fig. 3	5,600	4.7	-	-	CC-200-MFAH
		200RA-24T-M-SF	MTO	24														4.6			
		250RA-20T-M-SF	MTO	20	250	140		165									4,500	6.9	-	-	CC-250-MFAH
		250RA-32T-M-SF	MTO	32														6.8			
		315RA-24T-M-SF	MTO	24	315	220		220		60	38					Fig. 4	3,500	11.7	-	-	CC-315-MFAH
		315RA-40T-M-SF	MTO	40														11.5			
Bore Dia. Inch spec	MFAH	080RA-6T-SF	●	6	80	62	25.4	20	13	50	27	6.0	9.5	4.6	Yes	Fig. 1	14,600	0.83	HH12X35HC	-	-
		080RA-10T-SF	●	10														0.78			
		100RA-8T-254-SF	●	8	100	62	25.4	20	13		24						13,000	1.21	HH12X35HC	-	-
		100RA-12T-254-SF	●	12														1.16			
		100RA-8T-SF	●	8		85	31.75	42	-		34	8.0	12.7			Fig. 2		1.33	HF16X44HC	-	
		100RA-12T-SF	●	12														1.29			
		125RA-10T-254-SF	●	10	125	60	25.4	20	13		24	6.0	9.5			Fig. 1	11,400	1.80	HH12X35H	CC-125-MFAH	-
		125RA-16T-254-SF	●	16														1.74			
		125RA-10T-SF	●	10		89	38.1	55	-	55	38	10.0	15.9			Fig. 2		2.00	HF20X53HA		
		125RA-16T-SF	●	16														1.95			
		160RA-12T-SF	●	12	160	130	50.8	70				11.0	19.1				8,000	3.4	HF24X60HA	CC-160-MFAH	-
		160RA-20T-SF	●	20														3.3			
		200RA-16T-SF	MTO	16	200	175	47.625	126			35	14.0	25.4			Fig. 3	5,600	4.9	-	-	CC-200-MFAH
		200RA-24T-SF	MTO	24														4.8			
		250RA-20T-SF	MTO	20	250	140		165									4,500	7.0	-	-	CC-250-MFAH
		250RA-32T-SF	MTO	32														6.9			
		315RA-24T-SF	MTO	24	315	220		220		60	38					Fig. 4	3,500	11.7	-	-	CC-315-MFAH
		315RA-40T-SF	MTO	40														11.5			

Confirm the total weight of the cutter and the arbor is within the machine's acceptable range

Applicable Inserts ➡ **M138**

● : Std. Item
MTO : Made to order

MFAH (Steel Body)

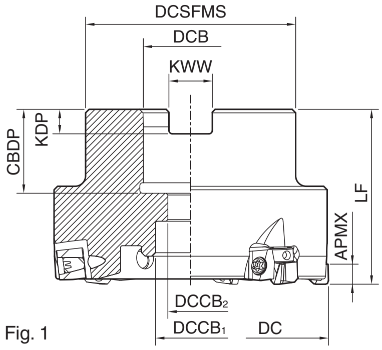


Fig. 1

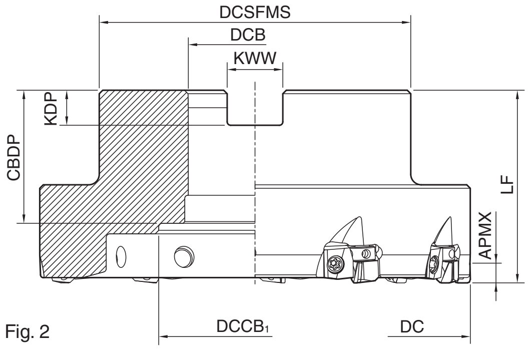
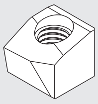
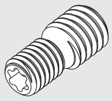
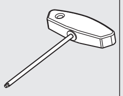
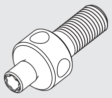
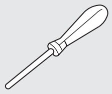
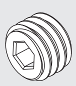
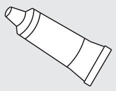


Fig. 2

Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)										Coolant Hole	Drawing	Max. Revolution (min^{-1})	Weight (kg)	Mounting bolt (Attachment)
					DC	DCSFMS	DCB	DCCB₁	DCCB₂	LF	CBDP	KDP	KWW	APMX					
Metric	**MFAH**	**050RS-4T-M-SF**	●	4	50	48	16	13.6	9	40	19	5.6	8.4	4.6	No	Fig. 1	19,200	0.44	HH8X25
		050RS-5T-M-SF	●	5														0.43	
		063RS-5T-M-SF	●	5	63	61	22	23	11		21	6.3	10.4				16,800	0.69	HH10X30
		063RS-6T-M-SF	●	6														0.68	
		080RS-6T-M-SF	●	6	80	60	27	20	13	50	24	7.0	12.4				14,600	1.16	HH12X35
		080RS-10T-M-SF	●	10														1.11	
		100RS-8T-M-SF	●	8	100	70	32	45	-		30	8.0	14.4			Fig. 2	13,000	1.56	-
		100RS-12T-M-SF	●	12														1.51	
		125RS-10T-M-SF	●	10	125	89	40	55		55	33	9.0	16.4				11,400	2.6	-
		125RS-16T-M-SF	●	16														2.5	
Bore Dia. Inch spec	**MFAH**	**080RS-6T-SF**	●	6	80	50	25.4	20	13	50	27	6.0	9.5	4.6		Fig. 1	14,600	1.02	HH12X35
		080RS-10T-SF	●	10														0.98	
		100RS-8T-SF	●	8	100	70	31.75	45	-		34	8.0	12.7			Fig. 2	13,000	1.59	-
		100RS-12T-SF	●	12														1.55	
		125RS-10T-SF	●	10	125	89	38.1	55		55	38	10.0	15.9				11,400	2.63	-
		125RS-16T-SF	●	16														2.56	

Spare Parts

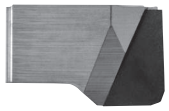
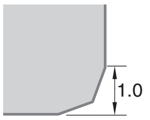
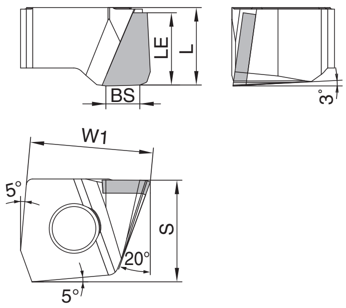
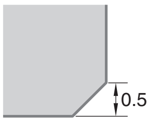
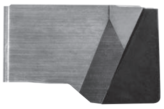
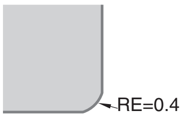
Description		Wedge	Wedge Screw	Wrench	Adjust Screw	Wrench	Adjust Screw	Anti-seize Compound	Applicable Inserts ➡ **M138**
									
Light-weight Hybrid Body	**MFAH080RA- …** ~ **MFAH315RA- …**	C08R	W5X13L	TTW-15	AJ-4170	DTPM-8	HS6X4	P-37	ENET0905…
Steel Body	**MFAH050RS- …** ~ **MFAH125RS- …**								

Recommended Cutting Conditions ➡ **M138**

● : Std. Item

High Efficiency Milling Cutter for Finishing Aluminum MFAH

Applicable Inserts

Insert			Description	Dimension (mm)					PCD
				W1	S	L	BS	LE	**KPD001**
 General purpose (Dual Cutting Edge)			**ENET 0905PAER-G**	9.61	7.9	6.02	2.6	5.6	●
 Low cutting force			**ENET 0905PAER-C**	9.61	7.9	6.02	3.0	5.6	●
 Tough Edge			**ENET 0905PAER-R**	9.61	7.9	6.02	3.1	5.6	●

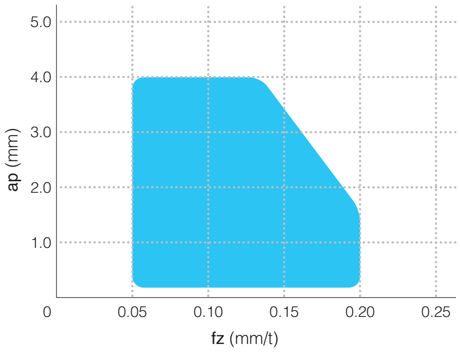
Recommended Cutting Conditions

Workpiece Material	Property	Cutting Speed Vc (m/min)	Feed fz (mm/t)	Recommended Insert Grades
Aluminum Alloys	Si Ratio 12.5% or less	1,000 - **2,500** - 3,000	0.05 - **0.10** - 0.20	KPD001
	Si Ratio 12.5% and over	400 - **600** - 800	0.05 - **0.10** - 0.20	

Recommended cutting conditions are reference values. Please adjust cutting speed and feed rate according to actual machining conditions taking into account machine and workpiece rigidity.
Do not use the cutter at speeds exceeding the maximum cutting speed limit.

Cutting Performance

BT50 M/C (Machine Power 30kw)



Cutting Conditions : Vc = 2,500 m/min, ae = 55 mm, Wet, Cutter Dia.⌀80
MFAH080RS-10T-SF ENET0905PAER-G KPD001 Workpiece Material : ADC12

● : Std. Item

Cautions

While in Use

⚠Caution

Please use within recommended cutting conditions

Do not run the cutter at revolutions exceeding the printed maximum revolution limit of the cutter body

Inserts or cutter body may be damaged due to the centrifugal force and cutting load

the centrifugal force may cause inserts and parts to scatter even under no load.

Please do not use under the following conditions :

When cutter is not fully loaded with inserts

If the body and/or clamp is damaged

If a clamp or clamp screw is removed

If inserts that have different regrind amounts are mounted

Please wear protective equipment such as protective glove when changing inserts or adjusting edge fluctuation

Injury can occur when touching the cutting edge

Dynamic Balance

Balance adjustment on the cutter is completed before shipping

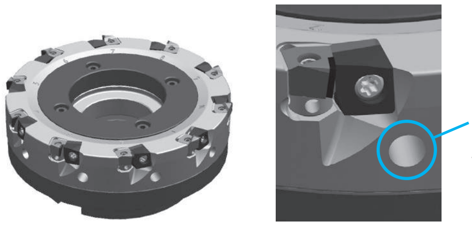
Balance adjustment has been made with special high precision inserts to be ISO balance quality grade (ISO 1940-1) G2.5

Do not operate the balance adjustment screw at the outer periphery of cutter

⇒ This could lead to improper dynamic balance

Do not completely remove clamp and clamp screw from cutter

⇒ This requires additional balance adjustment



Balance Adjustment Screw is Mounted at the Necessary Point

* Do Not Operate

How to Mount Insert

1 Adjust the clearance between adjustment screw for cutting edge and the surface of insert to be 0.5mm

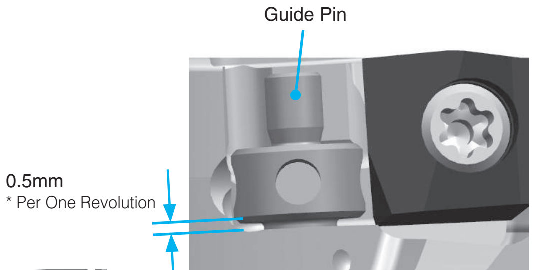
2 Mount the insert onto the guide pin

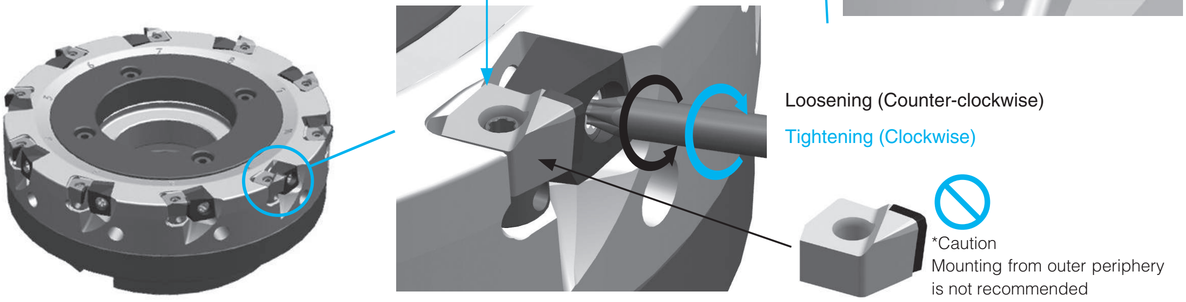
(Be sure to install from the head. Mounting from outer periphery is not recommended)

3 Tighten the clamp screw while lightly pressing the insert against the holding surface

(Recommended Torque 4.2N·m)

4 Make sure that there is no clearance between the insert side surfaces and the holding surface

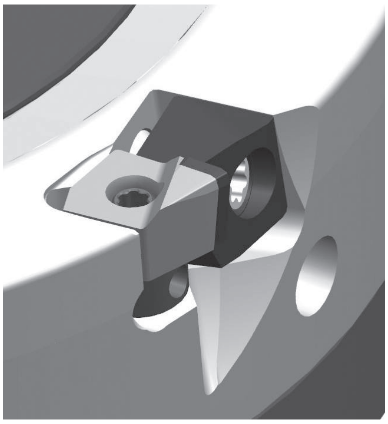




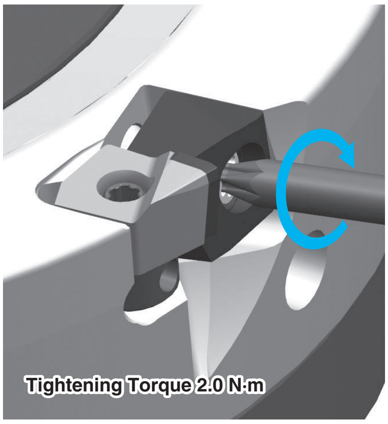
*Caution
Mounting from outer periphery
is not recommended

How to Adjust Blade Runout

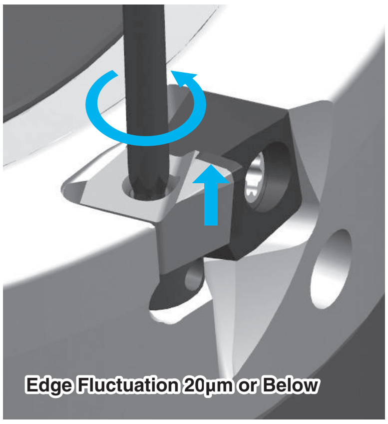
1 Install an Insert



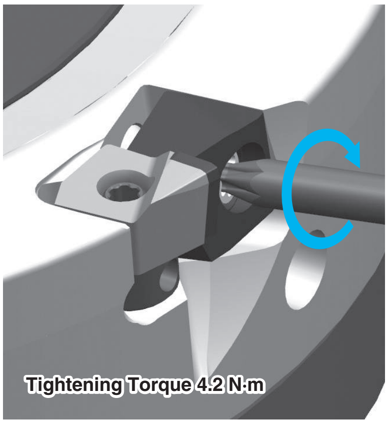
2 Partially Tighten



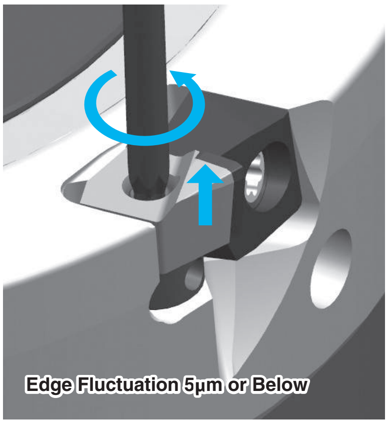
3 Adjustable Blade Runout

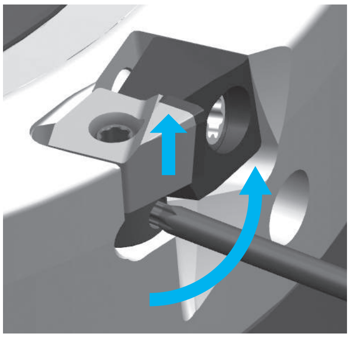


4 Fully Tighten



5 Adjustable Blade Runout





Adjustment edge fluctuation from outer periphery is workable

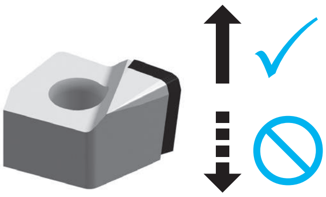
1 Install inserts into all pockets

2 Partially tighten the clamp screw (Recommended Torque 2.0N·m)

3 Turn the screw with the wrench to adjust and make sure that all screw heights are within 20μm of each other (Recommended)

4 Fully tighten the clamp screw with tightening torque 4.2 N·m

5 Slightly adjust position of cutting edge (Recommended Position Difference: 5μm or Below)
* All inserts should be fine-tuned

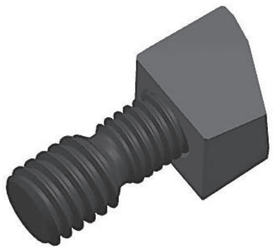


* Caution
Do not adjust cutting edge to lower position

Precaution for Changing Clamp

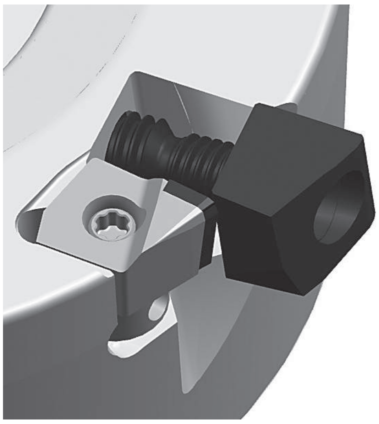
● How to mount a clamp on a holder

1 Attach clamp screw into clamp first



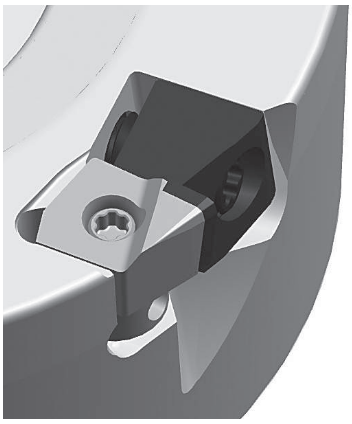
Attaching Clamp screw into clamp
(about 1 revolution)

2 Mounting



Mount it to the holder

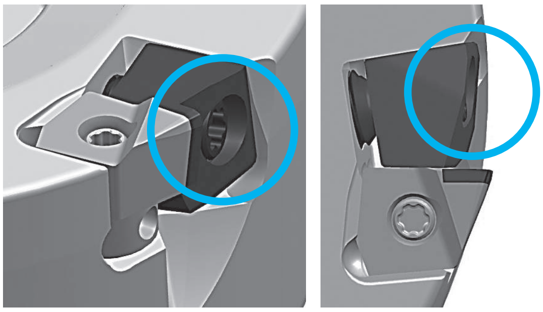
3 Fastening



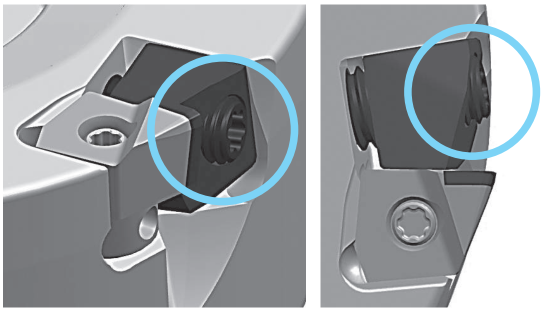
Fasten with recommended torque
(Completed)

● Mount position of clamp screw

✓ **Right position**
(Screw head does not come out)



⊘ **Wrong position**
(Screw head comes out)



Confirm if clamp screw is not coming out after fastening clamp screw with recommended torque
Re-mount if the clamp screw is coming out
Adjust the balance is needed after mounting in case removing a clamp screw completely such as clamp change

For Aluminum Alloys High Efficiency End Mill

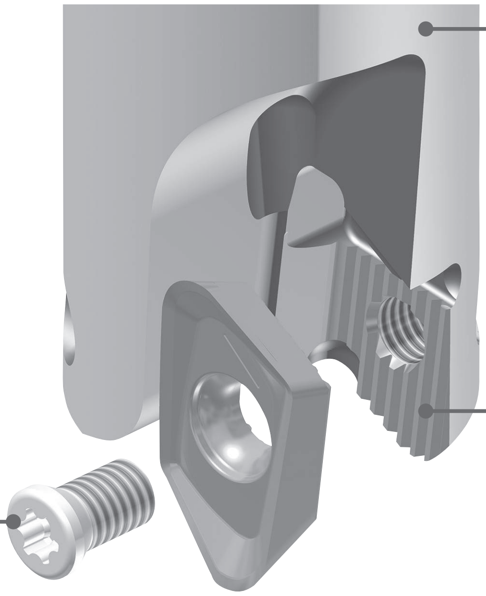
MEAS

Excellent Scatter Prevention to Ensure Stable, High Speed Aluminum Machining

Large Ramping Angle Delivers a Wide Range of Machining Applications

1 High Reliability and High Efficiency Machining

Grooved Connection Between the Insert and Holder
Provides High Speed Aluminum Machining (ø32: Recommended Max. Cutting Speed Vc = 3,000m/min)



Balance Quality Grade G6.3

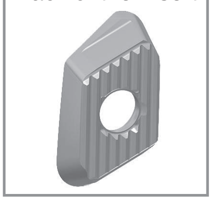
Prevents Vibration during High Speed Machining (ISO1940/1)

M4 Clamp Screw

Unique Grooved Contact Surface

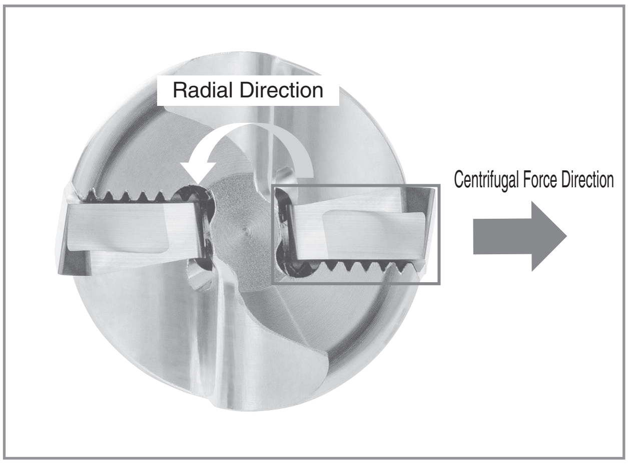
Prevents Insert Screw Breakage and Ensures Greater Safety

Back of the Insert

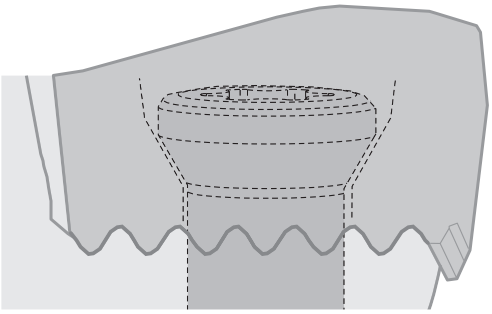


Grooved Insert Pocket

Centrifugal force is applied across the grooved surface to reduce pressure on the insert screw
Prevents insert screw breakage and safely secures the insert during high-speed revolutions



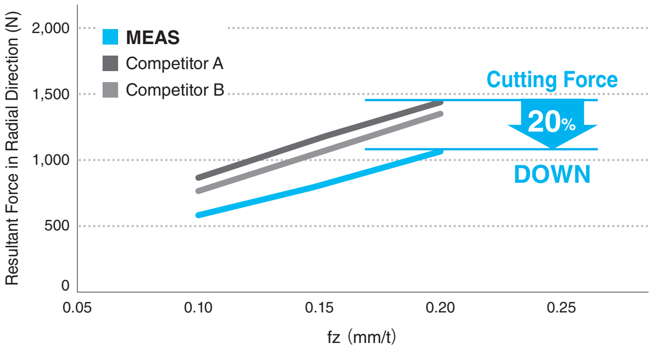
Grooved Contact Surface



2 Low Cutting Force with Sharp Cutting Edge

True Rake Angle Max. 20°
Low Cutting Force and High Chattering-Resistance

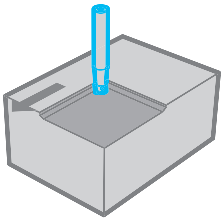
Cutting Force Comparison (Internal evaluation)

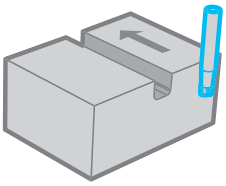


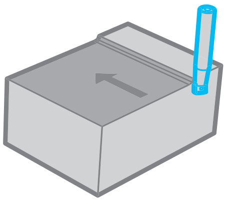
Cutting Conditions : Vc = 390 m/min, ap × ae = 8 × 5 mm, Dry
Cutter Dia. ø25 mm (2 Flutes) Workpiece Material : A7075

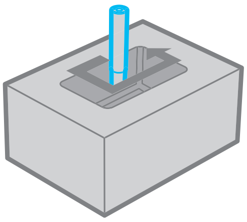
3 Applicable to a wide range of application

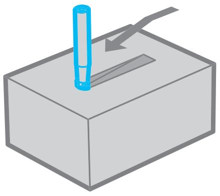
Max. Ramping Angle 20° (ø25)
The MEAS can be used for shouldering, slotting, ramping, and helical milling applications

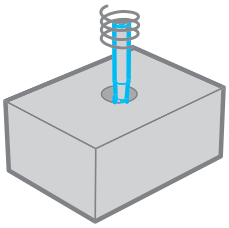

Facing, Shouldering

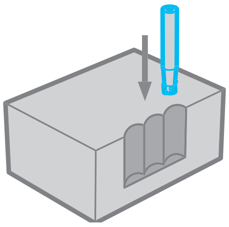

Slotting


Contouring


Pocketing


Ramping

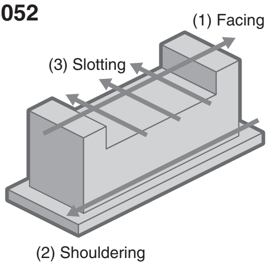

Helical Milling

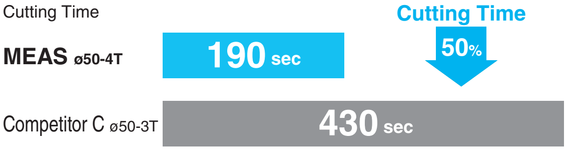

Vertical Milling (Plunging)

Case Studies

Industrial Machine Parts A5052

Vc = 1,500 m/min (n = 9,550 min^{-1})
① ap x ae = 3 x 40 mm
fz = 0.2 mm/t (Vf = 7,640 mm/min)
② ap x ae = 8 x 5 mm
fz = 0.2 mm/t (Vf = 7,640 mm/min)
③ ap x ae = 2 x ~ 50 mm
fz = 0.15 mm/t (Vf = 5,730 mm/min)
Wet
MEAS050R-13-4T-M
KCGT130504FR-AL PDL025





MEAS showed 50% faster cycle time or more compared to competitor C
(User Evaluation)

For Aluminum Alloys High Efficiency End Mill MEAS

MEAS End Mill

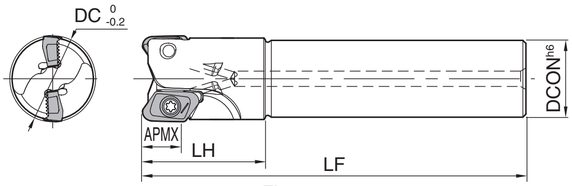


Fig. 1

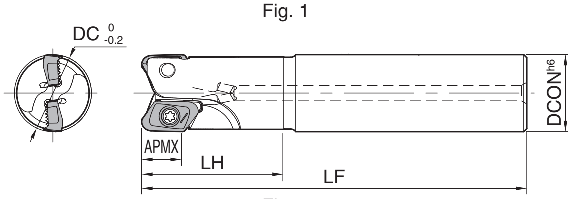
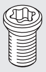
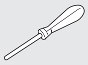
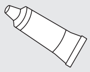


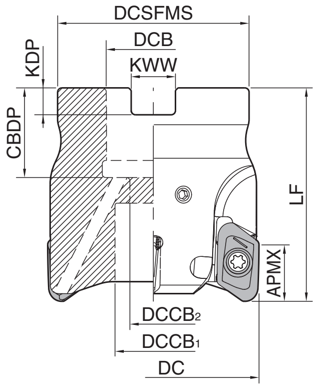
Fig. 2

Toolholder Dimensions

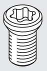
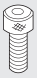
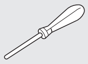
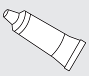
Description			Stock	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Weight (kg)	Drawing	Spare Parts			Max. Revolution (min^{-1})
					DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.				Clamp Screw	Wrench	Anti-seize Compound	
																		
Cylindrical	Standard Shank	**MEAS 28-S25-13-2T**	●	2	28	25	125	40	12	+10°	-13°	Yes	0.4	Fig. 1	SB-4090TRP	DTPM-15 Recommended tightening torque for Insert Clamp 3.5N·m	P-37	54,000
		35-S32-13-2T	●		35	32	150	50					0.9					46,000
		40-S32-13-3T	●	3	40						-12°							42,000
	Same Shank	**MEAS 25-S25-13-2T**	●	2	25	25	125	49	12	+10°	-14°	Yes	0.4	Fig. 2	SB-4075TRP			59,000
		32-S32-13-2T	●		32	32	150	69			-13°		0.8		SB-4090TRP			49,000
	Long Shank	**MEAS 25-S25-13-2T-170**	●	2	25	25	170	89	12	+10°	-14°	Yes	0.5	Fig. 2	SB-4075TRP			49,000
		32-S32-13-2T-200	●		32	32	200	119			-13°		1.1		SB-4090TRP			39,000

When using inserts with a corner-R(RE) of 3.2 or larger, additional modifications (R3.5 mm or larger) on the corner of cutter body is necessary.
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

MEAS Face Mill



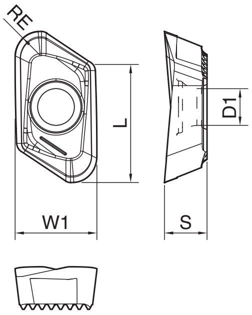
Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Weight (kg)	Spare Parts				Max. Revolution (min^{-1})
			DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX	A.R. (MAX.)	R.R.			Clamp Screw	Mounting bolt	Wrench	Anti-seize Compound	
																					
MEAS 050R-13-4T-M	●	4	50	45	22	18	11	50	21	6.3	10.4	12	+10°	-11°	Yes	0.4	SB-4090TRP	HH10X30H	DTPM-15 Recommended tightening torque for Insert Clamp 3.5N·m	P-37	36,000

When using inserts with a corner-R (RE) of 3.2 or larger, additional modifications (R3.5 mm or larger) on the corner of cutter body is necessary.
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

Insert Description

Insert	Description		Dimension (mm)					DLC Coated Carbide
			W1	S	D1	L	RE	PDL025
 	**KCGT**	**130504FR-AL**	9.9	5.1	4.4	14.1	0.4	●
		130508FR-AL				13.9	0.8	●
		130512FR-AL				13.8	1.2	●
		130516FR-AL				13.3	1.6	●
		130520FR-AL					2.0	●
		130524FR-AL					2.4	●
		130530FR-AL					3.0	●
		130532FR-AL				12.8	3.2	●
		130540FR-AL					4.0	●
		130550FR-AL					5.0	●

Recommended Cutting Conditions

Workpiece Material	Property	Cutting Speed Vc(m/min)	Feed fz(mm/t)
Aluminum Alloys	Si Ratio 12.5% or less	200~**1,000**~3,000	0.05~**0.15**~0.25
	Si Ratio 12.5% and over	200~**300**~400	0.05~**0.1**~0.2

- Recommended cutting conditions are reference values. Please adjust cutting speed and feed rate according to actual machining conditions taking into account machine and workpiece rigidity
- Do not use the cutter at speeds exceeding the maximum cutting speed limit (See page **M147**)
- Regularly changing the insert clamp screw is recommended
  Use appropriate safety covers to protect from tool breakage and chip scattering
- When using at a higher revolution (10,000min^{-1} or over), refer to the table below to adjust the balance of MEAS and arbor

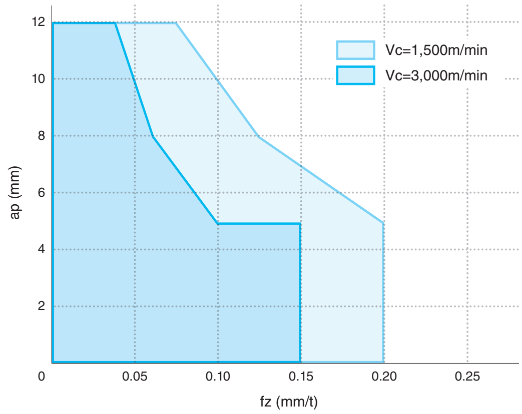
Revolution (min^{-1})	ISO balance quality grade ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

Max. Revolution for Each Cutting Diameter

Cutting Dia. øD(mm)	Max. Revolution (min^{-1})
ø25	59,000 (Long Shank : 49,000)
ø28	54,000
ø32	49,000
ø35	46,000 (Long Shank : 39,000)
ø40	42,000
ø50	36,000

MEAS Cutting Performance

ø50 (4 Flutes) Shouldering ae = 25mm Workpiece Material : A7075



- Reduce the feed rate when machining at high speeds

● : Std. Item

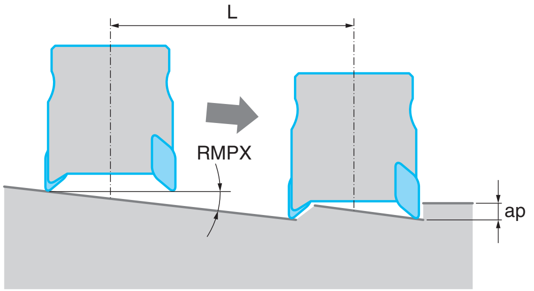
Reference data for Ramping

Cutter Dia. DC(mm)	25	28	32	35	40	50
Max. ramping angle RMPX	20°	16°	12.5°	11°	8.5°	6°
tan RMPX	0.363	0.287	0.221	0.194	0.149	0.105

Guide for Ramping (Slant Milling)

Ramping angle should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
Reduce recommended feed rate by 50%

Formula of the cutting length "L" at Max. ramping angle $L = \frac{ap}{\tan RMPX}$



Vertical Milling (Plunging)

* For vertical milling (plunging), reduce feed rate to fz=0.1mm/t or less.

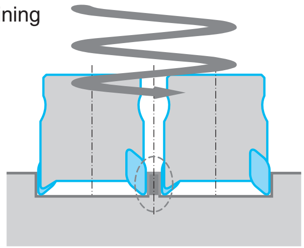
Insert Description	Max. Width of Cut (ae)
KCGT13 type	8mm

Guide for Helical milling

For helical milling, use between Min. cutting dia. and Max. cutting dia.

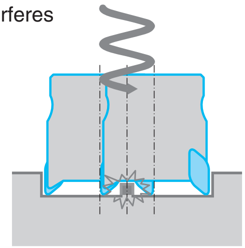
⊘ Over Max. Cutting Dia.

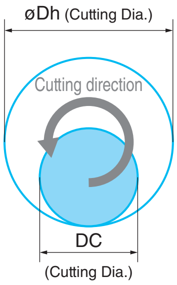
Center core part remains after machining



⊘ Under Min. Cutting Dia.

Center core part interferes with toolholder



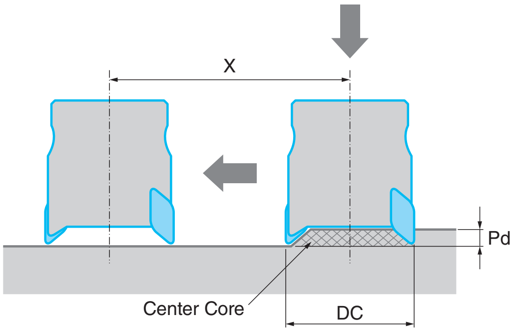


Description	Min. Cutting Dia.	Max. Cutting Dia.	Maximum ramping depth per cycle
MEAS…13…	2×DC-16	2×DC-3	3.5

Unit : mm

- Down-cut milling is recommended (refer to the figure above)
- Feed rate should be under 50% of the recommended cutting conditions
- Use caution to eliminate incidences caused by producing long chips

Guide for Drilling



[Drilling depth]

Please refer to Pd (Max. drilling depth) in the chart.

[When Traversing after Drilling]

(1) It is recommended to reduce feed by fz = 0.15 (mm/t) or less until the center core is removed.

(2) When drilling, reduce feed rate per revolution to f=0.1mm/rev or under.

Description	Max. Cutting Depth Pd	Min. cutting length X for flat bottom surface
MEAS…-13-…	3.5	DC-16

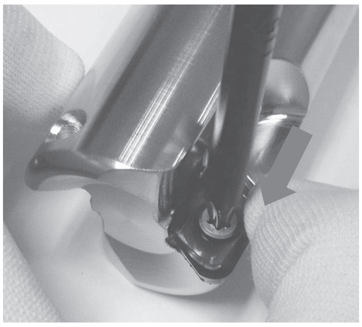
Unit : mm

How to Mount Inserts

1 . Be sure to remove dust and chips from the insert mounting pocket.

2. Insert Screw

- Coat Anti-seize Compound thinly on portion of taper and thread.
- Attach screw to the magnetized wrench tip and tighten while gently pressing the outside edge of the insert toward the insert pocket surface (grooved surface) (see the picture on the right) (Recommended Torque 3.5N·m)

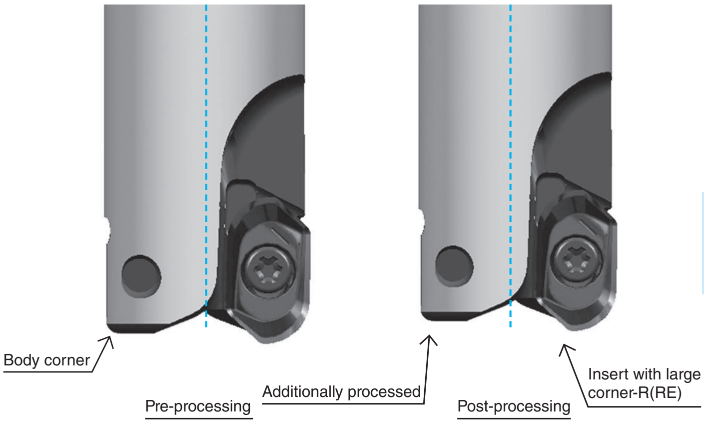


When using inserts with a corner-R(RE) of 3.2 or larger

When using inserts with corner-R(RE) 3.2 or larger, additional modifications of the cutter body will be necessary.
Additional modifications for the body will be necessary. Ref. to the chart below for the recommended modifications.
(If corner-R is 3.0 mm or smaller, additional modifications are not needed)

Insert Corner-R(RE)(mm)	Additional Processing Dimension to Body Corner (mm)
3.2	R2.0
4.0	R2.5
5.0	R3.0

* Round- shaped additional processing is recommended.
When applying chamfer shaped additional processing, do not cut away too much.



Cautions

While in Use

⚠Caution

Please use within recommended cutting conditions

Do not run the cutter at revolutions exceeding the printed maximum revolution limit of the cutter body

Do not use the end mill at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Please do not use under the following conditions :
When cutter is not fully loaded with inserts
If the body is damaged

Please wear protective equipment such as protective glove when changing inserts

Injury can occur when touching the cutting edge

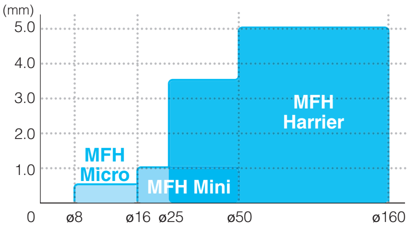
Dynamic Balance

Balance adjustment on the cutter is completed before shipping

Balance adjustment to be ISO balance quality grade (ISO 1940-1) G6.3
When using at a higher revolution (10,000min^{-1} or over), refer to the table below to adjust the balance of MEAS and arbor

Do not operate the balance adjustment screw on the outer periphery of the cutter. This could lead to improper dynamic balance

Revolution (min^{-1})	ISO balance quality grade ISO 1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

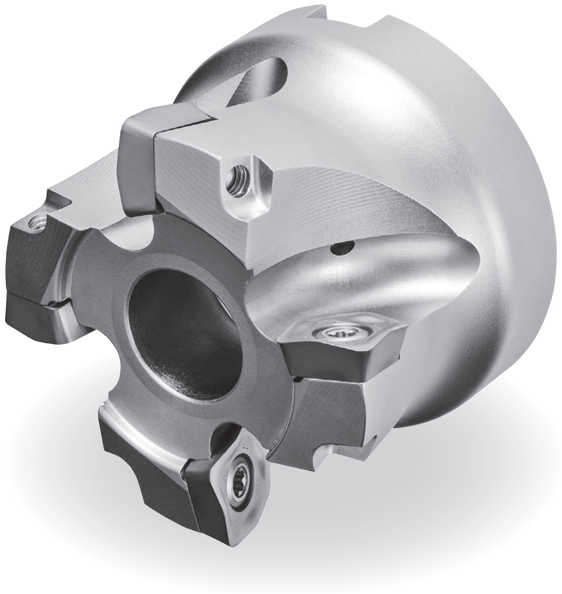


MFH Harrier

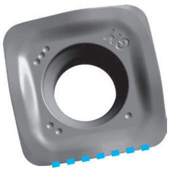
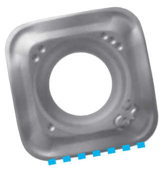
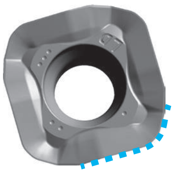
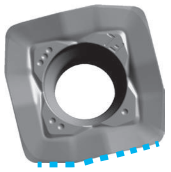
Anti chattering

Applicable to various applications with 4 types of inserts

Increased chip evacuation and shortened cutting time



POINT.1 Large Chipbreaker Lineup for Various Machining Applications

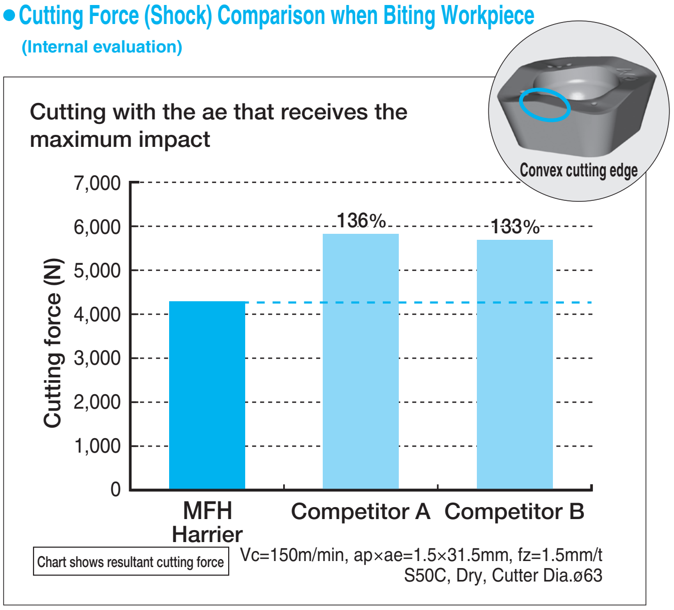
	GM type (General purpose)	NEW GH type (Tough Edge)	LD type (Large D.O.C.)	FL type (Low Cutting Force)
Shape				
Applications	1st recommendation for general purpose →Available for Facing, Ramping and Helical Milling	Excellent Fracture Resistance →Available for Facing, Ramping and Helical Milling	Max. ap=5mm →Applicable for scale removal at high efficiency	Wiper Edge with Low Cutting Forces →Applicable for both roughing and finishing, for small machining center

4 types of inserts according to your application
Applicable to a wide range of application

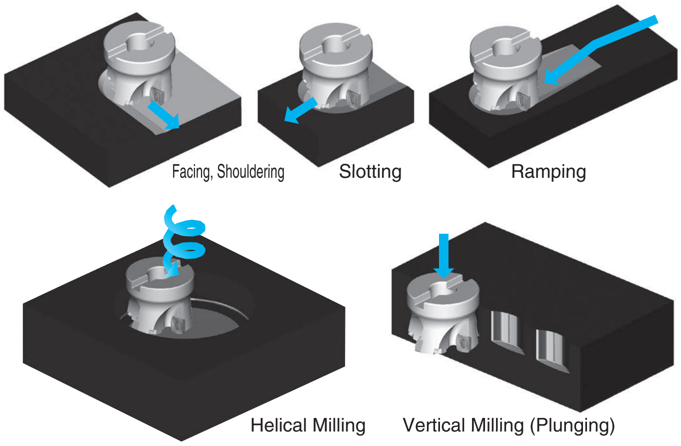
· For inclination angle at contouring, refer to the table above **M156**

POINT.2 3D convex cutting edge reduces shock of biting workpiece

● Cutting Force (Shock) Comparison when Biting Workpiece
(Internal evaluation)



POINT.3 Multi-functional cutter for ramping, helical milling, etc.



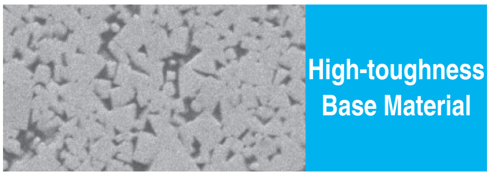
* GM and GH chipbreakers are available for all the applications.
* LD type and FL type are not applicable for Helical Milling, Plunging and Contouring of rising wall (Please refer to **M156**)

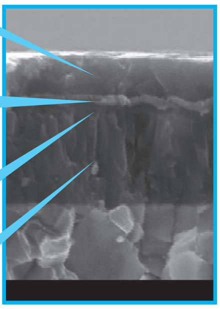
POINT.4 Applicable for Variety of Workpieces from Steel to Heat-resistant Alloys

Difficult-to-cut material which controls sudden fracture and realizes stable machining

CA6535

For Martensitic stainless steel and Ni-base heat-resistant alloys
High heat resistance and wear resistance with CVD coating
Improved stability due to thin layer coating technology



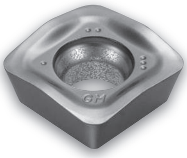


Smooth TiN layer
Smooth & less adhesion Improved stability

Tough α-Al_2O_3 layer
Prevents oxidation and wear of coating layer due to high heat-resistance of aluminum oxide

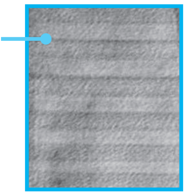
Special Interlayer
Prevents peeling of coating layer

Ultra Fine TiCN layer
High aspect ratio and micro columnar TiCN coating layer improves abrasive wear resistance



PR1535

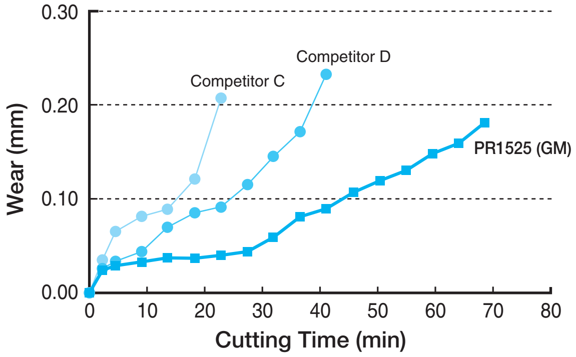
For Ni-base heat-resistant alloys, titanium alloys and precipitation hardened stainless steel
Stable and longer tool life by special nano coating layer "MEGACOAT NANO"



MEGACOAT base multi-layer structure

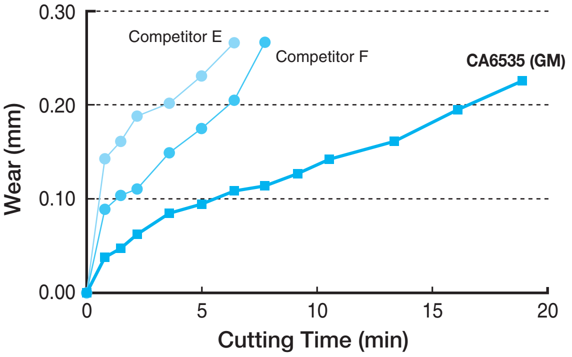
Wear Resistance Comparison (Internal evaluation)

SKD11



<Cutting Conditions> Vc=150m/min, apxae=1.0x16mm, fz=1.5mm/t, Dry

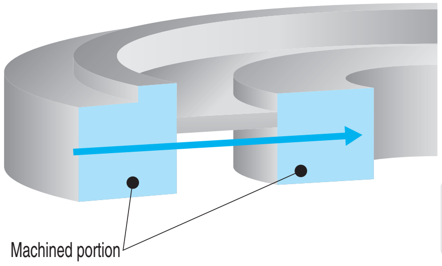
Ni-base heat-resistant alloys



<Cutting Conditions>Vc=30m/min, apxae=1.0x40mm, fz=0.8mm/t, Wet

Case Studies

SFVAF22B (Forged alloy steel)



Machining efficiency
3 times increase

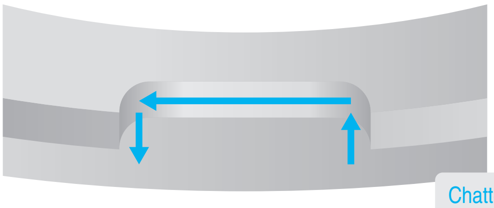
·Turbine parts ·Vc=160m/min ·apxae=1.5xmax.160mm
·fz=1.17mm/t ·Dry
·MFH160R-14-8T(8 Flutes) ·SOMT140520ER-GM (PR1525)

PR1525	Chip Evacuation Rate = 720cc/min
Competitor G	Chip Evacuation Rate = 240cc/min

·Small machining noise even at 3 times higher feed rate
·Good edge condition without chipping and stable machining

(User Evaluation)

SUS304F



Chattering reduced
Machining efficiency 1.6 times

·Clutch ·Vc=120m/min ·apxae=1.0x20mm
·fz=1.2mm/t ·Dry
·MFH32-S32-10-2T(2 Flutes) ·SOMT100420ER-GM (PR1535)

PR1535	Chip Evacuation Rate = 58cc/min
Competitor H	Chip Evacuation Rate = 36cc/min

·Competitor H caused chattering but MFH realized stable machining
·Good edge condition and long tool life

(User Evaluation)

MFH High Feed Cutter

MFH Harrier Face Mill

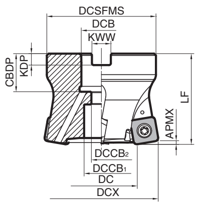


Fig. 1

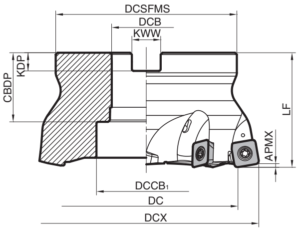


Fig. 2

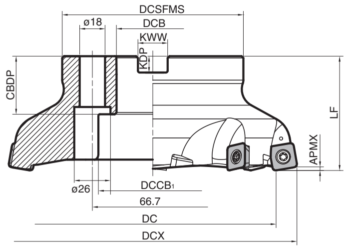


Fig. 3

Toolholder Dimensions (SOMT10 type)

Bore Dia.	Description	Stock	No. of Inserts	Dimension (mm)														Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DCX	DC			DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	APMX$_2$*1	A.R.				
					GM/GH	LD	FL															
Metric	**MFH 050R-10-4T-M**	●	4	50	33	37.5	36.5	47	22	19	11	50	21	6.3	10.4	1.5 *2 (3.5)	1.2	+10°	Yes	Fig. 1	0.4	10,000
	050R-10-5T-M	●	5																			
	063R-10-5T-22M	●	5	63	46	50.5	49.5	60													0.7	8,800
	063R-10-6T-22M	●	6																			
	063R-10-5T-27M	●	5						27	20	13		24	7	12.4							
	063R-10-6T-27M	●	6																			
	080R-10-7T-M	●	7	80	63	67.5	66.5	76				63									1.6	7,600
Inch spec	**MFH 050R-10-4T**	●	4	50	33	37.5	36.5	47	22.225	19	11	50	19	5	8.4			+10°	Yes	Fig. 1	0.4	10,000
	050R-10-5T	●	5																			
	063R-10-5T	●	5	63	46	50.5	49.5	60													0.7	8,800
	063R-10-6T	●	6																			
	080R-10-7T	●	7	80	63	67.5	66.5	76	31.75	26	17	63	32	8	12.7						1.3	7,600

*1 . For APMX₂, refer to the figure in the next page
*2. Dimension in ( ) is when attaching LD type

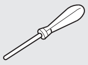
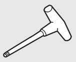
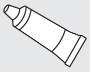
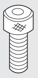
Toolholder Dimensions (SOMT14 type)

Bore Dia.	Description	Stock	No. of Inserts	Dimension (mm)														Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DCX	DC			DCSFMS	DCB	DCCB$_1$	DCCB$_2$	LF	CBDP	KDP	KWW	APMX	APMX$_2$*1	A.R.				
					GM/GH	LD	FL															
Metric	**MFH 050R-14-4T-M**	●	4	50	27	33	32	47	22	12	-	50	21	6.3	10.4	2 *2 (5)	2	+10°	Yes	Fig. 1	0.4	8,800
	063R-14-4T-22M	●	4	63	40	46	45	60		19	11										0.6	7,400
	063R-14-5T-22M	●	5																			
	063R-14-4T-27M	●	4						27	20	13		24	7	12.4							
	063R-14-5T-27M	●	5																			
	080R-14-5T-M	●	5	80	57	63	62	76				63									1.4	6,400
	080R-14-6T-M	●	6																			
	100R-14-6T-M	●	6	100	77	83	82	96	32	26	17		28	8	14.4					Fig. 2	2.4	5,600
	100R-14-7T-M	●	7																			
	125R-14-7T-M	●	7	125	102	108	107	100	40	55	-		33	9	16.4						2.8	4,800
	160R-14-8T-M	●	8	160	137	143	142			68	-		32						No	Fig. 3	3.7	4,200
Inch spec	**MFH 050R-14-4T**	●	4	50	27	33	32	47	22.225	12	-	50	19	5	8.4	2 *2 (5)	2	+10°	Yes	Fig. 1	0.4	8,800
	063R-14-4T	●	4	63	40	46	45	60		19	11										0.6	7,400
	063R-14-5T	●	5																			
	080R-14-5T	●	5	80	57	63	62	76	31.75	26	17	63	32	8	12.7						1.3	6,400
	080R-14-6T	●	6																			
	100R-14-6T	●	6	100	77	83	82	96													2.4	5,600
	100R-14-7T	●	7																			
	125R-14-7T	●	7	125	102	108	107	100	38.1	55	-		38	10	15.9					Fig. 2	2.9	4,800
	160R-14-8T	●	8	160	137	143	142		50.8	72				11	19.1				No		3.9	4,200

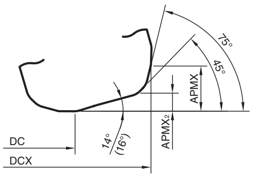
*1 . For APMX₂, refer to the figure in the next page
*2. Dimension in ( ) is when attaching LD type

● : Std. Item

Spare Parts (Face Mill)

Description		Spare Parts					Applicable Inserts
		Clamp Screw	Wrench		Anti-seize Compound	Mounting bolt	
			DTPM	TTP			
							
MFH	**050R-10-...**	SB-4090TRPN Recommended tightening torque for Insert Clamp 3.5N·m	DTPM-15		P-37	HH10X30	SOMT100420ER-GM SOMT100420ER-LD SOMT100420ER-FL
	050R-10-...-M						
	063R-10-...						
	063R-10-...-22M						
	063R-10-...-27M					HH12X35	
	080R-10-...					HH16X40	
	080R-10-...-M					HH12X35	
MFH	**050R-14-...**	SB-50120TRP Recommended tightening torque for Insert Clamp 4.5N·m		TTP-20	P-37	W10X31	SOMT140520ER-GM SOMT140520ER-LD SOMT140514ER-FL
	050R-14-...-M						
	063R-14-...					HH10X30	
	063R-14-...-22M						
	063R-14-...-27M					HH12X35	
	080R-14-...					HH16X40	
	080R-14-...-M					HH12X35	
	100R-14-...					HH16X40	
	100R-14-...-M					-	
	125R-14-...					-	
	160R-14-...					-	

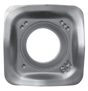
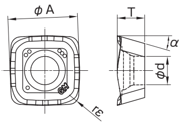
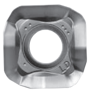
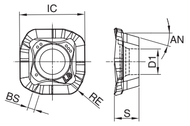
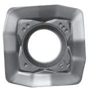
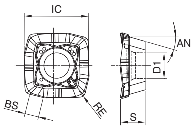
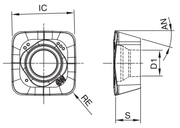
Cutting edge shape when attaching LD type



Angle in ( ) is for SOMT14 type

- **Max. Revolution**
Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Applicable Inserts ➡ M20

Insert		Description		Dimension (mm)					Angle	CVD Coated Carbide	MEGACOAT NANO			MEGACOAT HARD
Handed Insert shows Right-hand				IC	S	D1	BS	RE	AN	CA6535	PR1535	PR1525	PR1510	PR015S
 General purpose		**SOMT**	**100420ER-GM**	10.30	4.58	4.6	-	2.0	16°	●	●	●	●	
			140520ER-GM	14.14	5.56	5.8				●	●	●	●	
 Large D.O.C.		**SOMT**	**100420ER-LD**	10.45	4.58	4.6	0.9	2.0	16°	●	●	●	●	
			140520ER-LD	14.76	5.56	5.8	1.6			●	●	●	●	
 With Wiper Edge		**SOMT**	**100420ER-FL**	10.44	4.58	4.6	1.4	2.0	16°	●	●	●	●	
			140514ER-FL	14.57	5.56	5.8	3.1	1.4		●	●	●	●	
NEW  Tough Edge		**SOMT**	**100420ER-GH**	10.43	4.57	4.55	-	2.0	16°		●	●	●	●
			140520ER-GH	14.17	5.56	5.8					●	●	●	●

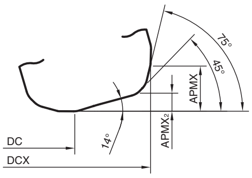
Recommended Cutting Conditions ➡ **M155**

● : Std. Item

MFH Harrier End Mill (SOMT10 type)

(Cylindrical)

Cutting edge shape when attaching LD type



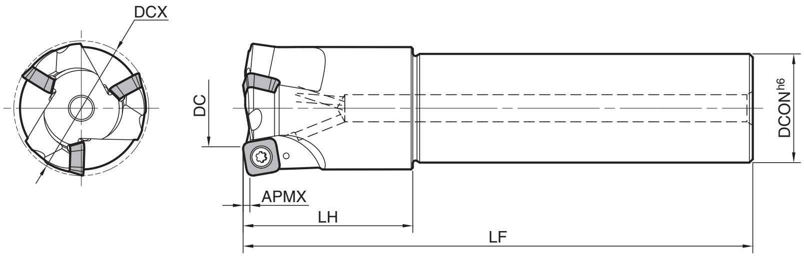


Fig. 1

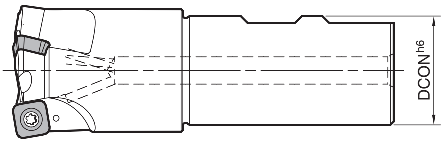


Fig. 2

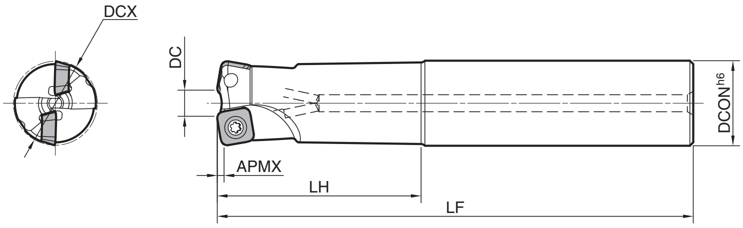


Fig. 3

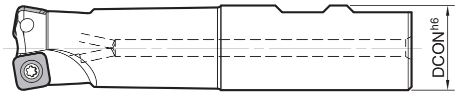


Fig. 4

Toolholder Dimensions

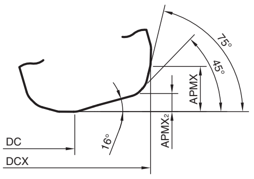
Description		Stock	No. of Inserts	Dimension (mm)									Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DCX	DC			DCON	LF	LH	APMX	$APMX_2$	A.R.				
					GM/GH	LD	FL										
Cylindrical	**MFH 25-S25-10-2T**	●	2	25	8	12.5	11.5	25	140	60	1.5 *(3.5)	1.2	+10°	Yes	Fig. 3	0.4	17,000
	28-S25-10-2T	●	2	28	11	15.5	14.5			40					Fig. 1	0.5	15,500
	32-S32-10-2T	●	2	32	15	19.5	18.5	32	150	70					Fig. 3	0.8	14,000
	32-S32-10-3T	●	3														
	35-S32-10-2T	●	2	35	18	22.5	21.5			50					Fig. 1		13,000
	35-S32-10-3T	●	3														
	40-S32-10-3T	●	3	40	23	27.5	26.5									0.9	11,500
	40-S32-10-4T	●	4														
Weldon	**MFH 25-W25-10-2T**	●	2	25	8	12.5	11.5	25	117	60	1.5 *(3.5)	1.2	+10°	Yes	Fig. 4	0.4	17,000
	32-W32-10-3T	●	3	32	15	19.5	18.5	32	131	70						0.7	14,000
	40-W32-10-3T	●	3	40	23	27.5	26.5		112	50					Fig. 2		11,500
	40-W32-10-4T	●	4														
Long Shank	**MFH 25-S25-10-2T-200**	●	2	25	8	12.5	11.5	25	200	120	1.5 *(3.5)	1.2	+10°	Yes	Fig. 3	0.6	17,000
	28-S25-10-2T-200	●	2	28	11	15.5	14.5			40					Fig. 1	0.7	15,500
	32-S32-10-2T-200	●	2	32	15	19.5	18.5	32		120					Fig. 3	1.0	14,000
	35-S32-10-2T-200	●	2	35	18	22.5	21.5			50					Fig. 1	1.4	13,000
	40-S32-10-4T-250	●	4	40	23	27.5	26.5		250							1.5	11,500
Extra Long Shank	**MFH 25-S25-10-2T-300**	●	2	25	8	12.5	11.5	25	300	180	1.5 *(3.5)	1.2	+10°	Yes	Fig. 3	1.0	17,000
	28-S25-10-2T-300	●	2	28	11	15.5	14.5			40					Fig. 1	1.1	15,500
	32-S32-10-2T-300	●	2	32	15	19.5	18.5	32		180					Fig. 3	1.6	14,000
	35-S32-10-2T-300	●	2	35	18	22.5	21.5			50					Fig. 1	1.7	13,000
	40-S32-10-4T-300	●	4	40	23	27.5	26.5									1.8	11,500

* Dimension in ( ) is when attaching LD type

● : Std. Item

MFH Harrier End Mill (SOMT14 type)

Cutting edge shape when attaching LD type



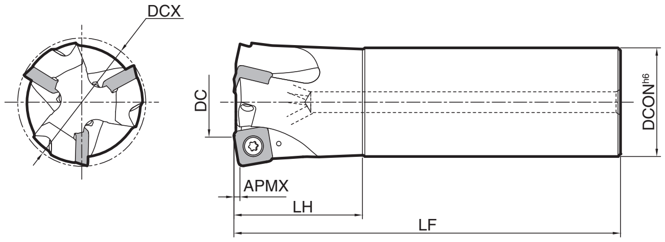


Fig. 1

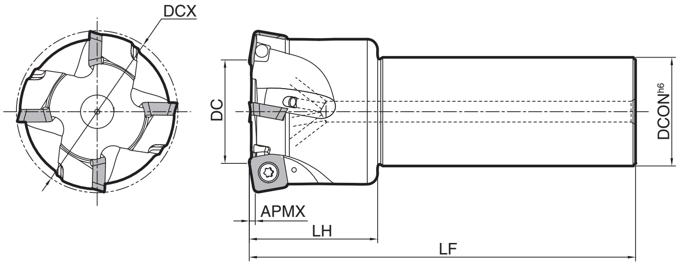


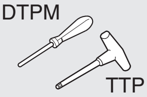
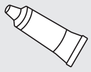
Fig. 2

Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)									Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
			DCX	DC			DCON	LF	LH	APMX	APMX$_2$	A.R.				
				GM/GH	LD	FL										
MFH 50-S42-14-3T	●	3	50	27	33	32	42	150	50	2 *(5)	2	+10°	Yes	Fig. 1	1.4	8,800
63-S42-14-4T	●	4	63	40	46	45								Fig. 2	1.7	7,400
80-S42-14-5T	●	5	80	57	63	62									2.3	6,400

* Dimension in ( ) is when attaching LD type

Spare Parts and Applicable Inserts

Description	Spare Parts			Applicable Inserts
	Clamp Screw	Wrench	Anti-seize Compound	
		DTPM  TTP		➡ **M20 , M151**
MFH ...-10-...	SB-4075TRP	DTPM-15	P-37	SOMT100420ER-GM SOMT100420ER-GH SOMT100420ER-LD SOMT100420ER-FL
	Recommended tightening torque for Insert Clamp 3.5N·m			
MFH ...-14-...	SB-50120TRP	TTP-20	P-37	SOMT140520ER-GM SOMT140520ER-GH SOMT140520ER-LD SOMT140514ER-FL
	Recommended tightening torque for Insert Clamp 4.5N·m			

- **Max. Revolution**
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

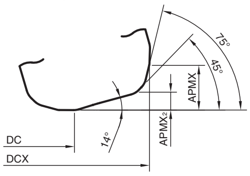
Recommended Cutting Conditions ➡ **M155**

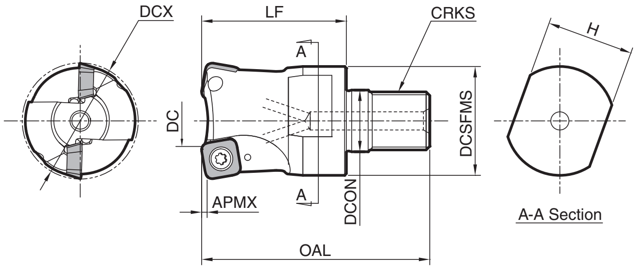
● : Std. Item

MFH Modular type

MFH Harrier Head

Cutting edge shape when attaching LD type





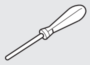
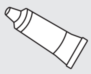
Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)												Rake Angle	Coolant Hole	Max. Revolution (min^{-1})
			DCX	DC			DCSFMS	DCON	OAL	LF	CRKS	H	APMX	APMX$_2$	A.R.		
				GM/GH	LD	FL											
MFH 25-M12-10-2T	●	2	25	8	12.5	11.5	23	12.5	57	35	M12xP1.75	19	1.5 *(3.5)	1.2	+10°	Yes	17,000
28-M12-10-2T	●	2	28	11	15.5	14.5											15,500
32-M16-10-2T	●	2	32	15	19.5	18.5	30	17	63	40	M16xP2.0	24					14,000
32-M16-10-3T	●	3															
35-M16-10-2T	●	2	35	18	22.5	21.5											13,000
35-M16-10-3T	●	3															
40-M16-10-3T	●	3	40	23	27.5	26.5											11,500
40-M16-10-4T	●	4															

See page ➜ **M60** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

* Dimension in ( ) is when attaching LD type

Spare Parts and Applicable Inserts

Description	Spare Parts			Applicable Inserts ➜ **M20 , M151**
	Clamp Screw	Wrench	Anti-seize Compound	
				
MFH ...-10-...	SB-4075TRP	DTPM-15	P-37	SOMT100420ER-GM SOMT100420ER-GH SOMT100420ER-LD SOMT100420ER-FL
	Recommended tightening torque for Insert Clamp 3.5N·m			

- **Max. Revolution**
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➜ **M155**

● : Std. Item

Recommended Cutting Conditions

Insert Type	Workpiece Material	Toolholder Description and Feed Rate (fz : mm/t)					Recommended Insert Grades (Cutting Speed Vc : m/min)				
		MFH25-...	MFH32-...	MFH40-...	MFH...R-10-...	MFH...R-14-...	MEGACOAT NANO			MEGACOAT HARD	CVD Coated Carbide
							PR1535	PR1525	PR1510	PR015S	CA6535
GM GH	Carbon Steel	0.5~**0.8**~1.0(ap≤1.0mm) 0.2~**0.4**~0.5(ap≤1.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.3~**0.7**~1.0(ap≤1.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.4~**1.0**~1.5(ap≤1.5mm)	0.5~**1.5**~2.0		☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.5~**0.8**~1.0(ap≤1.0mm) 0.2~**0.4**~0.5(ap≤1.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.3~**0.7**~1.0(ap≤1.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.4~**1.0**~1.5(ap≤1.5mm)	0.5~**1.5**~2.0		☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel (~ 40HRC)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		☆ 80~**140**~180	☆ 80~**140**~180	-	GH★ 80~**140**~180	-
	Mold Steel (40 ~ 50HRC)	0.15~**0.3**~0.5(ap≤1.0mm) 0.15~**0.2**~0.25(ap≤1.5mm)	0.2~**0.5**~0.8(ap≤1.0mm) 0.2~**0.3**~0.45(ap≤1.5mm)	0.2~**0.6**~0.9(ap≤1.0mm) 0.2~**0.5**~0.7(ap≤1.5mm)	0.2~**0.7**~1.0		-	☆ 60~**100**~130	-	GH★ 60~**100**~130	-
	Mold Steel (50 ~ 55HRC)	0.15~**0.25**~0.4(ap≤1.0mm)	0.15~**0.35**~0.6(ap≤1.0mm)	0.15~**0.4**~0.7(ap≤1.0mm)	0.2~**0.5**~0.8		-	☆ 50~**70**~100	-	GH★ 50~**70**~100	-
	Mold Steel (55 ~ 60HRC)	0.03~**0.06**~0.1(ap≤1.0mm)(* Recommended only for GH chipbreaker)					-	-	-	GH☆ 50~**60**~70	-
	Stainless Steel (Austenitic related)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		GM☆ 100~**160**~200	GM☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		★ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.5~**0.8**~1.0(ap≤1.0mm) 0.2~**0.4**~0.5(ap≤1.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.3~**0.7**~1.0(ap≤1.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.4~**1.0**~1.5(ap≤1.5mm)	0.5~**1.5**~2.0		-	-	★ 120~**180**~250	-	-
	Nodular Cast Iron	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		-	-	★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.2~**0.4**~0.6(ap≤1.0mm) 0.15~**0.2**~0.3(ap≤1.5mm)	0.2~**0.5**~0.9(ap≤1.0mm) 0.2~**0.4**~0.6(ap≤1.5mm)	0.2~**0.6**~1.0(ap≤1.0mm) 0.2~**0.5**~0.8(ap≤1.5mm)	0.2~**0.8**~1.2		☆ 20~**30**~50	-	-	-	★ 20~**30**~50
	Titanium Alloys	0.2~**0.4**~0.6(ap≤1.0mm) 0.15~**0.2**~0.3(ap≤1.5mm)	0.2~**0.5**~0.9(ap≤1.0mm) 0.2~**0.4**~0.6(ap≤1.5mm)	0.2~**0.6**~1.0(ap≤1.0mm) 0.2~**0.5**~0.8(ap≤1.5mm)	0.2~**0.8**~1.2		GM★ 40~**60**~80	-	GM☆ 30~**50**~70	-	-
LD	Carbon Steel	0.5~**0.8**~1.0(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.06~**0.15**~0.3(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.2**~0.3(ap≤3.5mm)	0.5~**1.5**~2.0(ap≤1.0mm) 0.06~**0.2**~0.3(ap≤3.5mm)	0.5~**1.5**~2.0(ap≤2.0mm) 0.06~**0.2**~0.4(ap≤5.0mm)	☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.5~**0.8**~1.0(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.06~**0.15**~0.3(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.2**~0.3(ap≤3.5mm)	0.5~**1.5**~2.0(ap≤1.0mm) 0.06~**0.2**~0.3(ap≤3.5mm)	0.5~**1.5**~2.0(ap≤2.0mm) 0.06~**0.2**~0.4(ap≤5.0mm)	☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel (~ 40HRC)	0.5~**0.7**~0.8(ap≤1.0mm) 0.06~**0.08**~0.15(ap≤3.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤2.0mm) 0.06~**0.15**~0.3(ap≤5.0mm)	☆ 80~**140**~180	★ 80~**140**~180	-	-	-
	Mold Steel (40 ~ 50HRC)	0.2~**0.3**~0.5(ap≤1.0mm) 0.03~**0.05**~0.1(ap≤3.5mm)	0.2~**0.5**~0.8(ap≤1.0mm) 0.03~**0.08**~0.15(ap≤3.5mm)	0.2~**0.6**~0.9(ap≤1.0mm) 0.03~**0.1**~0.15(ap≤3.5mm)	0.2~**0.7**~1.0(ap≤1.0mm) 0.03~**0.1**~0.15(ap≤3.5mm)	0.2~**0.7**~1.0(ap≤2.0mm) 0.03~**0.1**~0.2(ap≤5.0mm)	☆ 60~**100**~130	★ 60~**100**~130	-	-	-
	Stainless Steel (Austenitic related)	0.5~**0.7**~0.8(ap≤1.0mm) 0.06~**0.08**~0.15(ap≤3.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤2.0mm) 0.06~**0.15**~0.3(ap≤5.0mm)	★ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.5~**0.7**~0.8(ap≤1.0mm) 0.06~**0.08**~0.15(ap≤3.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤2.0mm) 0.06~**0.15**~0.3(ap≤5.0mm)	☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.5~**0.7**~0.8(ap≤1.0mm) 0.06~**0.08**~0.15(ap≤3.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤2.0mm) 0.06~**0.15**~0.3(ap≤5.0mm)	★ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.5~**0.8**~1.0(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.06~**0.15**~0.3(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.2**~0.3(ap≤3.5mm)	0.5~**1.5**~2.0(ap≤1.0mm) 0.06~**0.2**~0.3(ap≤3.5mm)	0.5~**1.5**~2.0(ap≤2.0mm) 0.06~**0.2**~0.4(ap≤5.0mm)	-	-	★ 120~**180**~250	-	-
	Nodular Cast Iron	0.5~**0.7**~0.8(ap≤1.0mm) 0.06~**0.08**~0.15(ap≤3.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.06~**0.1**~0.2(ap≤3.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.06~**0.15**~0.2(ap≤3.5mm)	0.5~**1.2**~1.8(ap≤2.0mm) 0.06~**0.15**~0.3(ap≤5.0mm)	-	-	★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.2~**0.4**~0.6(ap≤1.0mm) 0.03~**0.05**~0.1(ap≤3.5mm)	0.2~**0.5**~0.9(ap≤1.0mm) 0.03~**0.08**~0.15(ap≤3.5mm)	0.2~**0.6**~1.0(ap≤1.0mm) 0.03~**0.1**~0.15(ap≤3.5mm)	0.2~**0.8**~1.2(ap≤1.0mm) 0.03~**0.1**~0.15(ap≤3.5mm)	0.2~**0.8**~1.2(ap≤2.0mm) 0.03~**0.1**~0.2(ap≤5.0mm)	☆ 20~**30**~50	-	-	-	★ 20~**30**~50
	Titanium Alloys	0.2~**0.4**~0.6(ap≤1.0mm) 0.03~**0.05**~0.1(ap≤3.5mm)	0.2~**0.5**~0.9(ap≤1.0mm) 0.03~**0.08**~0.15(ap≤3.5mm)	0.2~**0.6**~1.0(ap≤1.0mm) 0.03~**0.1**~0.15(ap≤3.5mm)	0.2~**0.8**~1.2(ap≤1.0mm) 0.03~**0.1**~0.15(ap≤3.5mm)	0.2~**0.8**~1.2(ap≤2.0mm) 0.03~**0.1**~0.2(ap≤5.0mm)	★ 40~**60**~80	-	☆ 30~**50**~70	-	-
FL	Carbon Steel	0.5~**0.8**~1.0(ap≤1.0mm) 0.2~**0.4**~0.5(ap≤1.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.3~**0.7**~1.0(ap≤1.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.4~**1.0**~1.5(ap≤1.5mm)	0.5~**1.5**~2.0		☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel	0.5~**0.8**~1.0(ap≤1.0mm) 0.2~**0.4**~0.5(ap≤1.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.3~**0.7**~1.0(ap≤1.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.4~**1.0**~1.5(ap≤1.5mm)	0.5~**1.5**~2.0		☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel (~ 40HRC)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		☆ 80~**140**~180	★ 80~**140**~180	-	-	-
	Mold Steel (40 ~ 50HRC)	0.15~**0.3**~0.5(ap≤1.0mm) 0.15~**0.2**~0.25(ap≤1.5mm)	0.2~**0.5**~0.8(ap≤1.0mm) 0.2~**0.3**~0.45(ap≤1.5mm)	0.2~**0.6**~0.9(ap≤1.0mm) 0.2~**0.5**~0.7(ap≤1.5mm)	0.2~**0.7**~1.0		☆ 60~**100**~130	★ 60~**100**~130	-	-	-
	Stainless Steel (Austenitic related)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		★ 100~**160**~200	☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		★ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.5~**0.8**~1.0(ap≤1.0mm) 0.2~**0.4**~0.5(ap≤1.5mm)	0.5~**1.0**~1.5(ap≤1.0mm) 0.3~**0.7**~1.0(ap≤1.5mm)	0.5~**1.2**~1.8(ap≤1.0mm) 0.4~**1.0**~1.5(ap≤1.5mm)	0.5~**1.5**~2.0		-	-	★ 120~**180**~250	-	-
	Nodular Cast Iron	0.5~**0.7**~0.8(ap≤1.0mm) 0.2~**0.3**~0.4(ap≤1.5mm)	0.5~**0.8**~1.2(ap≤1.0mm) 0.3~**0.6**~0.8(ap≤1.5mm)	0.5~**1.0**~1.6(ap≤1.0mm) 0.4~**0.8**~1.2(ap≤1.5mm)	0.5~**1.2**~1.8		-	-	★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.2~**0.4**~0.6(ap≤1.0mm) 0.15~**0.2**~0.3(ap≤1.5mm)	0.2~**0.5**~0.9(ap≤1.0mm) 0.2~**0.4**~0.6(ap≤1.5mm)	0.2~**0.6**~1.0(ap≤1.0mm) 0.2~**0.5**~0.8(ap≤1.5mm)	0.2~**0.8**~1.2		☆ 20~**30**~50	-	-	-	★ 20~**30**~50
	Titanium Alloys	0.2~**0.4**~0.6(ap≤1.0mm) 0.15~**0.2**~0.3(ap≤1.5mm)	0.2~**0.5**~0.9(ap≤1.0mm) 0.2~**0.4**~0.6(ap≤1.5mm)	0.2~**0.6**~1.0(ap≤1.0mm) 0.2~**0.5**~0.8(ap≤1.5mm)	0.2~**0.8**~1.2		★ 40~**60**~80	-	☆ 30~**50**~70	-	-

* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

★ : 1st Recommendation ☆ : 2nd Recommendation

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
When finishing with LD type and FL type inserts, recommended feed rate for SOMT14 LD type : f=1.5(mm/rev) or less / for SOMT10 LD type : f=0.9(mm/rev) or less
for SOMT14 FL type : f=3.0(mm/rev) or less / for SOMT10 FL type : f=1.4(mm/rev) or less

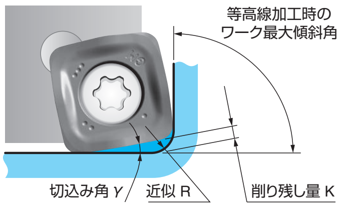
* For machining center equivalent to BT30, reduce feed rate to 25% or less of the recommended condition.

* For slotting, internal coolant is recommended.

Insert Grades
A Turning Indexable Inserts
B CBN & PCD Tools
C External
D Small Parts Machining
E Boring
F Grooving
G Cut-off
H Threading
J Drilling
K Solid Tools
L Milling
M Tools for Turning Mill
N Spare Parts
P Technical Information
R Index
T

MFH High Feed Cutter

Note for Machining Program (Approx. R)

Shape	Description	Insert Type	Cutting Edge Angle γ	Approx. R (mm)	Unmachined portion K (mm)	Max. inclination angle of workpiece at contouring
	MFH...-10-...	GM/GH	10°	3.0	0.85	90°
		FL	14°	3.0	0.89	80°
		LD	14°	3.5	0.69	65°
	MFH...-14-...	GM/GH	10°	3.5	1.37	90°
		FL	13°	3.0	1.36	80°
		LD	16°	5.0	1.06	65°

Reference data for Ramping

MFH...-10-...

Cutter Dia. DCX (mm)	25	28	32	35	40	50	63	80
Max. ramping angle RMPX	5°	4.5°	4°	3.5°	3°	2.5°	2°	1°
tan RMPX	0.087	0.078	0.070	0.061	0.052	0.043	0.035	0.017

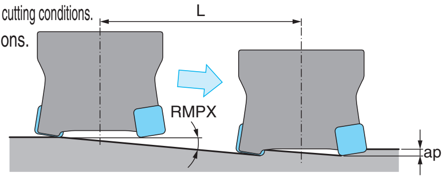
MFH...-14-...

Cutter Dia. DCX (mm)	50	63	80	100	125	160
Max. ramping angle RMPX	2°	1.8°	1°	0.5°	0.4°	0.2°
tan RMPX	0.035	0.031	0.017	0.009	0.007	0.003

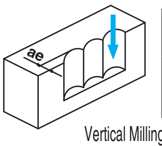
Guide for Ramping (Slant Milling)

·Ramping angle should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
·Feed rate should be 70% or under of the above cutting conditions.

Formula of the cutting length "L" at Max. ramping angle $L = \frac{ap}{\tan RMPX}$



Vertical Milling (Plunging)



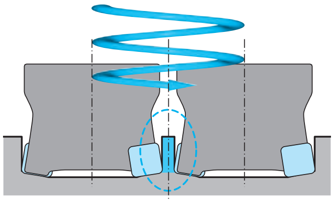
Insert Description	Max. Width of Cut (ae)
SOMT10	8mm
SOMT14	11.5mm

Vertical Milling (Plunging) is available only with GM/ GH type inserts.
(LD type and FL type are not applicable)
·For vertical milling (plunging), reduce feed rate to fz=0.2mm/t or less.

Guide for Helical milling

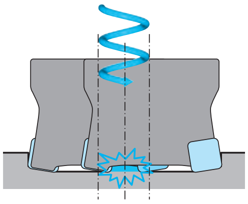
For helical milling, use between Min. cutting dia. and Max. cutting dia.

⃠ Over Max. Cutting Dia.



Center core part remains after machining

⃠ Under Min. Cutting Dia.

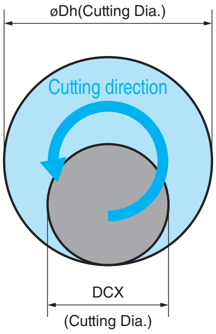


Center core part interferes with toolholder

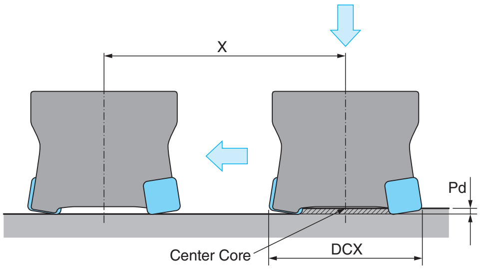
Description	Min. Cutting Dia.	Max. Cutting Dia.
MFH...-10-...	2×DCX-18	2×DCX-2
MFH...-14-...	2×DCX-25	2×DCX-2

Unit : mm

·Sinking depth (h) at helical milling should be under Max. depth of cut (APMX) in the cutter dimension chart.
·Down-cut milling is recommended. (Ref. to the right figure)
·Feed rate should be under 50% of the recommended cutting conditions.
·Use caution to eliminate incidences caused by producing long chips.



Guide for Drilling



3D machining

Insert Type	Ramping	Contouring (rising wall angle)	Vertical	Helical Milling	Pocketing
GM/GH	✓	✓ (90°)	✓	✓	✓
LD	✓	△ (65°)	×	×	×
FL	✓	△ (80°)	×	×	×

·Some applications are not available depending on insert type.
·For FL and LD type, there is a limit of rising wall angle at contouring.

Description	GM type / GH type		LD type		FL type	
	Max. cutting depth Pd	Min. cutting length X for flat bottom surface	Max. cutting depth Pd	Min. cutting length X for flat bottom surface	Max. cutting depth Pd	Min. cutting length X for flat bottom surface
MFH...-10-...	1.5	DCX-18	1.5	DCX-14	1.5	DCX-15
MFH...-14-...	2	DCX-24	2	DCX-18	2	DCX-19

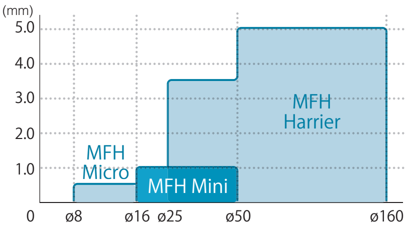
Unit : mm

[Drilling depth] Please refer to Pd (Max. drilling depth) in the chart.
[When Traversing after Drilling]
(1) Reduce feed rate 25% or less of the recommended conditions until the center core part (unmachined part) is removed.
(2) When drilling, reduce feed rate per revolution to f=0.2mm/rev or under.

MFH Mini

Cutter Dia. : ø16~ø50

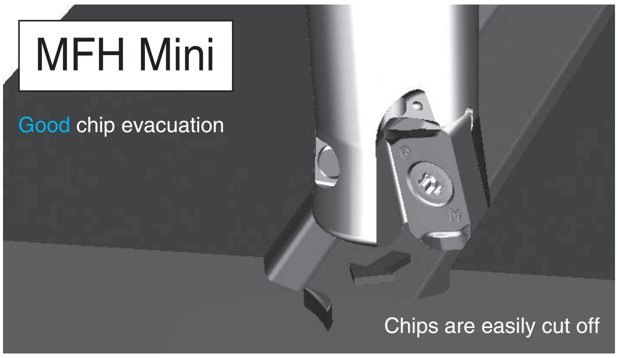
NEW **GH Chipbreaker Now Available**

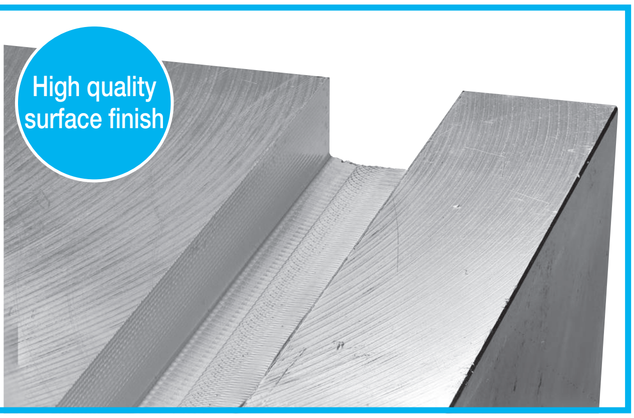


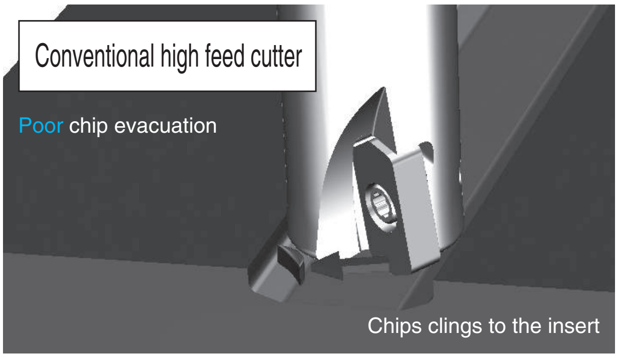
- Economical Double-sided 4-edge Insert
- High efficiency and high feed machining at small dia. machining and small machining center

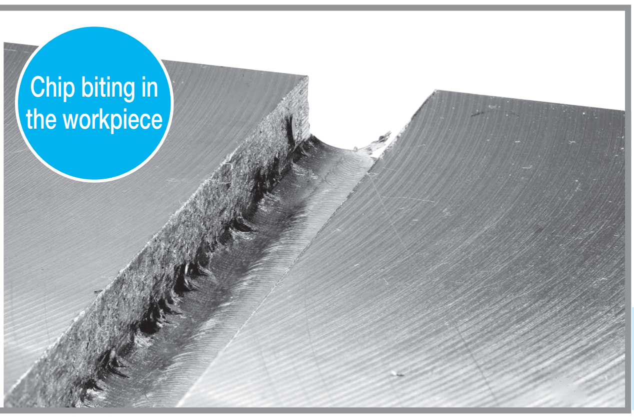
POINT.1 Excellent chip evacuation

(Internal evaluation)

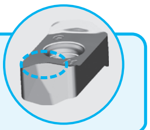








! MFH Mini controls chip biting with 3D convex cutting edge



Cutting Conditions : Workpiece Material SS400 Cutter Dia. ø16 Vc=150m/min apxae=10mm(0.5mmx20 passes)x16mm fz=0.6mm/t Dry

POINT.2 Multi edge design enables high efficiency machining

· Cutter Dia. ø25

MFH Mini

5 flutes

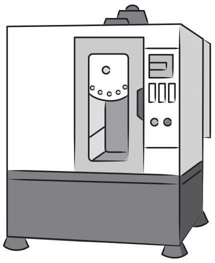
MFH25-S25-03-5T

MFH Harrier

2 flutes

MFH25-S25-10-2T

POINT.3 High efficiency and high feed machining at small machining center (BT30/BT40)



Suitable for roughing of mold

MFH High Feed Cutter

MFH Mini End Mill

(Cylindrical)

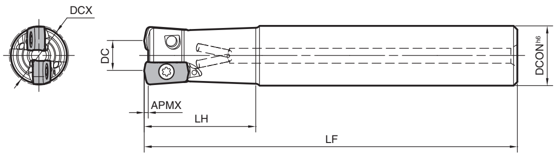


Fig. 1

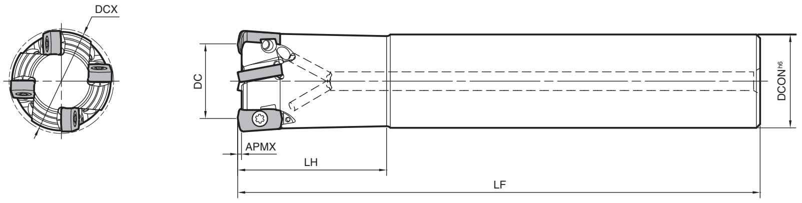


Fig. 2

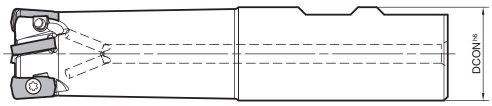


Fig. 3

Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)						Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DCX	DC	DCON	LF	LH	APMX	A.R.				
Standard Shank	**MFH 16-S16-03-2T**	●	2	16	8	16	100	30	1	-10°	Yes	Fig. 1	0.1	18,800
	20-S20-03-3T	●	3	20	12	20	130	50					0.3	15,700
	20-S20-03-4T	●	4											
	25-S25-03-4T	●		25	17	25	140	60					0.5	13,400
	25-S25-03-5T	●	5											
	32-S32-03-5T	●		32	24	32	150	70					0.8	11,400
	32-S32-03-6T	●	6											
Over Size (Straight)	**MFH 17-S16-03-2T**	●	2	17	9	16	100	20				Fig. 2	0.1	17,900
	18-S16-03-2T	●		18	10									17,000
	22-S20-03-3T	●	3	22	14	20	130	30					0.3	14,700
	22-S20-03-4T	●	4											
	28-S25-03-4T	●		28	20	25	140	40					0.5	12,400
	28-S25-03-5T	●	5											
Weldon	**MFH 16-W16-03-2T**	●	2	16	8	16	79	30				Fig. 3	0.1	18,800
	20-W20-03-3T	●	3	20	12	20	101	50					0.2	15,700
	20-W20-03-4T	●	4											
	25-W25-03-4T	●		25	17	25	117	60					0.4	13,400
	25-W25-03-5T	●	5											
	32-W32-03-5T	●		32	24	32	131	70					0.7	11,400
	32-W32-03-6T	●	6											
Long Shank	**MFH 16-S16-03-2T-150**	●	2	16	8	16	150	50				Fig. 1	0.2	18,800
	20-S20-03-3T-160	●	3	20	12	20	160	80					0.3	15,700
	25-S25-03-4T-180	●	4	25	17	25	180	100					0.6	13,400
	32-S32-03-5T-200	●	5	32	24	32	200	120					1.1	11,400

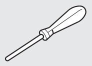
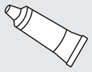
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➡ **M160**

■ **Max. Revolution**

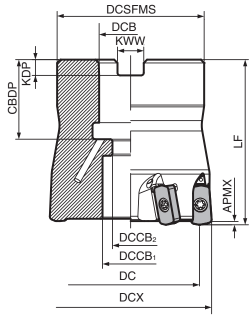
Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Spare Parts

Description	Spare Parts		
	Clamp Screw	Wrench	Anti-seize Compound
			
MFH ...-03-...	SB-3065TRP	DTPM-8	P-37
	Recommended tightening torque for Insert Clamp 1.2N·m		

● : Std. Item

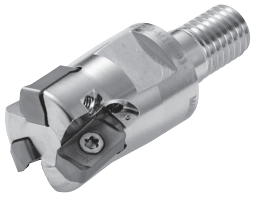
MFH Mini Face Mill

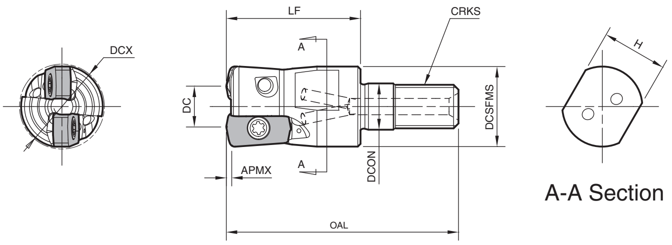


Toolholder Dimensions

Bore Dia.	Description		Stock	No. of Inserts	Dimension (mm)											Rake Angle	Coolant Hole	Weight (kg)	Max. Revolution (min⁻¹)
					DCX	DC	DCSFMS	DCB	DCCB1	DCCB2	LF	CBDP	KDP	KWW	APMX	A.R.			
Metric	**MFH**	**040R-03-5T-M**	●	5	40	32	38	16	15	9	40	19	5.6	8.4	1	-10°	Yes	0.2	9,900
		040R-03-6T-M	●	6															
		050R-03-8T-M	●	8	50	42	47	22	19	11	50	21	6.3	10.4				0.5	8,600

MFH Mini Head





Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)									Rake Angle	Coolant Hole	Max. Revolution (min⁻¹)
				DCX	DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX	A.R.		
MFH	**16-M08-03-2T**	●	2	16	8	14.7	8.5	42	25	M8xP1.25	12	1	-10°	Yes	18,880
	17-M08-03-2T	●		17	9										17,900
	18-M08-03-2T	●		18	10										17,000
MFH	**20-M10-03-3T**	●	3	20	12	18.7	10.5	48	30	M10xP1.5	15				15,700
	20-M10-03-4T	●	4												
	22-M10-03-3T	●	3	22	14										14,700
	22-M10-03-4T	●	4												
MFH	**25-M12-03-4T**	●		25	17	23	12.5	56	35	M12xP1.75	19				13,400
	25-M12-03-5T	●	5												
	28-M12-03-4T	●	4	28	20	23									12,400
	28-M12-03-5T	●	5												
MFH	**32-M16-03-5T**	●		32	24	30	17	62	40	M16xP2.0	24				11,400
	32-M16-03-6T	●	6												

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

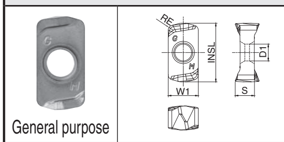
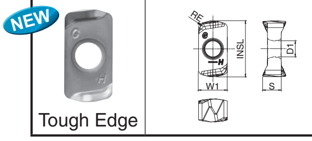
Recommended Cutting Conditions ➡ **M160**

■ **Max. Revolution**

Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

See page ➡ **M60** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

Applicable Inserts ➡ M15

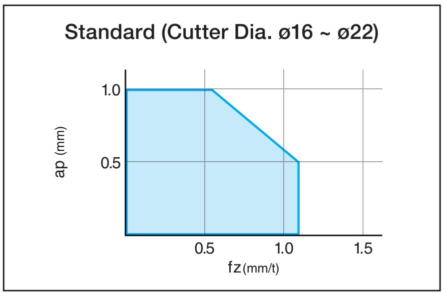
Insert	Description	Dimension (mm)					MEGACOAT NANO			MEGACOAT HARD	CVD Coated Carbide
		W1	S	D1	INSL	RE	PR1535	PR1525	PR1510	PR015S	CA6535
 General purpose	**LOGU 030310ER-GM**	6.2	3.96	3.45	11.9	1.0	●	●	●		●
 Tough Edge	**LOGU 030310ER-GH**	6.2	3.96	3.45	11.9	1.0	●	●	●	●	

● : Std. Item

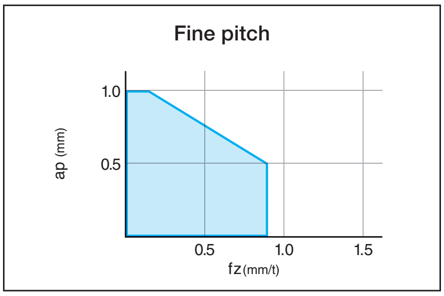
A Insert Grades
B Turning Indexable Inserts
C CBN & PCD Tools
D External
E Small Parts Machining
F Boring
G Grooving
H Cut-off
J Threading
K Drilling
L Solid Tools
M Milling
N Tools for Turning Mill
P Spare Parts
R Technical Information
T Index

MFH High Feed Cutter

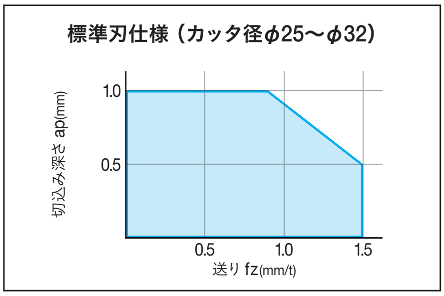
Cutting Performance


Standard (Cutter Dia. ø16 ~ ø22)

MFH16-...-2T, MFH17-...-2T, MFH18-...-2T
MFH20-...-3T, MFH22-...-3T


Fine pitch

MFH20-...-4T, MFH22-...-4T, MFH25-...-5T
MFH28-...-5T, MFH32-...-6T


標準刃仕様（カッタ径ϕ25〜ϕ32）

MFH25-...-4T, MFH28-...-4T, MFH32-...-5T
MFH040R-..., MFH050R-...

When using fine pitch type, reduce the cutting conditions compared with standard type.

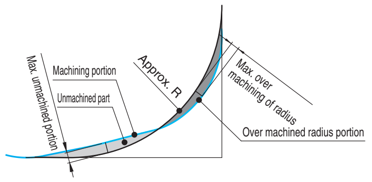
Recommended Cutting Conditions

Insert Type	Workpiece Material	Toolholder Description and Feed Rate (fz : mm/t) * Recommended feed rate (Reference value) : ap=0.5mm								Recommended Insert Grades (Cutting Speed Vc: m/min)				
		MFH16 -...-2T	MFH20 -...-3T	MFH20 -...-4T	MFH25 -...-4T	MFH25 -...-5T	MFH32 -...-5T	MFH32 -...-6T	MFH -...-R-03	MEGACOAT NANO			MEGACOAT HARD	CVD Coated Carbide
										PR1535	PR1525	PR1510	PR015S	CA6535
GM GH	Carbon Steel	0.2~**0.7**~1.2		0.2~**0.5**~0.8	0.2~**0.8**~1.5	0.2~**0.5**~0.8	0.2~**0.8**~1.5	0.2~**0.5**~0.8	0.2~**0.8**~1.5	☆ 120~**180**~250	★ 120~**180**~250	-	-	-
	Alloy Steel									☆ 100~**160**~220	★ 100~**160**~220	-	-	-
	Mold Steel (~40HRC)	0.2~**0.5**~0.9		0.2~**0.4**~0.6	0.2~**0.6**~1.2	0.2~**0.4**~0.6	0.2~**0.6**~1.2	0.2~**0.4**~0.6	0.2~**0.6**~1.2	☆ 80~**140**~180	☆ 80~**140**~180	-	GH★ 80~**140**~180	-
	Mold Steel (40~50HRC)	0.2~**0.3**~0.5		0.2~**0.25**~0.3	0.2~**0.3**~0.6	0.2~**0.25**~0.3	0.2~**0.3**~0.6	0.2~**0.25**~0.3	0.2~**0.3**~0.6	-	☆ 60~**100**~130	-	GH★ 60~**100**~130	-
	Mold Steel (50~55HRC)	0.1~**0.3**~0.5		0.1~**0.2**~0.3	0.1~**0.3**~0.5	0.1~**0.2**~0.3	0.1~**0.3**~0.5	0.1~**0.2**~0.3	0.1~**0.3**~0.5	-	☆ 50~**70**~100	-	GH★ 50~**70**~100	-
	Mold Steel (55~60HRC)	0.03~**0.06**~0.1(* Recommended only for GH chipbreaker)								-	-	-	GH☆ 50~**60**~70	-
	Stainless Steel (Austenitic related)	0.2~**0.5**~0.9		0.2~**0.4**~0.6	0.2~**0.6**~1.2	0.2~**0.4**~0.6	0.2~**0.6**~1.2	0.2~**0.4**~0.6	0.2~**0.6**~1.2	GM★ 100~**160**~200	GM☆ 100~**160**~200	-	-	-
	Stainless Steel (Martensitic related)									☆ 150~**200**~250	-	-	-	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)									★ 90~**120**~150	-	-	-	-
	Gray Cast Iron	0.2~**0.7**~1.2		0.2~**0.5**~0.8	0.2~**0.8**~1.5	0.2~**0.5**~0.8	0.2~**0.8**~1.5	0.2~**0.5**~0.8	0.2~**0.8**~1.5	-	-	★ 120~**180**~250	-	-
	Nodular Cast Iron	0.2~**0.5**~0.9		0.2~**0.4**~0.6	0.2~**0.6**~1.2	0.2~**0.4**~0.6	0.2~**0.6**~1.2	0.2~**0.4**~0.6	0.2~**0.6**~1.2	-	-	★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.2~**0.3**~0.6		0.2~**0.25**~0.4	0.2~**0.4**~0.8	0.2~**0.25**~0.4	0.2~**0.4**~0.8	0.2~**0.25**~0.4	0.2~**0.4**~0.8	☆ 20~**30**~50	-	-	-	★ 20~**30**~50
	Titanium Alloys									GM★ 40~**60**~80	-	GM☆ 30~**50**~70	-	-

🟦 Standard ▭ Fine pitch ★ : 1st Recommendation ☆ : 2nd Recommendation

* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.
The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
For machining center equivalent to BT30, reduce feed rate to 25% or less of the recommended condition.
For slotting, internal coolant or center through coolant is recommended.
Slotting and pocketing are not recommended for face mill type.

Note for Machining Program (Approx. R)

Shape	Approx. R (mm)	Max. over machining of radius (mm)	Max. unmachined portion (mm)
	R1.0	0	0.51
	R1.5	0	0.41
	R1.6 (Recommended)	0	0.39
	R2.0	0.09	0.31

Cutting Edge Angle : 12°

Reference data for Ramping

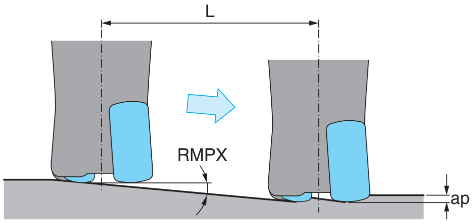
Description	Cutter Dia. DCX (mm)	16	17	18	20	22	25	28	32	40	50
MFH ...-03-...	Max. ramping angle RMPX	2.8°	2.5°	2.1°	1.7°	1.4°	1.2°	1°	0.8°	0.5°	0.4°
	tan RMPX	0.049	0.042	0.037	0.03	0.024	0.021	0.017	0.014	0.009	0.007

Guide for Ramping (Slant Milling)

- Ramping angle should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
- Feed rate should be 70% or under of the above cutting conditions.

Formula of the cutting length "L" at Max. ramping angle

$$L = \frac{ap}{\tan RMPX}$$

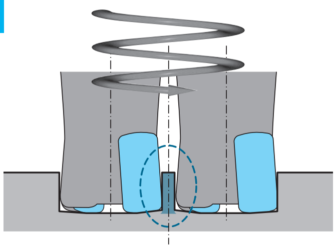


Guide for Helical milling

- For helical milling, use between Min. cutting dia. and Max. cutting dia.

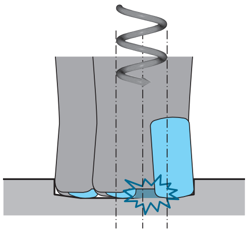
⃠ Over Max. Cutting Dia.

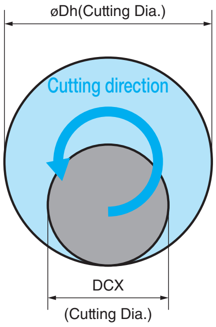
Center core part remains after machining



⃠ Under Min. Cutting Dia.

Center core part interferes with toolholder



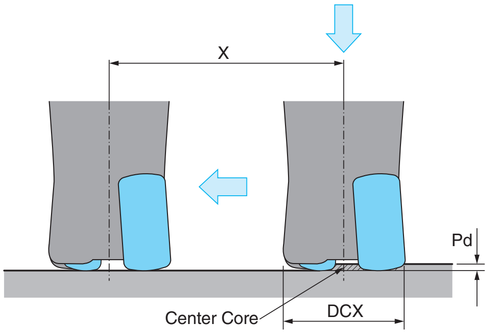


Description	Min. Cutting Dia.	Max. Cutting Dia.
MFH...-03-...	2×DCX-8	2×DCX-2

Unit : mm

- Sinking depth at helical milling should be Max. ap (1mm) or under.
- Down-cut milling is recommended. (refer to the figure above)
- Feed rate should be under 50% of the recommended cutting conditions.
- Be careful to machine in a safe environment to avoid accident caused by long chips.

Guide for Drilling



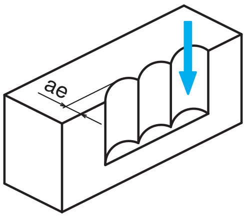
Description	GM type / GH type	
	Max. cutting depth Pd	Min. cutting length X for flat bottom surface
MFH...-03-...	1.0	DCX-9

Unit : mm

* When traversing directly after drilling, set the table feed at up to 25% of the recommended cutting conditions.
* When drilling, reduce feed rate per revolution to f=0.2mm/rev or under.

Vertical milling (Plunging)

Vertical milling (Plunging)



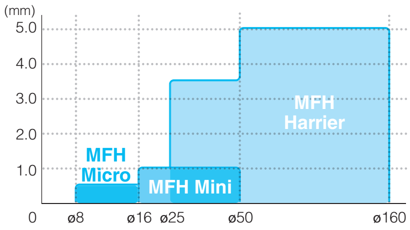
- Available for vertical milling (plunging).

Insert Description	Max. Width of Cut (ae)
LOGU03 type	3.5mm

- For vertical milling (plunging), reduce feed rate to fz=0.2mm/t or less.

MFH Micro

Cutter Dia. : ø8~ø16



- High Efficiency Machining with Low Cutting Force and Reduced Chattering
- Max. ap 0.5 mm. Stable High Feed Machining on a Wide Range of Applications

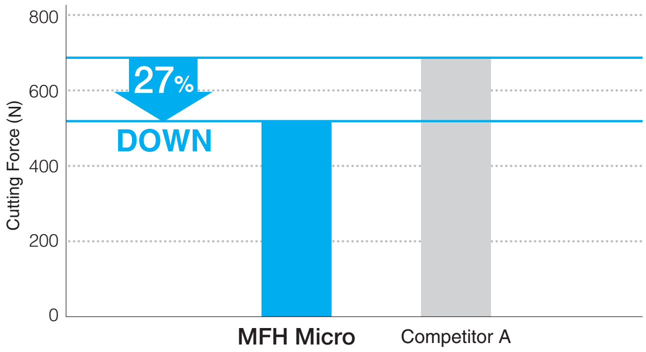
POINT.1 Stable Machining with Chattering Resistance

3D convex cutting edge

High Precision G Class Insert

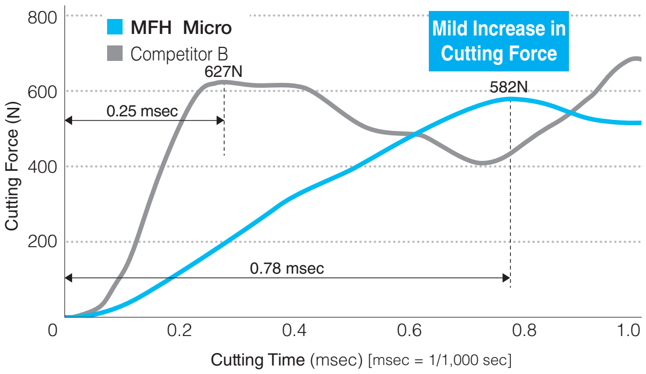
3D Convex Cutting Edge Controls Initial Impact when Entering the Workpiece

Cutting Force Comparison (Internal evaluation)



Cutting Conditions : Vc = 120 m/min, ap = 0.4 mm, fz = 0.6 mm/t
Cutter Dia. ø10 mm, Slotting, Dry Workpiece Material : S50C

Increase in Cutting Force when Entering Workpiece (Internal evaluation)



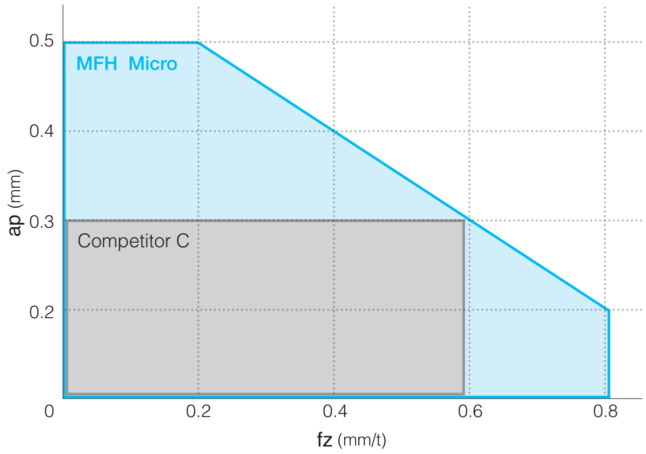
Cutting Conditions : Vc = 120 m/min, ap × ae = 0.4 × 5 mm, fz = 0.6 mm/t
Cutter Dia. ø10 mm, Dry Workpiece Material : S50C

POINT.2 Wide Range of Machining Applications

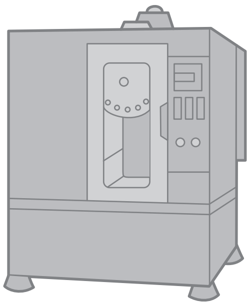
Wide Range of Machining Applications at a Maximum Depth of Cut of 0.5 mm

Stable Machining Even with Small Machining Centers

Cutting Performance Map (Cutter Dia. ø10 mm)



(Internal evaluation)

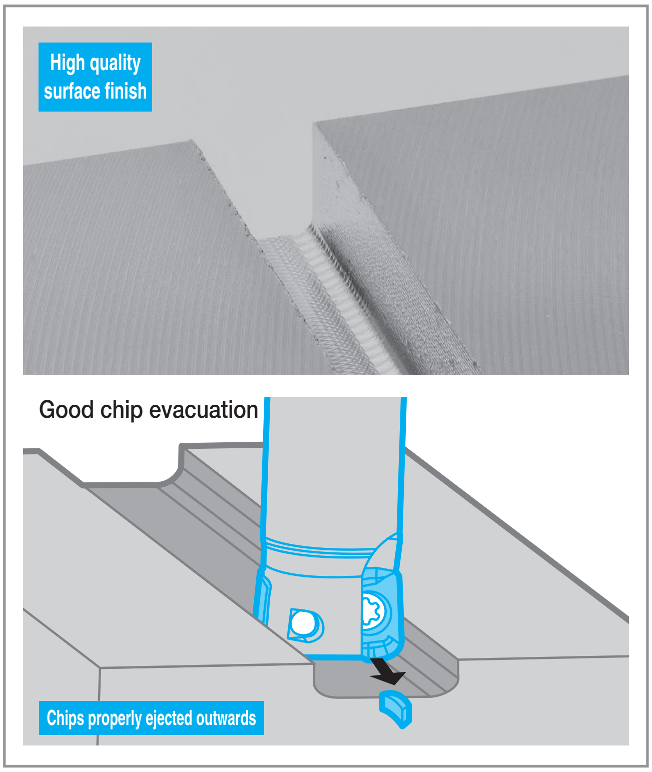


Applicable for BT30/ BT40

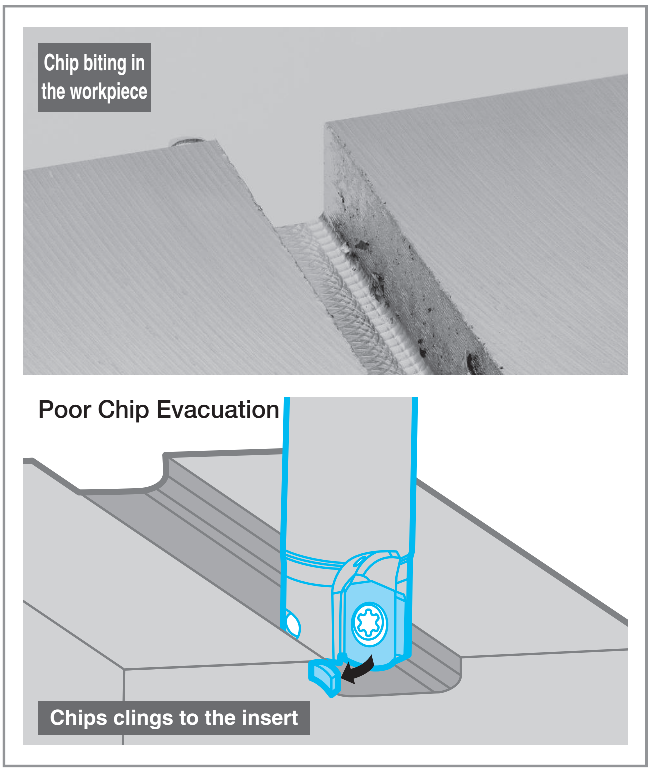
POINT.3 Excellent chip evacuation

Controls Chip Biting with Convex Cutting Edge

MFH Micro



Competitor F



Cutting Conditions : Cutter Dia. DCX = ø10 mm, Vc = 120 m/min, ap = 0.4 mm (25pass), fz = 0.6 mm/t Total 10 mm, Dry Workpiece Material : SS400 (Internal evaluation)

POINT.4 Replaces Solid End Mills to Reduce Machining Costs

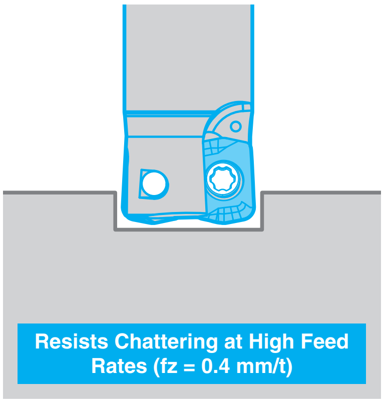
Suppresses Chattering and Increases Milling Efficiency

MFH Micro Compared to Solid End Mills

MFH Micro Q = 15.3 cc/min

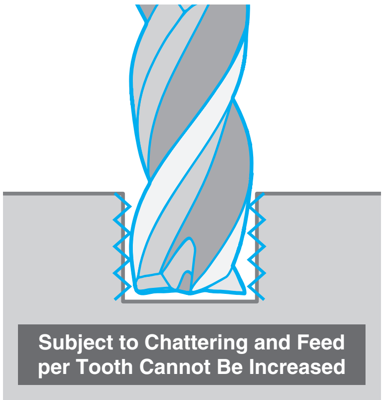
Vc = 150 m/min, fz = 0.4 mm/t
ap × ae = 0.4 × 10 mm, Dry
MFH10-S10-01-2T (2 Flutes)
LPGT010210ER-GM (PR1525)

1.25 times
Machining efficiency

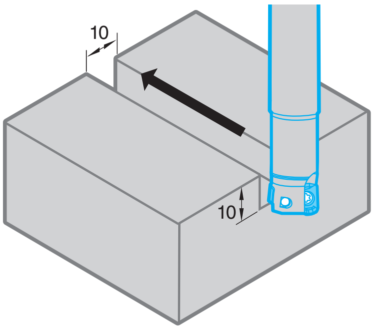


Solid End Mill Q = 12.2 cc/min

Vc = 80 m/min, fz = 0.04 mm/t
ap × ae = 3 × 10 mm, Dry
ø10 (4 Flutes)



Machine Part Slotting
Workpiece Material : S50C



(User Evaluation)

MFH Micro End Mill

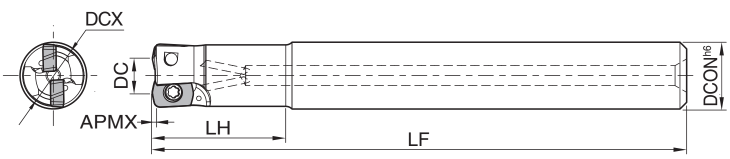


Fig. 1

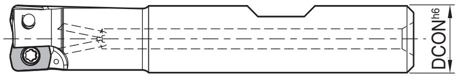


Fig. 2

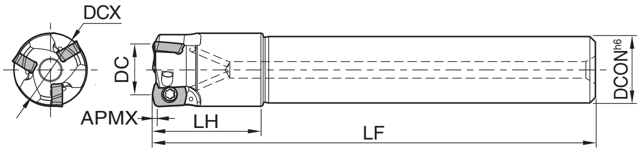


Fig. 3

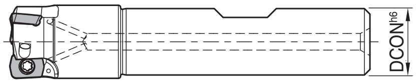


Fig. 4

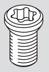
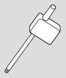
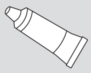
Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)						Max. ramping angle	A.R.	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DCX	DC	DCON	LF	LH	APMX						
Standard Shank	**MFH 08-S10-01-1T**	●	1	8	4.2	10	75	16	0.5	4°	+5°	Yes	Fig. 1	0.04	20,000
	10-S10-01-2T	●	2	10	6.2	10	80	20		3°				0.04	16,200
	12-S12-01-3T	●	3	12	8.2	12	80	20		2°				0.06	14,000
	16-S16-01-4T	●	4	16	12.2	16	90	25		1.2°				0.12	11,400
Over Size (Straight)	**MFH 14-S12-01-3T**	●	3	14	10.2	12	80	20	0.5	1.5°	+5°	Yes	Fig. 3	0.07	12,500
Weldon	**MFH 08-W10-01-1T**	●	1	8	4.2	10	58	16	0.5	4°	+5°	Yes	Fig. 2	0.03	20,000
	10-W10-01-2T	●	2	10	6.2	10	60	20		3°				0.03	16,200
	12-W12-01-3T	●	3	12	8.2	12	65	20		2°				0.05	14,000
	16-W16-01-4T	●	4	16	12.2	16	73	25		1.2°				0.1	11,400
Over Size (Weldon)	**MFH 14-W12-01-3T**	●	3	14	10.2	12	65	20	0.5	1.5°	+5°	Yes	Fig. 4	0.05	12,500

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

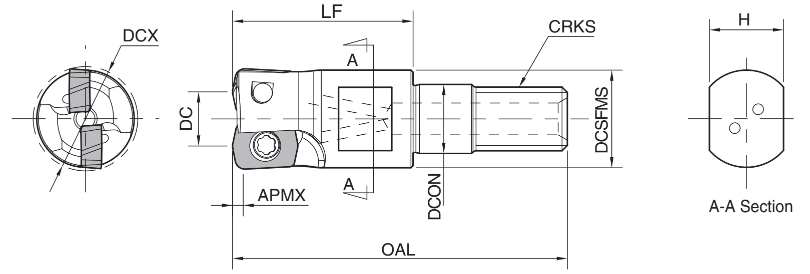
■ **Max. Revolution**
Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Spare Parts

Description	Spare Parts		
	Clamp Screw	Wrench	Anti-seize Compound
			
MFH...-01-...	SB-1840TRP	FTP-6	P-37
	Recommended tightening torque for Insert Clamp 0.5N·m		

●: Std. Item

MFH Micro Head



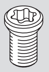
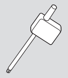
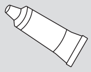
Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)									Max. ramping angle	Rake Angle	Coolant Hole	Max. Revolution (min^{-1})
			DCX	DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX		A.R.		
MFH 08-M06-01-1T	●	1	8	4.2	9.2	6.5	30.5	17	M6xP1.0	7	0.5	4°	+5°	Yes	20,000
10-M06-01-2T	●	2	10	6.2								3°			16,200
12-M06-01-3T	●	3	12	8.2	11.2							2°			14,000
14-M06-01-3T	●	3	14	10.2								1.5°			12,500
MFH 16-M08-01-4T	●	4	16	12.2	14.7	8.5	39	22	M8xP1.25	12		1.2°			11,400

Please use commercial shanks for cutting diameter from ø8 to ø14 (Screw size : M6 x P1.0)

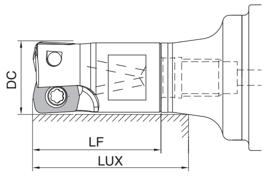
Check screw specifications for the shank in use

Spare Parts

Description	Spare Parts		
	Clamp Screw	Wrench	Anti-seize Compound
			
MFH...-01-...	SB-1840TRP	FTP-6	P-37

Recommended tightening torque for Insert Clamp 0.5N·m

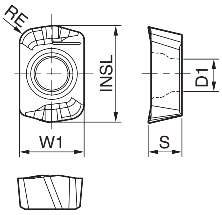
Actual End Mill depth (MFH16-M08-01-4T)



Arbor Description	Applicable End Mill (Head)			Actual End Mill depth (mm)
	Description	Cutting Dia.	Dimension	
		DC	LF	LUX
BT30K-M08-45	**MFH16-M08-01-4T**	16	22	28.8
BT40K-M08-55	**MFH16-M08-01-4T**	16	22	28.7

➡ See page **M60** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

Applicable Inserts ➡ M16

Insert		Description	Dimension (mm)					MEGACOAT NANO		CVD Coated Carbide
			W1	S	D1	INSL	RE	PR1535	PR1525	CA6535
 General purpose		**LPGT 010210ER-GM**	4.19	2.19	2.1	6.26	1.0	●	●	●

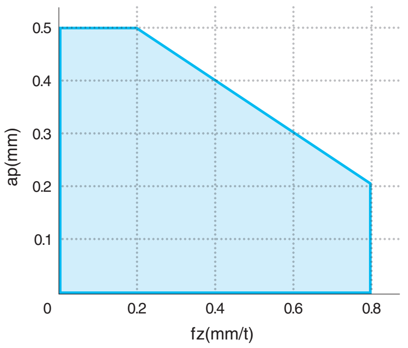
Recommended Cutting Conditions ➡ **M166**

●: Std. Item

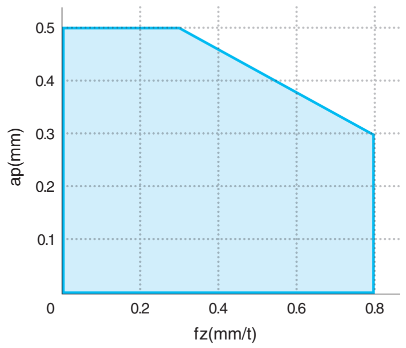
MFH Micro Dia. Cutter for High Feed Machining

Cutting Performance

Cutter Dia. : ø8~ø12



Cutter Dia. : ø14~ø16



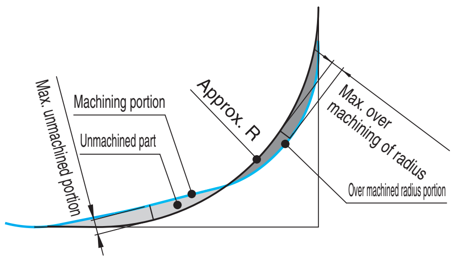
Recommended Cutting Conditions

Insert Type	Workpiece Material	Toolholder Description and Feed Rate (fz : mm/t) Recommended feed rate (fz : mm/t) : ap=0.3mm (Reference value)					Recommended Insert Grades (Cutting Speed Vc: m/min)		
		MFH08-...-1T	MFH10-...-2T	MFH12-...-3T	MFH14-...-3T	MFH16-...-4T	MEGACOAT NANO		CVD Coated Carbide
							PR1525	PR1535	CA6535
GM	Carbon Steel	0.2~**0.4**~0.6			0.2~**0.5**~0.8		★ 120~**180**~250	☆ 120~**180**~250	-
	Alloy Steel						★ 100~**160**~220	☆ 100~**160**~220	-
	Mold Steel (~40HRC)	0.2~**0.3**~0.5			0.2~**0.4**~0.6		★ 80~**140**~180	☆ 80~**140**~180	-
	Mold Steel (40~50HRC)	0.2~**0.25**~0.3			0.2~**0.25**~0.4		★ 60~**100**~130	☆ 60~**100**~130	-
	Stainless Steel (Austenitic related)	0.2~**0.3**~0.5			0.2~**0.4**~0.6		☆ 100~**160**~200	★ 100~**160**~200	-
	Stainless Steel (Martensitic related)						-	☆ 150~**200**~250	★ 180~**240**~300
	Stainless Steel (Precipitation Hardening)						-	★ 90~**120**~150	-
	Gray Cast Iron	0.2~**0.4**~0.6			0.2~**0.5**~0.8		★ 120~**180**~250	-	-
	Nodular Cast Iron	0.2~**0.3**~0.5			0.2~**0.4**~0.6		★ 100~**150**~200	-	-
	Ni-base heat-resistant alloys	0.2~**0.25**~0.3			0.2~**0.25**~0.4		-	☆ 20~**30**~50	★ 20~**30**~50
	Titanium Alloys						-	★ 40~**60**~80	-

★ : 1st Recommendation ☆ : 2nd Recommendation

Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.
The bold-faced number indicates a center value of recommended cutting condition.
Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
Internal coolant is recommended for slotting.

Note for Machining Program (Approx. R)

Shape	Approx. R (mm)	Max. over machining of radius (mm)	Max. unmachined portion (mm)
	R1.0	0	0.21
	R1.2 (Recommended)	0	0.17
	R1.5	0.08	0.1
	R2.0	0.28	0.01

Cutting Edge Angle : 12°

Reference data for Ramping

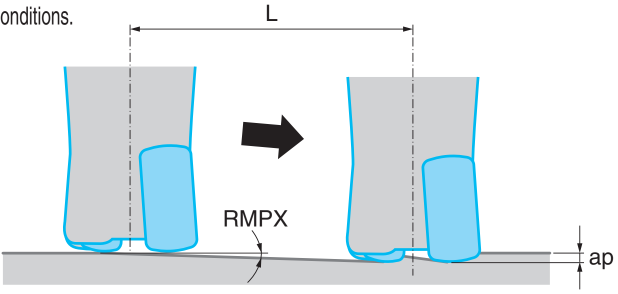
Description	Cutter Dia. DCX (mm)	8	10	12	14	16
MFH...-01-...	Max. ramping angle RMPX	4.0°	3.0°	2.0°	1.5°	1.2°
	tan RMPX	0.070	0.052	0.035	0.026	0.021

Decrease ramping angle if chips become excessively long.

Guide for Ramping (Slant Milling)

Ramping angle should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
Feed rate should be 70% or under of the above cutting conditions.

Formula of the cutting length “L” at Max. ramping angle $L = \dfrac{ap}{\tan RMPX}$

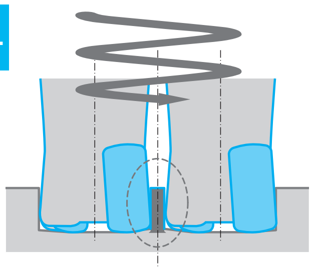


Guide for Helical milling

For helical milling, use between Min. cutting dia. and Max. cutting dia.

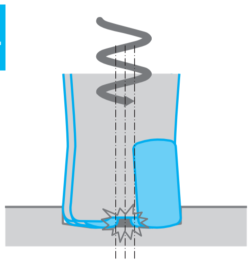
⃠ Exceeding Max. Cutting Dia.

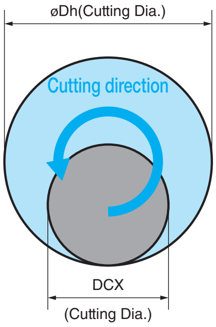
Center core part remains after machining



⃠ Under Min. Cutting Dia.

Center core part interferes with toolholder



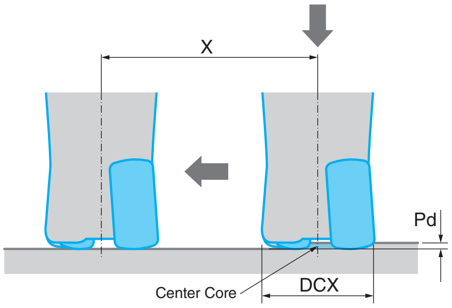


Description	Min. Cutting Dia.	Max. Cutting Dia.
MFH...-01-...	2×DCX-3.5	2×DCX-2

Unit : mm

- Sinking depth at helical milling should be Max. ap (0.5mm) or under.
- Down-cut milling is recommended (refer to the figure above).
- Feed rate should be under 50% of the recommended cutting conditions.
- Be careful to machine in a safe environment to avoid accident caused by long chips.

Guide for Drilling



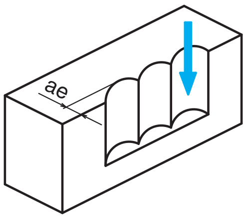
Description	GM type	
	Max. Cutting Depth Pd	Min. cutting length X for flat bottom surface
MFH...-01-...	0.5	DCX-3.5

Unit : mm

* When traversing directly after drilling, set the table feed at up to 25% of the recommended cutting conditions.
* When drilling, reduce feed rate per revolution to under f=0.2mm/rev.

Vertical milling (Plunging)

Vertical milling (Plunging)



- Available for vertical milling (plunging).

Insert Description	Max. Width of Cut (ae)
LOGT01 type	1.7mm

·For vertical milling (plunging), reduce feed rate to fz=0.2mm/t or less.

High-Precision Cutter for Finishing Applications

MFF

Cutter Body Design Provides Excellent Reliability

Molded Wiper Inserts Increases Machining Efficiency

1 Our Solution for Finish Machining

MFF was made to solve the problems in machining.

Designed with a unique insert combination of semi-finishing and finishing, the MFF drastically improves productivity by reducing quality issues.

Semi-finishing Insert

To flatten ruggedness when roughing

Finishing Insert

Provides excellent surface finish

Adjustable cutting edge and a single insert eliminates runout

SOLUTION

Increase feed to f = 5.0 mm/rev

Achieved 0.8 μm Ra surface finish

No grinding required

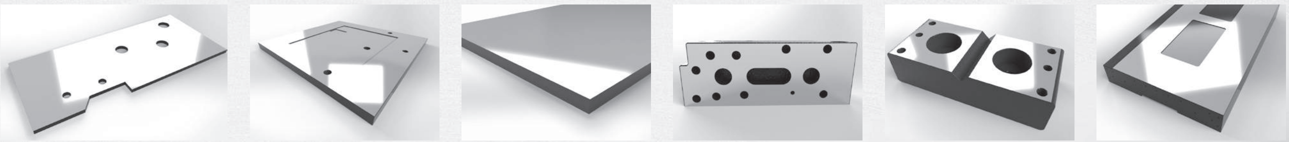
Achieved 5 μm flatness

The above is the result of a field test. Actual results will depend on machining environment, workpiece rigidity, machine, etc.
For more details, see case studies on page **M171**.

MFF Machining Solutions

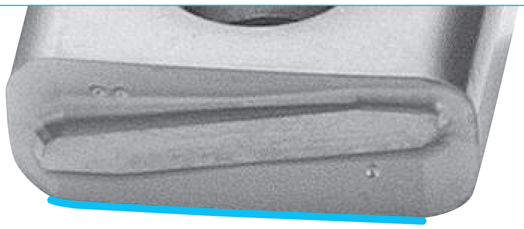
Can be used on a wide variety or parts and workpieces

Part Name	Workpiece Material	Industry
Plate / Frame / Case	Rolled Steel for General Structure / Gray Cast Iron / Spheroidal Graphite Cast Iron	**Industrial Machining / Machine Tools**
Cylinder Pump / Rail	**Ni-resist Cast Iron**	**Shipbuilding / Automotive**
Turbine Housing	**Mold Steel**	**Construction Machinery / Molds**
Casing / Mold Base	Carburized and hardened steel (60 HRC)	



2 Molded Wiper Insert for High-Quality Surface Finish

Utilizes KYOCERA's unique molded insert technology for high feed rates and excellent surface finish



Low cutting force with special edge preparation

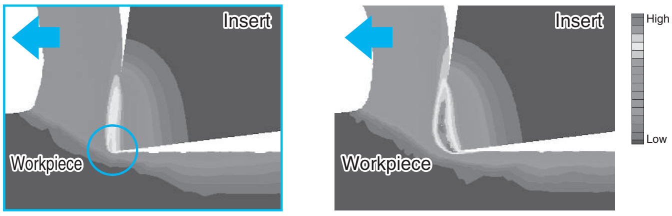
Micro-honing
Good sharpness

Wiper edge

Large S-curve shape developed
for higher feed rates

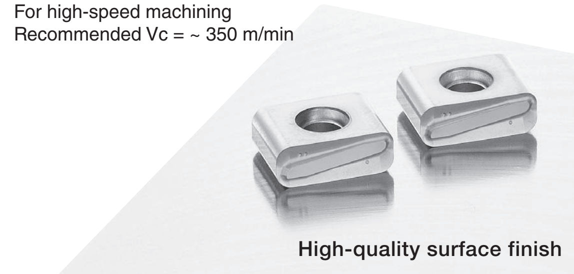
Edge Temperature Simulation Comparison (Internal evaluation)

MFF Conventional tool **After 2 sec machining**



MEGACOAT NANO Cermet PV60M

For high-speed machining
Recommended Vc = ~ 350 m/min



High-quality surface finish

Molded TT Chipbreaker

Reduces chip clogging
High feed machining

Comprehensive Machining Solutions

From Roughing to Finishing Machining Improvements (Internal evaluation)

Combine with KYOCERA's MFH high feed cutter to improve quality and efficiency

General Use Cutter

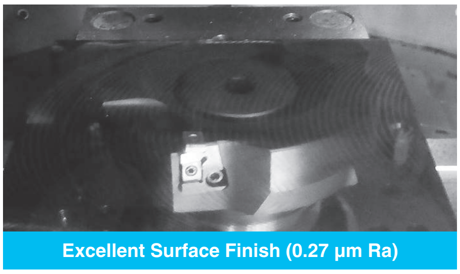
MFH Harrier + MFF
High Feed Cutter

Cutting Conditions
Conventional ⌀200 (6 inserts)
Vc = 200 m/min
Roughing : Vf = 286 mm/min (fz = 0.15 mm/t), ap = 1.2 mm
Finishing : Vf = 230 mm/min (fz = 0.12 mm/t), ap = 0.3 mm

SOLUTION
Roughing : MFH Harrier ⌀63 (6 inserts)
Vc = 200 m/min
Vf = 7,300 mm/min (fz = 1.2 mm/t), ap = 0.7 mm
Finishing : MFF ⌀200 (2 inserts)
Vc = 300 m/min
Vf = 2,400 mm/min (f = 5.0 mm/rev), ap = 0.1 mm

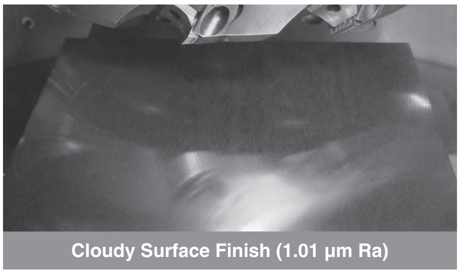
Surface Finish Quality after Machining

SOLUTION



Excellent Surface Finish (0.27 µm Ra)

Conventional Machining



Cloudy Surface Finish (1.01 µm Ra)

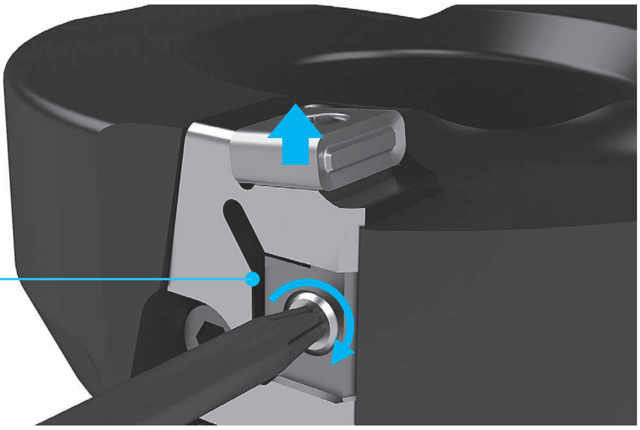
3 Adjustable cutting edge for increased usability

Cartridge height comes pre-adjusted and should not be necessary.

Adjustment is not required after replacing insert.

Easy-to-adjust Cutting Edge

Cutting edge height can be adjusted easily with one screw



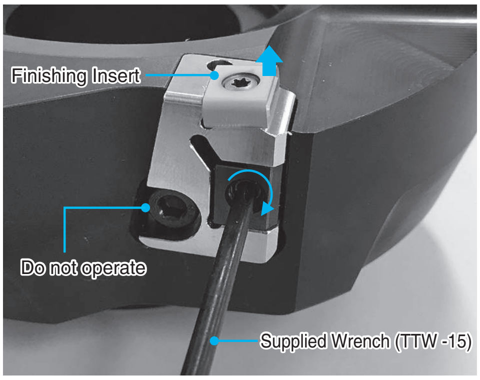
Included adjustment wrench

Edge Adjustment

If D.O.C. is ap 0.1 ~ 0.2 mm, no adjustment is necessary (Pre-adjusted before holder is shipped).

Cutting edge adjustment is NOT required when replacing inserts.

If D.O.C. is less than 0.1 mm or if you prefer a different edge height, use the following method:



Adjusting the Cutting Edge

Use the supplied TTW-15 wrench to rotate the screw and easily adjust the cutting edge position.

Procedure

To adjust, start with the screw turned counterclockwise about two rotations (lowering the cutting edge).
Tighten the screw clockwise (raising the cutting edge) to adjust the amount of protrusion.
*Use a dial gauge to measure protrusion amount.

Precautions

Make sure to lower the cutting edge below the desired height first (turning screw counterclockwise) and then raise the edge up to the final height (turning screw clockwise).
If cutting edge is simply lowered to the final edge height, chattering or loosening of the screw may occur due to backlash.
Make sure the measurement position of the cutting edge is the same machining diameter.

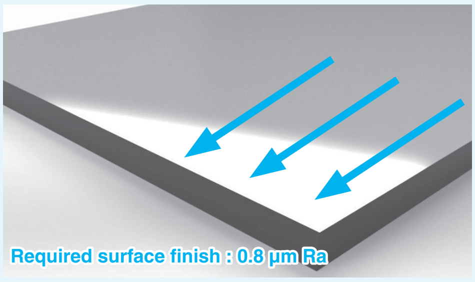
Standard Cutting Edge Height

ap = 0.05 mm → protrusion against rough edge : 0.03 mm

ap = 0.10 mm ~ → protrusion against rough edge : 0.06 mm *Pre-adjusted before shipment

SOLUTION ❶ 1.7 times increase in efficiency at f = 5.0 mm/rev with a 0.8 μm Ra surface finish

Plate (SS400)



SOLUTION
MFF
ø200 2 inserts

1.7 times Machining Efficiency
Vf=2,600mm/min

Vc = 330 m/min, f = 5.0 mm/rev, ap = 0.1 mm, Dry

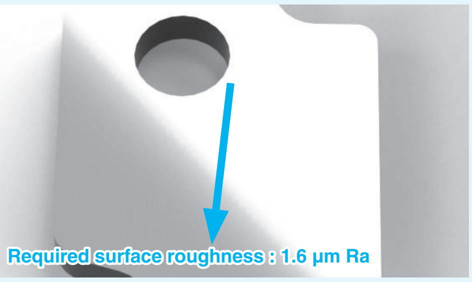
Conventional
Competitor A
ø200 2 inserts

Vf=1,500mm/min
Vc = 220 m/min, f = 4.3 mm/rev, ap = 0.1 mm, Dry

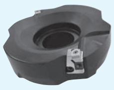
The conventional cutter was not able to feed faster than f = 4.3 mm/rev as surface finish deteriorated.
The MFF showed good surface finish of 0.8 μm Ra or less even at f = 5.0 mm/rev.
Increasing the cutting speed increased machining efficiency by 1.7 times.

SOLUTION ❷ Surface finish 0.5 μm Ra. No grinding required (Fewer Processes)

Valve (FCD450)



SOLUTION
MFF
ø160 2 inserts



No grinding required
127sec

Vc = 300 m/min, Vf = 250 mm/min (f = 0.4 mm/rev) ap = 0.1 mm, Wet

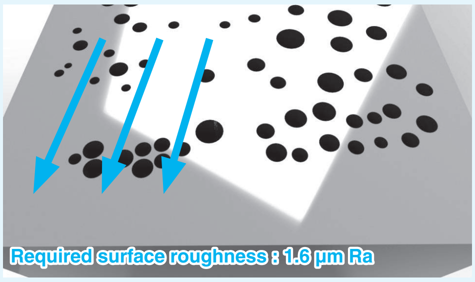
Conventional
Competitor B
ø200 10 inserts

Machining 32 sec + Grinding 10 min
Vc = 300 m/min, Vf = 800 mm/min (f = 1.6 mm/rev) ap = 0.1 mm, Wet

Conventional tool showed cloudy finished surface,
MFF provided 0.5 μm Ra with a glossy finish.
Reduced grinding process and cycle time by 80%.

SOLUTION ❸ Improved flatness and machining efficiency tripled in interrupted mold steel

Mold (SKD61 equivalent)



SOLUTION
MFF
ø200 2 inserts

Machining Efficiency x 3
Vf=380mm/min 6 Pass

Vc = 120 m/min, f = 2.0 mm/rev, ap = 0.05 mm, Dry

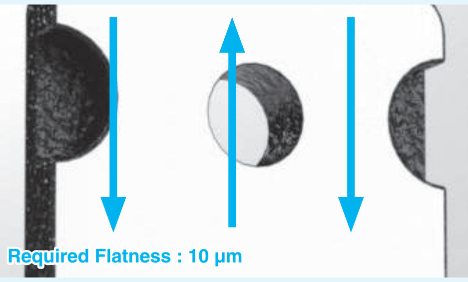
Conventional
Competitor C
ø125 5 inserts

Vf=210mm/min 10 Pass
Vc = 120 m/min, f = 0.65 mm/rev, ap = 0.05 mm, Dry

The MFF left a good finished surface with no gaps among tool path seams.
Larger cutter diameter reduced the number of passes to six and improved productivity.
Desirable chip shape and size were achieved.

SOLUTION ❹ Flatness of 5 μm was achieved. Showed good surface finish with reduced chattering on the thin part

Case (FC250)



SOLUTION
MFF
ø100 2 inserts

Machining Quality Improvement
Reduced Chattering and Good Finish

Vc = 330 m/min, Vf = 1,600 mm/min (f = 1.5 mm/rev) ap = 0.1 mm, Dry

Conventional
Competitor D
ø100 8 inserts (CBN)

Chattering occurred in thin wall
Vc = 1,200 m/min, Vf = 2,450 mm/min (f = 0.64 mm/rev) ap = 0.1 mm, Dry

Conventional cutter needed adjustment due to chattering on the thin portion.
MFF prevent chattering. Finished surface is good and there is no gap in the tool path seams.
Flatness of 5 μm achieved.

Cutter for Finishing MFF

MFF

Rake Angle	
A.R.	R.R.
-8°	Medium-Finishing Insert : -9° Finishing Insert : -20°

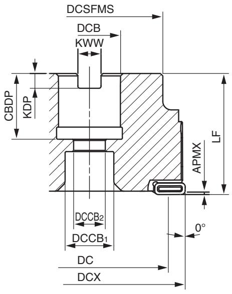


Fig.1

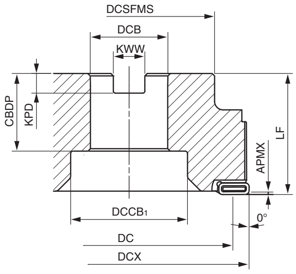


Fig.2

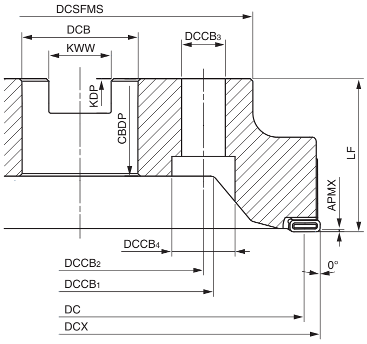


Fig.3

Toolholder Dimensions

	Description	Stock	No. of Inserts	Dimension (mm)													Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DCX	DC	DCSFMS	DCB	DCCB₁	DCCB₂	DCCB₃	DCCB₄	LF	CBDP	KDP	KWW	APMX				
Metric	**MFF080R-M-SF**	MTO	2	80	67.3	60	27	20	13	-	-	50	24	7	12.4	0.3	No	Fig.1	1.3	2,000
	MFF100R-M-SF	MTO		100	87.3	70	32	48	-	-	-	50	32	8	14.4			Fig.2	1.8	1,600
	MFF125R-M-SF	MTO		125	112.3	87	40	55	-	-	-	63	33	9	16.4				3.5	1,300
	MFF160R-M-SF	MTO		160	147.3	102		72	-	-	-								5.9	1,000
	MFF200R-M-SF	MTO		200	187.3	142	60	110	101.6	26	18		40	14	25.7			Fig.3	7.7	800
	MFF250R-M-SF	MTO		250	237.3														10.5*	800
Bore Dia. Inch spec	**MFF080R-SF**	MTO	2	80	67.3	60	25.4	20	13	-	-	50	27	6	9.5	0.3	No	Fig.1	1.3	2,000
	MFF100R-SF	MTO		100	87.3	70	31.75	48	-	-	-	50	32	8	12.7			Fig.2	1.8	1,600
	MFF125R-SF	MTO		125	112.3	87	38.1	58	-	-	-	63	38	10	15.9				3.5	1,300
	MFF160R-SF	MTO		160	147.3	102	50.8	72	-	-	-			11	19.1				5.9	1,000
	MFF200R-SF	MTO		200	187.3	142	47.625	110	101.6	26	18		40	14	25.4			Fig.3	8.1	800
	MFF250R-SF	MTO		250	237.3														10.8*	800

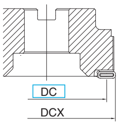
*⌀250 sizes have holes for lighter weight.

Max. Revolution

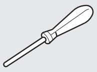
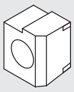
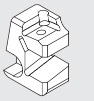
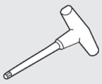
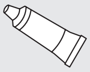
Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page **M173**. Do not use the end mill or cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

Surface Finish

The surface will be finished flat within the range of DC shown on the right.

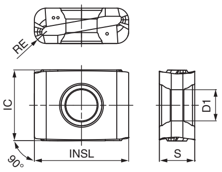
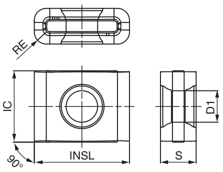


Spare Parts

Spare Parts							
Clamp Screw	Wrench	Wedge	Cartridge	Cartridge Clamp Screw	Wrench	Adjustment Screw	Anti-seize Compound
							
SB-3592TR	DTM-10	AD-MFF	CR-MFF	HH5X15L	TTW-15	W6X18N	P-37
Recommended tightening torque for Insert Clamp 1.2N·m							

MTO : Made to order

Applicable Inserts

Insert		Description	Dimension (mm)					MEGACOAT NANO Cermet	MEGACOAT NANO
			IC	S	D1	INSL	RE	PV60M	PR1525
 For steel and stainless steel (Low cutting force)		**LNGX 120916R-TT**	9.525	6.35	4.2	12.7	1.6	MTO	MTO
 For Cast Iron		**LNGX 120916**	9.525	6.35	4.2	12.7	1.6	MTO	MTO

◆ Recommended Cutting Conditions

Chipbreaker	Workpiece Material	f (mm/rev)	ap (mm)	Recommended Insert Grades (Cutting speed Vc : m/min)	
				PV60M	PR1525
TT	Structural Steel	1.5 – **4.0** – 5.0	0.03 – **0.1** – 0.3	★ 230 – **280** – 350	☆ 230 – **280** – 350
	Carbon Steel	1.0 – **4.0** – 5.0		★ 200 – **250** – 350	☆ 200 – **250** – 350
	Alloy Steel	1.0 – **4.0** – 5.0		★ 200 – **250** – 350	☆ 200 – **250** – 350
	Mold Steel	1.0 – **2.0** – 4.0	0.03 – **0.1** – 0.2	☆ 120 – **200** – 250	★ 120 – **200** – 250
	Mold Steel (50HRC～)	0.6 – **1.0** – 1.2	0.03 – **0.05** – 0.1	–	★ 50 – **70** – 80
	Stainless Steel (Austenitic related)*	1.0 – **2.0** – 4.0	0.03 – **0.1** – 0.2	☆ 120 – **200** – 250	★ 120 – **200** – 250
	Stainless Steel (Martensitic related) *	1.0 – **3.0** – 4.0		☆ 150 – **200** – 300	★ 150 – **200** – 300
Standard	Gray Cast Iron	1.0 – **2.0** – 4.0	0.03 – **0.1** – 0.3	☆ 200 – **250** – 350	★ 200 – **250** – 350
	Nodular Cast Iron	1.5 – **2.0** – 4.0		☆ 150 – **250** – 300	★ 150 – **250** – 300

*Machining with coolant is recommended for stainless steel

★1st Recommendation ☆2nd Recommendation

The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

MTO : Made to order

Multi-Function Machining End Mill MEY

Pocketing | Drilling | Shouldering | Deep Slotting | Facing

MEY


Standard


Long Head


Long Shank

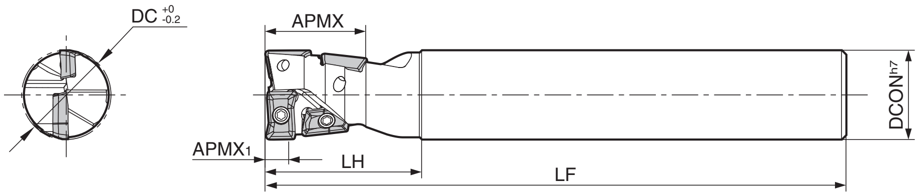


Fig. 1

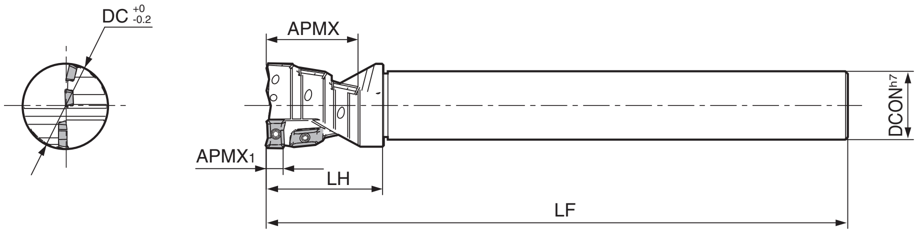


Fig. 2

Toolholder Dimensions

Description			Stock	No. of Inserts	No. of Flutes	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
						DC	DCON	LF	LH	APMX	APMX1	A.R.	R.R.		Clamp Screw	Wrench	Anti-seize Compound
Standard	MEY	16-S16	●	4	2	16	16	120	31	19	4.5	+11°	-11°	Fig. 1	SB-2040TRG	DTM-6	P-37
		17-S16	●			17											
		20-S20	●			20	20	130	35	22	6	+13°	- 9°		SB-2555TRG	DT-8	
		21-S20	●			21											
		25-S25	●			25	25	140	40	28	7.5		-11°		SB-3070TRG	DT-10	
		26-S25	●			26											
		32-S32	●			32	32	150	50	36	9.5		- 9°		SB-4070TRG	DT-15	
		33-S32	●			33											
		40-S32	●	7		40		160	55	42	7.5		-11°	Fig. 2	SB-3070TRG	DT-10	
		50-S42	●			50	42	170	70	54	9.5		- 9°		SB-4070TRG	DT-15	
Long Head	MEY	16-S16-140H	●	4	2	16	16	140	51	19	4.5	+11°	-11°	Fig. 1	SB-2040TRG	DTM-6	P-37
		20-S20-150H	●			20	20	150	53	22	6	+13°	- 9°		SB-2555TRG	DT-8	
		25-S25-170H	●			25	25	170	70	28	7.5		-11°		SB-3070TRG	DT-10	
		32-S32-180H	●			32	32	180	80	36	9.5		- 9°		SB-4070TRG	DT-15	
Long Shank	MEY	16-S16-190	●	4	2	16	16	190	61	19	4.5	+11°	-11°	Fig. 1	SB-2040TRG	DTM-6	P-37
		17-S16-190	●			17			31								
		20-S20-200	●			20	20	200	63	22	6	+13°	- 9°		SB-2555TRG	DT-8	
		21-S20-200	●			21			35								
		25-S25-220	●			25	25	220	80	28	7.5		-11°		SB-3070TRG	DT-10	
		26-S25-220	●			26			40								
		32-S32-230	●			32	32	230	90	36	9.5		- 9°		SB-4070TRG	DT-15	
		33-S32-230	●			33			50								
		40-S32-240	●	7		40		240	55	42	7.5		-11°	Fig. 2	SB-3070TRG	DT-10	
		50-S42-250	●			50	42	250	70	54	9.5		- 9°		SB-4070TRG	DT-15	

·APMX1 shows the edge length of the complete 2-insert part.

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

Applicable Inserts

Description		Applicable Inserts ➡ **M23**			
					
		Side Edge	No. of Inserts	Center Edge	No. of Inserts
MEY	**16-S16(-...)**	**JOMT08T208ER-D**	3	**GOMT08T208ER-D**	1
	17-S16(-...)				
	20-S20(-...)	**JOMT100308ER-D**		**GOMT100308ER-D**	
	21-S20(-...)				
	25-S25(-...)	**JOMT13T308ER-D**		**GOMT13T308ER-D**	
	26-S25(-...)				
	32-S32(-...)	**JOMT160408ER-D**		**GOMT160408ER-D**	
	33-S32(-...)				
	40-S32(-...)	**JOMT13T308ER-D**	6	**GOMT13T308ER-D**	
	50-S42(-...)	**JOMT160408ER-D**		**GOMT160408ER-D**	

Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc : m/min)	
			MEGACOAT	
	Drilling	Shouldering, Slotting	**PR1225**	**PR1210**
Carbon Steel	0.08~0.15	0.05~0.25	★ 120~250	-
Alloy Steel	0.08~0.15	0.05~0.25	★ 100~220	-
Mold Steel	0.08~0.12	0.05~0.15	★ 80~180	-
Stainless Steel	0.08~0.12	0.05~0.15	★ 120~220	-
Cast Iron	0.05~0.20	0.05~0.25	-	★ 100~220

★ : 1st Recommendation ☆ : 2nd Recommendation

Caution of drilling

(1) Drilling conditions should be calculated as one flute line.

(2) Use compressed air during drilling.

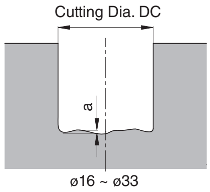
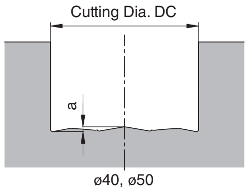
(3) Carbon steel other than low carbon steel can be drilled to a depth of 0.5D without step feeding. For soft steel or sticky material such as stainless steel, step feed drilling (0.5 ~ 1.0mm) is recommended.

(4) For stainless steel drilling, coolant is recommended.

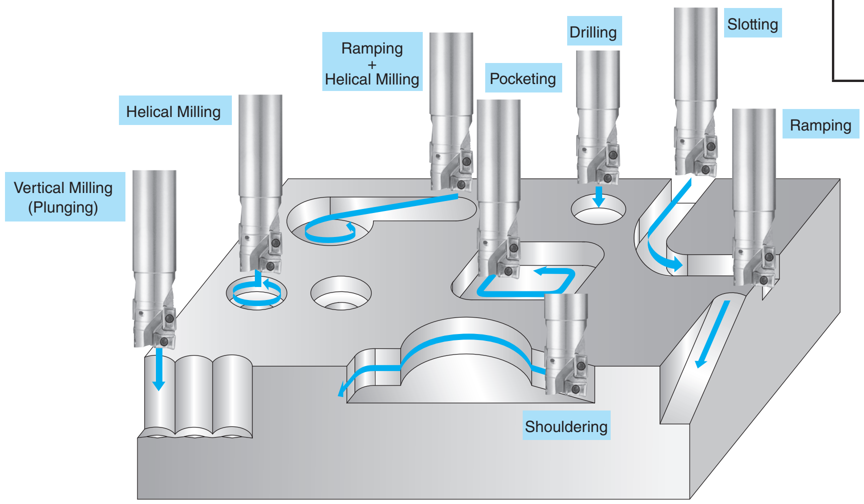
(5) Please refer to right list for maximum hole depth.

Cutting Dia.(DC)	Max. hole depth (mm)
ø16	13
ø17	13
ø20	17
ø21	17
ø25	22
ø26	22
ø32	29
ø33	29
ø40	36
ø50	40

Shape of the bottom of the drilled hole

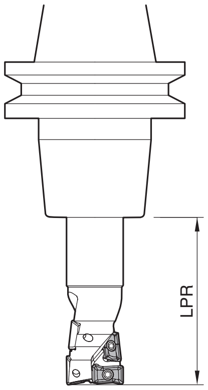
Cutting Dia.	a (mm)	Shape of the bottom
ø16,ø17	0.5	 Cutting Dia. DC a ø16 ~ ø33
ø20,ø21	0.64	
ø25,ø26	0.85	
ø32,ø33	1.12	
ø40	1.54	 Cutting Dia. DC a ø40, ø50
ø50	1.65	

Examples of MEY Multi-function Machining

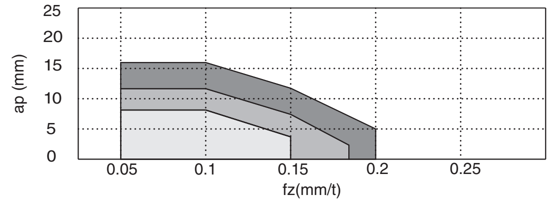
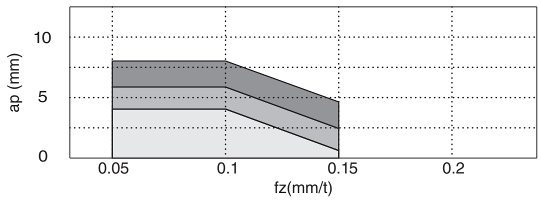
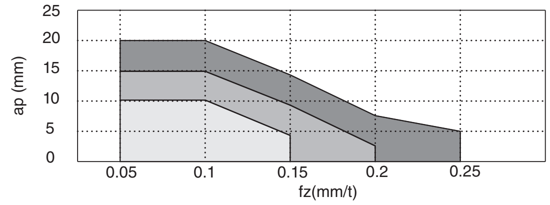
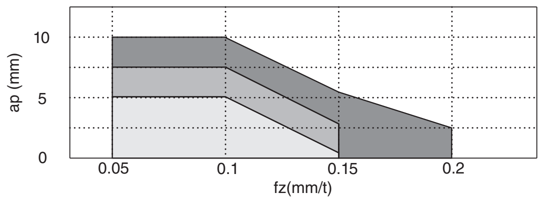
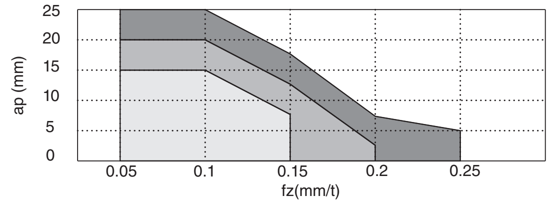
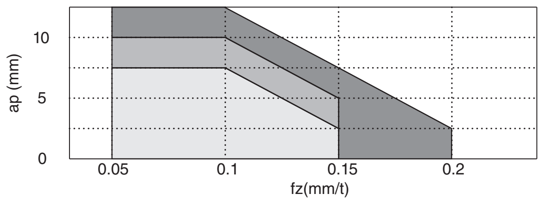
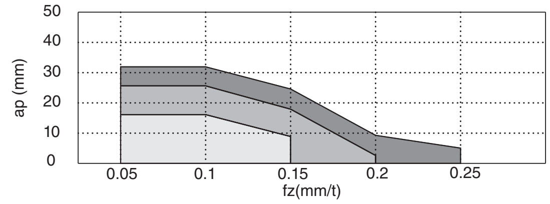
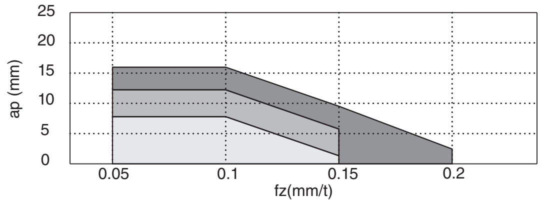
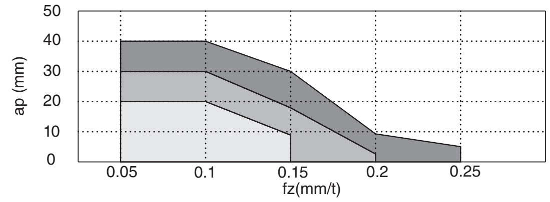
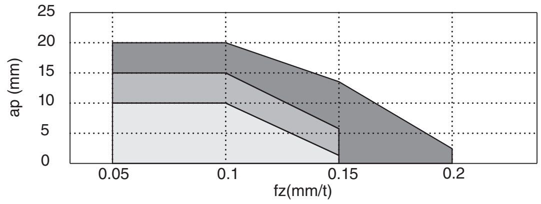
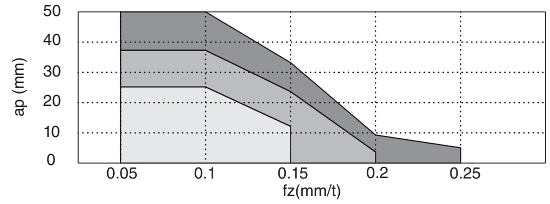
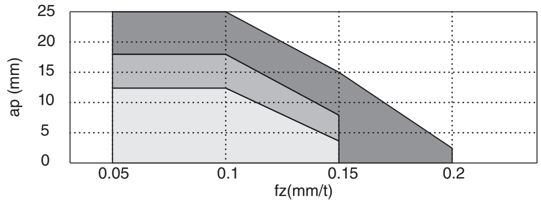


Cutting Performance of MEY

[Workpiece Material : S50C]

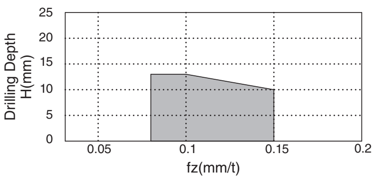
Cutting Dia.	Description	Overhang Length LPR (mm)			Shape
		■	▨	□	
ø16	**MEY16-S16**	31	[~61]	(Not Recommended)	
	MEY16-S16-140H	-	~61	[~91]	
	MEY16-S16-190	-	61	~91	
ø17	**MEY17-S16**	31	[~61]	(Not Recommended)	
	MEY17-S16-190	31	~61	~91	
ø20	**MEY20-S20**	35	[~65]	(Not Recommended)	
	MEY20-S20-150H	-	~65	[~95]	
	MEY20-S20-200	-	65	~95	
ø21	**MEY21-S20**	35	[~65]	(Not Recommended)	
	MEY21-S20-200	35	~65	~95	
ø25	**MEY25-S25**	40	[~70]	(Not Recommended)	
	MEY25-S25-170H	-	70	[~100]	
	MEY25-S25-220	-	~80	~100	
ø26	**MEY26-S25**	40	[~70]	(Not Recommended)	
	MEY26-S25-220	40	~70	~100	
ø32	**MEY32-S32**	50	[~80]	(Not Recommended)	
	MEY32-S32-180H	-	~80	[~110]	
	MEY32-S32-230	-	90	~110	
ø33	**MEY33-S32**	50	[~80]	(Not Recommended)	
	MEY33-S32-230	50	~80	~110	
ø40	**MEY40-S32**	55	[~85]	[~115]	
	MEY40-S32-240	55	~85	~115	
ø50	**MEY50-S42**	70	[~100]	[~130]	
	MEY50-S42-250	70	~100	~130	

When using in [ ] dimension,
be careful that the chucking length to the shank may get too short.

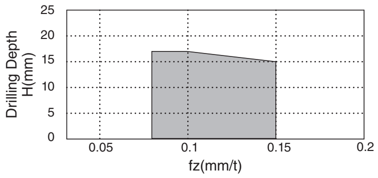
Description	■ Shouldering (Cutting width ae = DC/2) Note) □ Part ae = DC/4	■ Slotting ■ Ramping and Helical Milling
MEY16-S16 **MEY17-S16**		
MEY20-S20 **MEY21-S20**		
MEY25-S25 **MEY26-S25**		
MEY32-S32 **MEY33-S32**		
MEY40-S32		
MEY50-S42		

Drilling (Standard / Long Head / Long Shank : S50C)

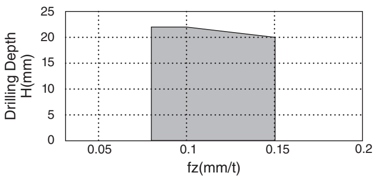
MEY16-S16
MEY17-S16



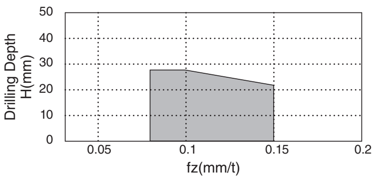
MEY20-S20
MEY21-S20



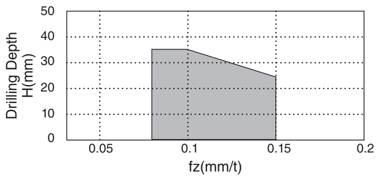
MEY25-S25
MEY26-S25



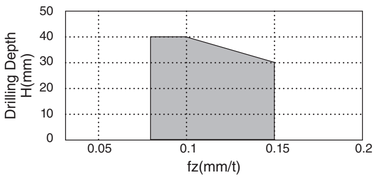
MEY32-S32
MEY33-S32



MEY40-S32



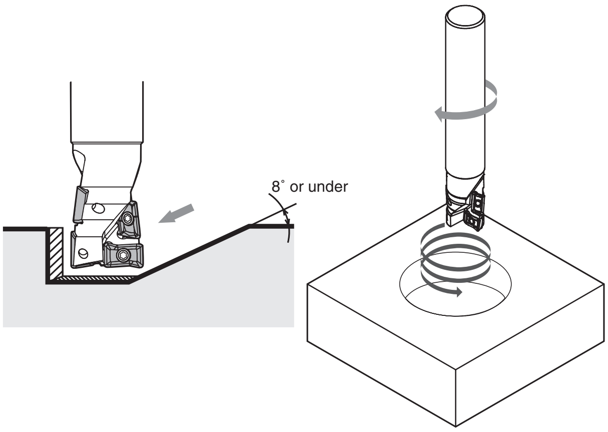
MEY50-S42



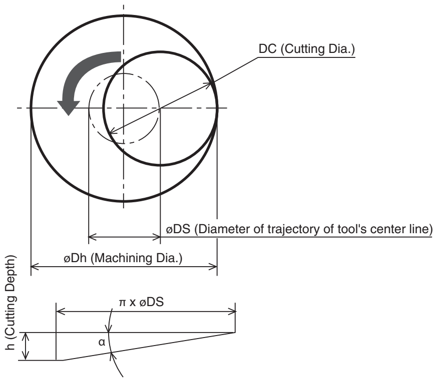
How to Use MEY Effectively

Ramping / Helical Milling

- Ramping angle is recommended to be 8˚ or under.
- Sinking depth per revolution when helical milling should be 1/2DC or under.
  Use compressed air during machining.



Helical Milling Factors



øDS (How to find diameter of trajectory of tool's center line)

øDS = øDh - DC

h How to find "h"

h = π X øDS X tan α

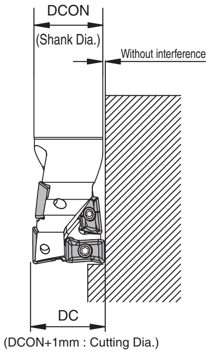
(α should be 8˚ or under)

Shouldering

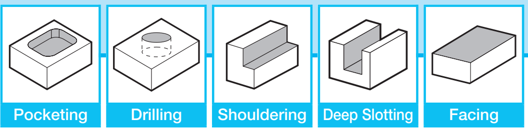
- Tools with 1mm larger cutting diameter than shank diameter are available.
  High wall shouldering is possible.
- Lineup

(mm)

Description	DC	DCON
MEY17-S16	17	16
MEY21-S20	21	20
MEY26-S25	26	25
MEY33-S32	33	32
MEY17-S16-190	17	16
MEY21-S20-200	21	20
MEY26-S25-220	26	25
MEY33-S32-230	33	32



Multi-Function Machining End Mill MEZ-G



MEZ-G (Will be switched to MEY ➡ M174)

Standard

Long Shank / Long Head

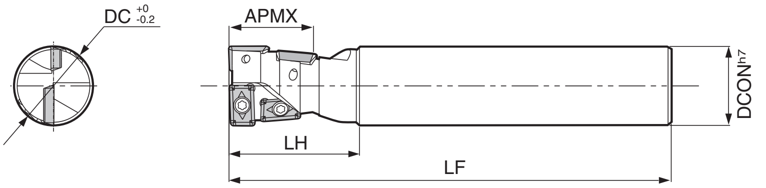


Fig. 1

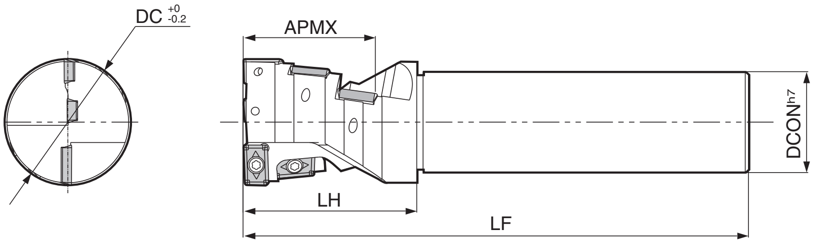
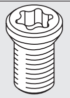
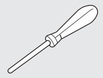


Fig. 2

Toolholder Dimensions

Description		Stock	No. of Inserts	No. of Flutes	Dimension (mm)					Rake Angle		Drawing	Spare Parts		See Page for Applicable Inserts ➡ M24
													Clamp Screw	Wrench	
					DC	DCON	LF	LH	APMX	A.R.	R.R.				
Standard	**MEZ 16-S16G**	▲	4	2	16	16	120	31	16	+9°	-5°	Fig. 1	SB-2040TRG	DTM-6	NDMT080208ER-D□
	20-S20G	▲			20	20	130	33	21		-4°		SB-2555TRG	DT-8	NDMT10T208ER-D□
	25-S25G	▲			25	25	140	40	25		-5°		SB-3070TRG	DT-10	NEMT120308ER-D□
	32-S32G	▲			32	32	150	50	33		-2°		SB-4070TRG	DT-15	NEMT16T308ER-D□
	40-S32G	▲	7		39	32	160	55	39		-3°	Fig. 2	SB-3070TRG	DT-10	NEMT120308ER-D□
	50-S42G	▲			49	42	170	70	51		-2°		SB-4070TRG	DT-15	NEMT16T308ER-D□
Long Head	**MEZ 16-S16-140HG**	▲	4		16	16	140	51	16	+9°	-5°	Fig. 1	SB-2040TRG	DTM-6	NDMT080208ER-D□
	20-S20-150HG	▲			20	20	150	53	21		-4°		SB-2555TRG	DT-8	NDMT10T208ER-D□
	25-S25-170HG	▲			25	25	170	70	25		-5°		SB-3070TRG	DT-10	NEMT120308ER-D□
	32-S32-180HG	▲			32	32	180	80	33		-2°		SB-4070TRG	DT-15	NEMT16T308ER-D□
Long Shank	**MEZ 16-S16-190G**	▲	4		16	16	190	61	16	+9°	-5°	Fig. 1	SB-2040TRG	DTM-6	NDMT080208ER-D□
	20-S20-200G	▲			20	20	200	63	21		-4°		SB-2555TRG	DT-8	NDMT10T208ER-D□
	25-S25-220G	▲			25	25	220	80	25		-5°		SB-3070TRG	DT-10	NEMT120308ER-D□
	32-S32-230G	▲			32	32	230	90	33		-2°		SB-4070TRG	DT-15	NEMT16T308ER-D□
	40-S32-240G	▲	7		39	32	240	55	39		-3°	Fig. 2	SB-3070TRG	DT-10	NEMT120308ER-D□
	50-S42-250G	▲			49	42	250	70	51		-2°		SB-4070TRG	DT-15	NEMT16T308ER-D□

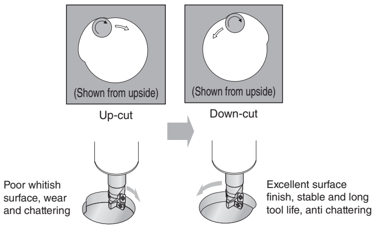
Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc : m/min)			
			Cermet	MEGACOAT		Carbide
	Drilling	Shouldering , Slotting	TN100M	PR1225	PR1210	KW10
Carbon Steel	0.05~0.2	0.05~0.2	★ 120~200	★ 120~250	-	-
Alloy Steel	0.05~0.2	0.05~0.2	★ 100~180	★ 100~220	-	-
Mold Steel	0.05~0.12	0.05~0.15	★ 100~180	★ 80~180	-	-
Stainless Steel	0.05~0.12	0.05~0.15	☆ 120~200	★ 120~220	-	-
Cast Iron	0.05~0.2	0.05~0.2	-	-	★ 100~220	☆ 80~150
Non-ferrous Metals	0.05~0.2	0.05~0.2	-	-	-	★ 100~300

★ : 1st Recommendation ☆ : 2nd Recommendation

- Drilling conditions should be calculated as one flute line. Step feed (0.5 ~ 0.1mm) is recommended.
- Coolant is recommended when drilling stainless steel / cast iron.

- Down-cut milling is recommended for the improvement of tool life and surface finish.
- Compressed air is recommended.

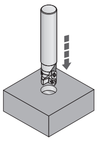


How to Use MEZ-G Effectively

Drilling

- Step feeding is recommended for good chip control. (Depth approx. 1mm)
- Drill depth should be 0.5DC or under. (DC : Drilling Dia.)

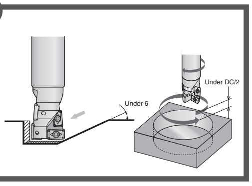
Use compressed air during machining.



Ramping / Helical Milling

- Ramping angle is recommended to be 6° or under.
- Sinking depth per revolution when helical milling should be 1/2DC or under.

Use compressed air during machining.



End Milling

- Tough edge insert is recommended for high load end milling. (High feed rate, large D.O.C.)

Use a low cutting force insert to prevent chattering.

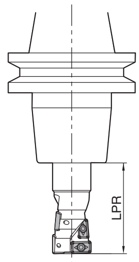
N(D/E)MT...ER-DH
(Tough Edge)

N(D/E)MT...ER-D
(Low Cutting Force)

▲ :To be replaced by a new product

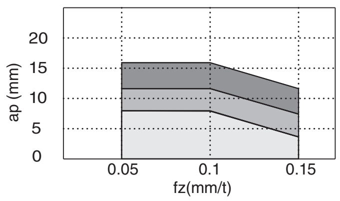
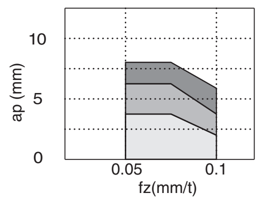
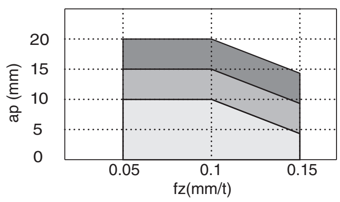
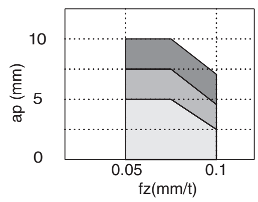
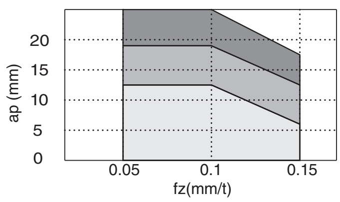
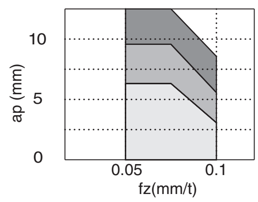
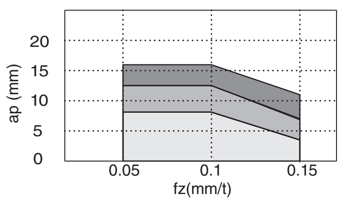
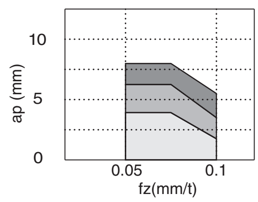
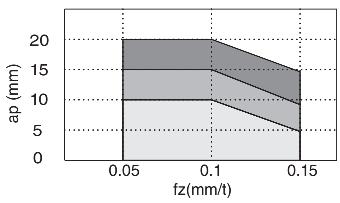
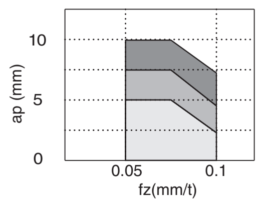
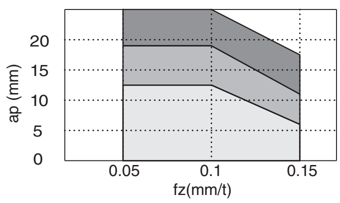
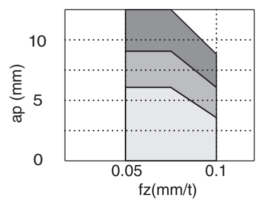
Cutting Performance of MEZ-G

[Workpiece Material : S50C]

Cutting Dia.	Description	Overhang Length LPR (mm)			Cutting Dia.	Description	Overhang Length LPR (mm)			Shape
		■	▨	□			■	▨	□	
ø16	**MEZ16-S16G**	31	[~61]	(Not Recommended)	ø32	**MEZ32-S32G**	50	[~80]	(Not Recommended)	
	MEZ16-S16-140HG	-	~61	[~91]		**MEZ32-S32-180HG**	-	80	[~110]	
	MEZ16-S16-190G	-	61	~91		**MEZ32-S32-230G**	-	90	~110	
ø20	**MEZ20-S20G**	33	[~63]	(Not Recommended)	ø39	**MEZ40-S32G**	55	[~85]	[~115]	
	MEZ20-S20-150HG	-	~63	[~93]		**-**	-	-	-	
	MEZ20-S20-200G	-	63	~93		**MEZ40-S32-240G**	55	~85	~115	
ø25	**MEZ25-S25G**	40	[~70]	(Not Recommended)	ø49	**MEZ50-S42G**	70	[~100]	[~130]	
	MEZ25-S25-170HG	-	70	[~100]		**-**	-	-	-	
	MEZ25-S25-220G	-	80	~100		**MEZ50-S42-250G**	70	~100	~130	

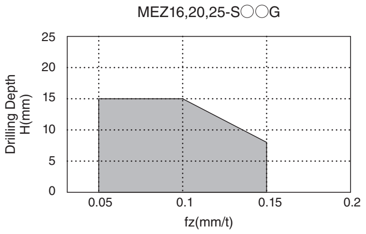
When using in [ ] dimension, be careful that the chucking length to the shank may get too short.

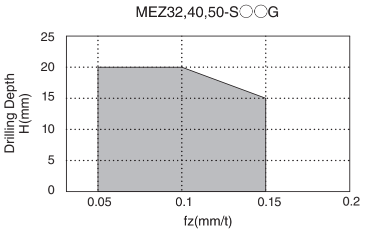
Shouldering / Slotting

Description	■ Shouldering (Cutting width ae = DC/2) Note) □ Part ae = DC/4	■ Slotting ■ Ramping and Helical Milling
MEZ16-S16G		
MEZ20-S20G		
MEZ25-S25G		
MEZ32-S32G		
MEZ40-S32G		
MEZ50-S42G		

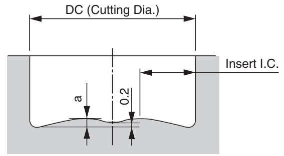
Drilling

■ Drilling
(Standard / Long Head / Long Shank)



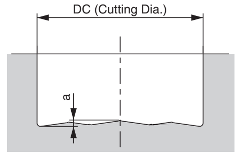


Shape of the bottom of the drilled hole
(ø16 ~ ø49)



ø16 ~ ø32

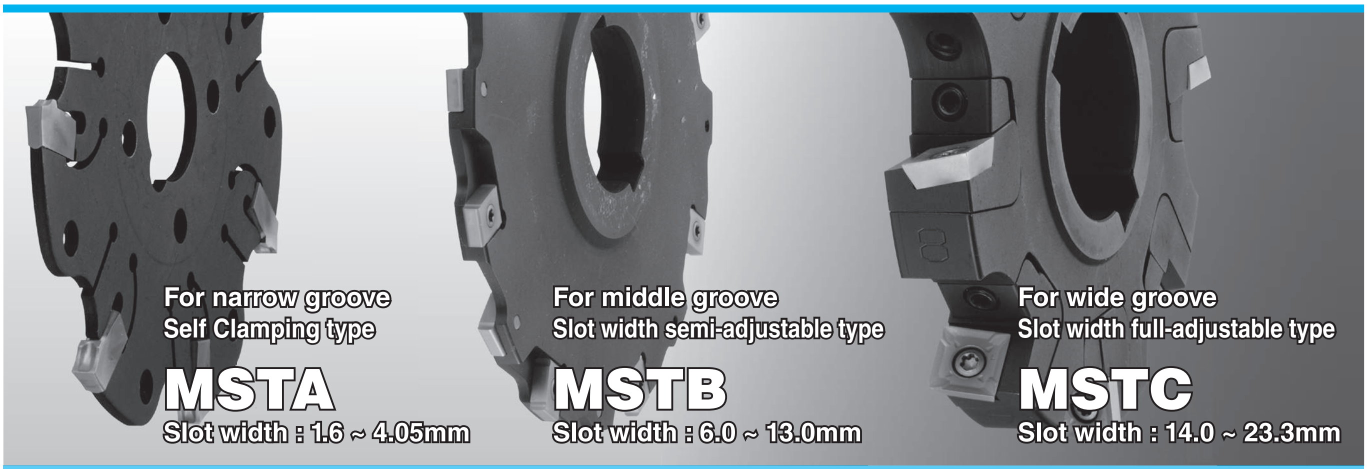
Cutting Dia.	ø16	ø20	ø25	ø32
a (mm)	0.30	0.33	0.38	0.45



ø39, ø49

Cutting Dia.	ø39	ø49
a (mm)	0.68	0.74

Slot Mill MST



Full range from 1.6mm to 23.3mm in 3 types

Full lineup of MST Series Slot Mills

Type	Applicable Inserts	Features	Slot width (mm)													
			1.6	2.2 (2.25)	3.05	4.05	6	8	10	13	14	16	18	20	22	24
MSTA	SLT..	1.6 ~ 4.05mm fixed	●	●	●	●										
MSTB	LNEU12..	6 ~ 13mm Semi-Adjustable					◆ * Adjustable in 0.5mm increments between 6mm and 13mm with the combination of inserts	◆	◆	◆						
MSTC	SP..10T3..	14 ~ 18mm Full-Adjustable									◆ * Adjustable between 14mm and 18mm	◆	◆			
	SD..1204...	18 ~ 23.3mm Full-Adjustable												◆ * Adjustable between 18mm and 23.3mm	◆	◆

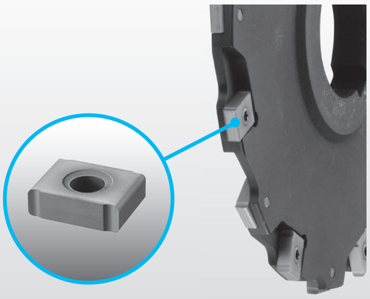
Slot Mill MSTA (Slot width 1.6, 2.2(2.25), 3.05, 4.05mm)

- **Self-clamping type Slot Mill**
  MSTA Slot Mills have simple self-clamping system to allow for easy attachment by just installing the insert.
- **High Rigidity Clamping System**
  Owing to the high rigidity clamping system - with an end - stopper, the toolholder enable high operability and stable slotting by maintaining an accurate edge position.
- **Double-Prism Clamping System**
  High replacement precision with the double-prism clamping system
- **Easy replacement**
  The replacement of inserts is easy and quick by using special wrench.

Wrench is not attached. Please purchase it separately.

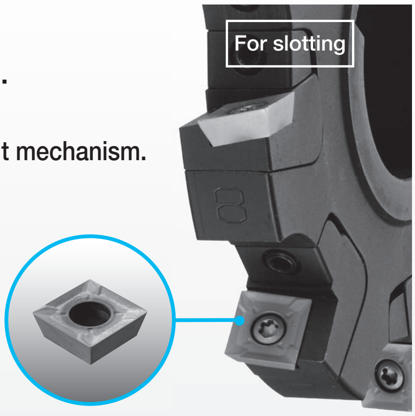
Slot Mill MSTB (Slot width 6.0 ~ 13.0mm)

- **Up-right type / semi-adjustable slot width**
- **Easy and secure screw holding**
  Inserts can be attached to the MSTB Slot Mills very easily by using clamp screws.
- **Economical Inserts with 4 Cutting Edges**
- **Applicable to a variety of slotting by choosing different inserts**
  By changing the thickness of inserts, it's a applicable to various slotting widths up to max 13mm in 0.5mm increments.

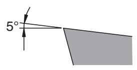
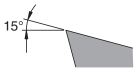
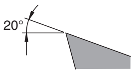
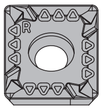
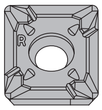
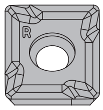


Slot Mill MSTC (Slot width 14.0 ~ 23.3mm)

- Lay-down type / full-adjustable slot width
- Applicable to various slotting needs. Slotting widths : 14.0mm to 23.3mm.
  Cutter Dia. : from 100mm to 160mm
- Smooth slotting width adjustment is possible owing to unique cam style adjustment mechanism.
- Economical 4-edge Insert
- A wide range of corner-R is suitable for various work.
- Owing to the wiper edge insert, an excellent surface finish can be expected.
- Owing to numerous insert geometries and grades, they are applicable for various types of workpiece machining.



Features of Insert Grades

	Insert Shape		
Symbol	SB	SD	SE
Rake Angle	 5°	 15°	 20°
Shape			

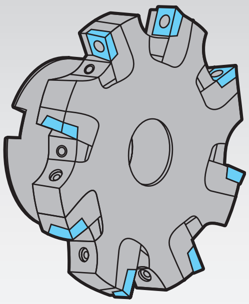
CA0835
- TiN+TiCN+Al_2O_3 based CVD Coated Carbide
- For Carbon Steel, Alloy Steel, Stainless Steel and Nodular Cast Iron.
- For middle to high speed machining.

PR0725
- TiN+TiCN+TiN based Multi-layer PVD Coated Carbide
- For Carbon Steel, Alloy Steel, Stainless Steel, Heat-resistant Alloys and Cast Iron.
- For middle speed machining.

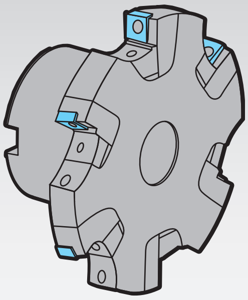
PR0110
- TiB_2 based PVD Coated Carbide
- For Non-ferrous Metals such as Aluminum Alloys (Si<10%) and Titanium Alloys.
- For high speed machining.

With Boss

Right-hand



Left-hand



Slot Mill MSTA (Self-clamping type)

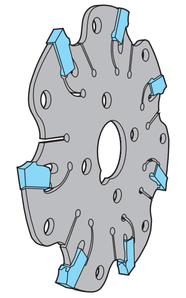
Slotting
Slotting
Cut-off

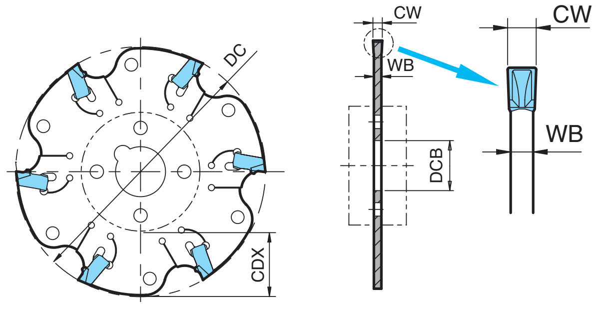
Identification System

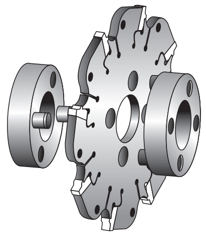
MSTA Slot Mill

MSTA	○○○	N	○○○-	○○	T
Self-clamping type Slot Mill	Cutting Dia.	Neutral	Edge Width	No. of Inserts	

MSTA (Metric)

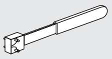






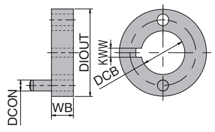
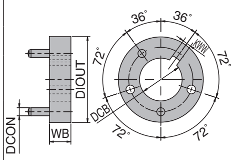
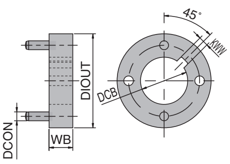
Drive Ring (sold separately) Assembly Example

Toolholder Dimensions

Description		Stock	Edge Width	Slot Depth	No. of Inserts	Dimension (mm)			Weight (kg)	Applicable Inserts ➡ M184	Max. Revolution (min^{-1})	Spare Parts	Recommended Cutting Conditions
			CW (mm)	CDX (mm)		DC	DCB (H7)	WB				Wrench 	
MSTA	63N16-5T	●	1.6	15	5	63	16	1.3	0.03	SLT16…	5,100	**MS-FRW1** (Wrench is not attached. Please purchase it separately) · How to use Wrench →**M185**	**M185**
	80N16-7T	●		21	7	80			0.04		4,000		
	100N16-9T	●		27	9	100	22		0.07		3,200		
	125N16-11T	●		35	11	125	32		0.1		2,600		
MSTA	63N22-5T	●	2.2 (2.25)	15	5	63	16	1.8	0.03	SLT22…	5,100		
	80N22-7T	●		21	7	80			0.05		4,000		
	100N22-9T	●		27	9	100	22		0.08		3,200		
	125N22-11T	●		35	11	125	32		0.12		2,600		
	160N22-14T	●		40	14	160	40		0.3		2,000		
MSTA	63N30-4T	●	3.05	15	4	63	16	2.4	0.05	SLT30…	5,100		
	80N30-6T	●		21	6	80			0.08		4,000		
	100N30-9T	●		27	9	100	22		0.13		3,200		
	125N30-11T	●		35	11	125	32		0.2		2,600		
	160N30-14T	●		40	14	160	40		0.35		2,000		
MSTA	63N40-4T	●	4.05	15	4	63	16	3.4	0.06	SLT40…	5,100		
	80N40-6T	●		21	6	80			0.1		4,000		
	100N40-9T	●		27	9	100	22		0.15		3,200		
	125N40-11T	●		35	11	125	32		0.25		2,600		
	160N40-14T	●		40	14	160	40		0.4		2,000		

Note) 1. Attach the drive ring (sold separately) to MSTA slot mill to use. Drive ring is sold singularly.
Please purchase two drive rings per one MSTA slot mill.
2. Do not exceed the max. revolution.
3. Do not operate cutting on reverse revolution.
4. Wrench (MS-FRW1) is not attached. Please purchase it separately.

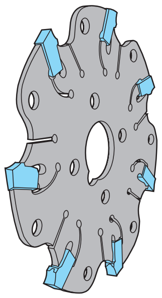
Drive Ring (For Metric)

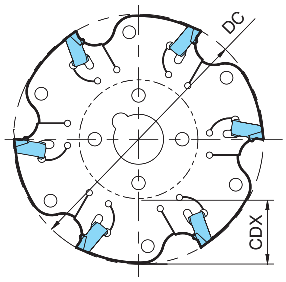
Shape	Description	Stock	Dimension (mm)					Drawing	Applicable Toolholders
			DCB	DIOUT	WB	KWW	DCON		
 Fig. 1  Fig. 2  Fig. 3	**DR16-32A**	●	16	32	8	4.1	3	Fig. 2	**MSTA 63N16-5T** **63N22-5T**
	DR16-32B	●					4	Fig. 1	**MSTA 63N30-4T** **63N40-4T**
	DR16-38	●		38				Fig. 3	**MSTA 80N○○-○T**
	DR22-46	●	22	46	10	6.1	5		**MSTA 100N○○-○T**
	DR32-55	●	32	55		8.1	6		**MSTA 125N○○-○○T**
	DR40-80	●	40	80	12	10.1	12		**MSTA 160N○○-○○T**

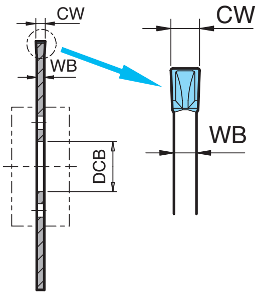
●: Std. Item

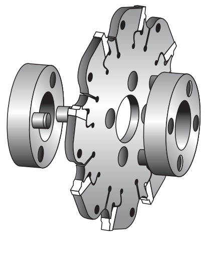
Wrenches and drive rings are sold in 1 piece boxes

MSTA (inch spec)



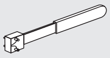






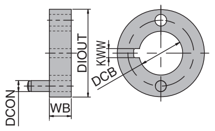
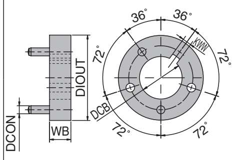
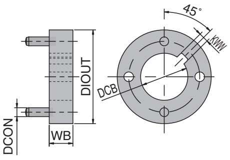
Drive Ring (sold separately) Assembly Example

Toolholder Dimensions

Description		Stock	Edge Width	Slot Depth	No. of Inserts	Dimension (inch)			Weight (kg)	Applicable Inserts ➡ M184	Max. Revolution (min^{-1})	Spare Parts	Recommended Cutting Conditions
			CW (inch)	CDX (inch)		DC	DCB (H7)	WB				Wrench 	
MSTA	**02N063-5T**	○	.063 (1.6mm)	.625 (15.875mm)	5	2.500 (63.5mm)	.625 (15.875mm)	.051 (1.3mm)	0.03	SLT16…	5,100	**MS-FRW1** (Wrench is not attached. Please purchase it separately) · How to use Wrench →**M185**	**M185**
	03N063-7T	○		.875 (22.225mm)	7	3.000 (76.2mm)			0.04		4,000		
	04N063-9T	○		1.063 (27.000mm)	9	4.000 (101.6mm)	1.000 (25.4mm)		0.07		3,200		
	05N063-11T	○		1.375 (34.925mm)	11	5.000 (127mm)	1.250 (31.75mm)		0.1		2,600		
MSTA	**03N089-7T**	○	.089 (2.2mm) (2.25mm)	.875 (22.225mm)	7	3.000 (76.2mm)	.625 (15.875mm)	.071 (1.8mm)	0.05	SLT22…	4,000		
	04N089-9T	○		1.063 (27.000mm)	9	4.000 (101.6mm)	1.000 (25.4mm)		0.08		3,200		
	06N089-14T	○		1.438 (36.525mm)	14	6.000 (152.4mm)	1.250 (31.75mm)		0.3		2,000		
MSTA	**02N126-4T**	○	.120 (3.05mm)	.625 (15.875mm)	4	2.500 (63.5mm)	.625 (15.875mm)	.095 (2.4mm)	0.05	SLT30…	5,100		
	03N126-6T	○		.875 (22.225mm)	6	3.000 (76.2mm)			0.08		4,000		
	04N126-9T	○		1.063 (27.000mm)	9	4.000 (101.6mm)	1.000 (25.4mm)		0.13		3,200		
	05N126-11T	○		1.375 (34.925mm)	11	5.000 (127mm)	1.250 (31.75mm)		0.2		2,600		
	06N126-14T	○		1.438 (36.525mm)	14	6.000 (152.4mm)			0.35		2,000		
MSTA	**03N164-6T**	○	.160 (4.05mm)	.875 (22.225mm)	6	3.000 (76.2mm)	.625 (15.875mm)	.134 (3.4mm)	0.1	SLT40…	4,000		
	04N164-9T	○		1.063 (27.000mm)	9	4.000 (101.6mm)	1.000 (25.4mm)		0.15		3,200		
	05N164-11T	○		1.375 (34.925mm)	11	5.000 (127mm)	1.250 (31.75mm)		0.25		2,600		

Note) 1. Attach the drive ring (sold separately) to MSTA slot mill to use. Drive ring is sold singularly.
Please purchase two drive rings per one MSTA slot mill.
2. Do not exceed the max. revolution.
3. Do not operate cutting on reverse revolution.
4. Wrench (MS-FRW1) is not attached. Please purchase it separately.

Drive Ring (for Inch spec)

Shape			Description	Stock	Dimension (inch)					Drawing	Applicable Toolholders
					DCB	DIOUT	WB	KWW	DCON		
 Fig. 1	 Fig. 2	 Fig. 3	**DR0625-1250A**	○	.625 (15.875mm)	1.250 (31.75mm)	.315 (8mm)	.130 (3.3mm)	.158 (4mm)	Fig. 1	**MSTA 02N126-4T**
			DR0625-1250B	○					.120 (3mm)	Fig. 2	**MSTA 02N063-5T**
			DR0625-1250C	○						Fig. 3	**MSTA 03N○○○-○T**
			DR1000-1875	○	1.000 (25.4mm)	1.875 (47.625mm)	.394 (10mm)	.256 (6.5mm)	.200 (5mm)		**MSTA 04N○○○-○T**
			DR1250-2250	○	1.250 (31.75mm)	2.250 (57.15mm)		.319 (8.1mm)	.240 (6mm)		**MSTA 05N○○○-○T**
			DR1250-3125	○	1.250 (31.75mm)	3.125 (79.375mm)	.472 (12mm)	.319 (8.1mm)	.472 (12mm)		**MSTA 06N○○○-○T**

○ : Check Availability

Wrenches and drive rings are sold in 1 piece boxes

Slot Mill SLT type Insert

Inserts Identification System

S L T	16	-	15	S	KB
(1)	(2)		(3)	(4)	(5)

(1) Insert Symbol

(2) Edge Width

Symbol	Edge Width
16	1.6mm
22	2.2(2.25)mm
30	3.05mm
40	4.05mm

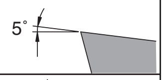
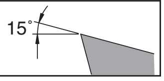
(3) Corner-R(RE)

Symbol	Corner-R(RE)
15	0.15mm
20	0.2mm

(4) Edge Preparation

Symbol	Cutting Edge Spec.
S	Chamfered + R-honed

(5) Chipbreaker Symbol

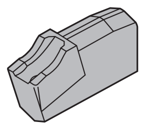
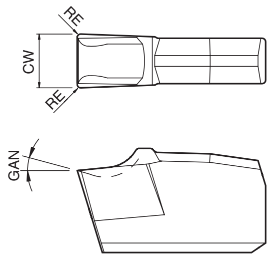
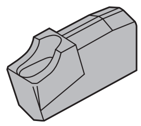
Symbol	Rake Angle
KB	 5°
KD	 15°

SLT

Classification of usage
● : 1st Choice
○ : 2nd Choice

P	Carbon Steel / Alloy Steel	●	○
M	Stainless Steel	○	●
K	Cast Iron	○	
N	Non-ferrous Metals		
S	Heat-resistant Alloys		●
	Titanium Alloys		

Applicable Inserts

Insert		Description		Dimension (mm) CW	RE	Rake Angle GAN	CVD Coated Carbide CA0835	PVD Coated Carbide PR0735	See Page for Applicable Toolholders
		**SLT**	**16-15SKB**	1.6 $^{+0}_{-0.1}$	0.15	5°	●	●	**M182** **M183**
			22-20SKB	2.2 $^{+0.08}_{-0.05}$	0.2		●	●	
			30-20SKB	3.05 $^{+0.15}_{-0}$			●	●	
			40-20SKB	4.05 $^{+0.15}_{-0}$			●	●	
 Low Cutting Force		**SLT**	**16-15SKD**	1.6 $^{+0}_{-0.1}$	0.15	15°	●	●	
			22-20SKD	2.25 $^{+0.15}_{-0}$	0.2		●	●	
			30-20SKD	3.05 $^{+0.15}_{-0}$			●	●	
			40-20SKD	4.05 $^{+0.15}_{-0}$			●	●	

Selection of chipbreaker

KB Chipbreaker ··· General purpose chipbreaker for Steel and Cast Iron
KD Chipbreaker ··· Low cutting force chipbreaker for Stainless Steel

Features of Insert Grades

CA0835

- · TiN+TiCN+Al_2O_3 based CVD Coated Carbide
- · For Carbon Steel, Alloy Steel, Stainless Steel and Cast Iron
- · For middle to high speed machining

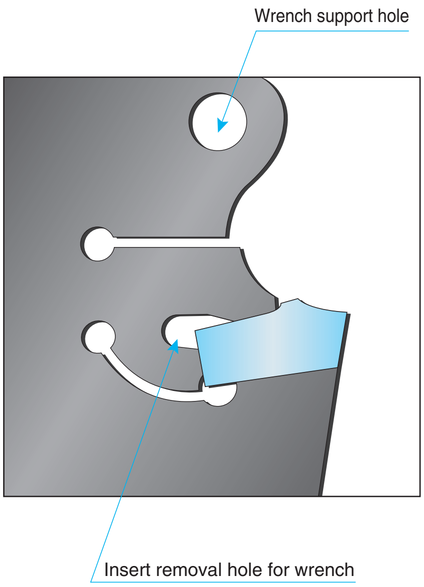
PR0735

- · TiN base PVD Coated Carbide
- · For Stainless Steel, Heat-resistant Alloys, etc.
- · For low to middle speed machining

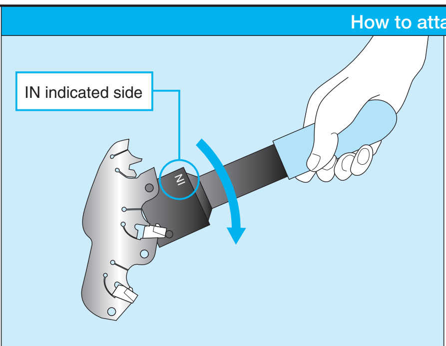
Inserts are
sold in 10 piece boxes

● : Std. Item

Set up

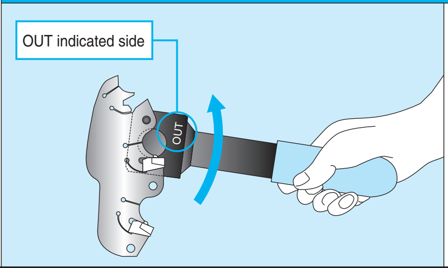


How to attach inserts



1. Put insert inside the slot mill.
2. Insert one of the pins on the wrench (on **IN** indicated side) into the wrench support hole.
3. Using the other pin, push the front relief surface of the insert.
4. Rotate the wrench until insert's back end makes contact with slot mill.

How to detach inserts



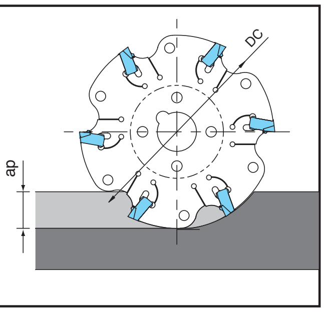
1. Insert one of the pins on the wrench (on **OUT** indicated side) into the wrench support hole, and insert other pin into the insert releasing hole.
2. Insert can be uninstalled by rotating the wrench counterclockwise. (A magnet is installed on **OUT** indicated side.)

Note) Use appropriate wrench for set up.

◆ Recommended Cutting Conditions

Workpiece Material		Hardness (HB)	Recommended Insert Grades (Cutting Speed Vc : m/min)		fz (mm/t)				Remarks
			CVD Coated Carbide	PVD Coated Carbide	Edge Width (mm)				
			CA0835	**PR0735**	1.6	2.2(2.25)	3.05	4.05	
Low Carbon Steel	SS400 S10C~S25C	125	250~310	200~250	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	Coolant
Carbon Steel	S30C~S58C (Annealed)	190	160~190	130~160	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	
	S30C~S58C (Heat treated)	250	140~180	110~150	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	
Alloy Steel	Annealed	180	140~180	110~150	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	
	Heat treated	275	120~160	100~130	0.03~0.10	0.04~0.12	0.06~0.16	0.08~0.18	
High Carbon Alloy	SKD11, SKD61, etc.	280	100~140	80~120	0.03~0.10	0.04~0.12	0.06~0.16	0.08~0.18	
Stainless Steel	Austenitic related	220	150~190	80~120	0.03~0.10	0.04~0.12	0.06~0.16	0.08~0.18	
	Martensitic related	300	140~180	60~80	0.03~0.10	0.04~0.12	0.06~0.16	0.08~0.18	
Gray Cast Iron	FC250~FC350	260	160~200	-	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	Dry
Nodular Cast Iron	FCD400~FCD500	160	130~160	-	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	
	FCD600~FCD800	250	110~140	-	0.03~0.12	0.04~0.14	0.06~0.18	0.08~0.20	

Note) 1. Use down-cut machining.
2. If ap is 1/10 or under of Cutter Dia.(DC), it is possible to increase feed per tooth (fz) by 40%.



Slot Mill MSTB

Identification System

MSTB Slot Mill

Metric

M S T B ○○○ A N ○○○○ - ○ T

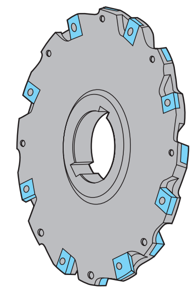
- M S T B : Slot Mill with Up-right Insert
- ○○○ : Cutting Dia. (mm)
- A : Without Boss / S : With Boss
- N : Neutral
- ○○○○ : Edge Width (mm)
- ○ T : No. of Flutes

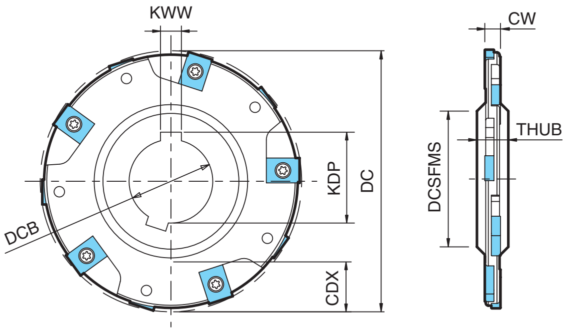
Inch spec

M S T B ○○○○ A N ○○○ - ○ T

- M S T B : Slot Mill with Up-right Insert
- ○○○○ : Cutting Dia. (inch)
- A : Without Boss
- N : Neutral
- ○○○ : Min. Edge Width (inch)
- ○ T : No. of Flutes

Without Boss





In order to be used in combination with two or more mills, this slot mill has 2 key slots.

Toolholder Dimensions (Metric)

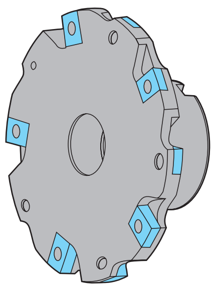
Description	Stock	Edge Width (mm) CW (min.)	Edge Width (mm) CW (max.)	Slot Depth CDX (mm)	No. of Inserts	No. of Edge Lines	Dimension (mm) DC	DCB (H7)	DCSFMS	THUB	KDP	KWW	Weight (kg)	Max. Revolution (min^{-1})
MSTB 80AN0607-4T	●	6	7	15	8	4	80	27	44	12	29.8	7	0.3	9,240
100AN0607-5T	●			21	10	5	100	32	52		34.8	8	0.4	8,270
125AN0607-6T	●			28	12	6	125	40	63		43.5	10	0.7	7,390
160AN0607-8T	●			45.5	16	8	160						1.1	6,540
MSTB 80AN0809-4T	●	8	9	16	8	4	80	27	44		29.8	7	0.4	9,240
100AN0809-5T	●			22	10	5	100	32	52		34.8	8	0.5	8,270
160AN0809-8T	●			45.5	16	8	160	40	63		43.5	10	1.3	6,540
MSTB 125AN1011-4T	●	10	11	30	12	4	125						0.9	7,390
160AN1011-5T	●			47.5	15	5	160						1.6	6,540
MSTB 160AN1213-5T	●	12	13	48.5	15	5	160						1.6	6,540

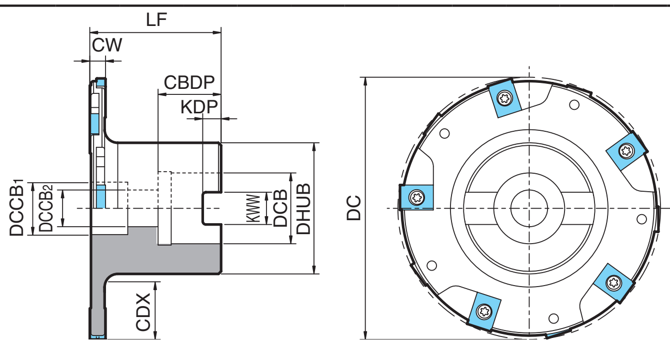
Toolholder Dimensions (inch spec)

Description	Stock	Edge Width (inch) CW (min.)	Edge Width (inch) CW (max.)	Slot Depth CDX (inch)	No. of Inserts	No. of Edge Lines	Dimension (inch) DC	DCB (H7)	DCSFMS	THUB	KDP	KWW	Weight (kg)	Max. Revolution (min^{-1})
MSTB 3000AN250-4T	○	.250 (6.35mm)	.289 (7.34mm)	.625 (15.875mm)	8	4	3.000 (76.2mm)	1.000 (25.4mm)	1.500 (38.1mm)	.500 (12.7mm)	1.106 (28.1mm)	.250 (6.35mm)	0.3	9,470
4000AN250-5T	○			.935 (23.8mm)	10	5	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.8mm)		1.386 (35.2mm)	.312 (7.92mm)	0.3	8,200
5000AN250-6T	○			1.435 (36.4mm)	12	6	5.000 (127mm)						0.7	7,300
6000AN250-8T	○			1.750 (44.45mm)	16	8	6.000 (152.4mm)	1.500 (38.1mm)	2.250 (57.2mm)		1.665 (42.3mm)	.375 (9.52mm)	1.0	6,700
MSTB 4000AN312-5T	○	.312 (7.92mm)	.351 (8.91mm)	.966 (24.5mm)	10	5	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.8mm)		1.386 (35.2mm)	.312 (7.92mm)	0.5	7,400
5000AN312-6T	○			1.466 (37.2mm)	12	6	5.000 (127mm)						0.8	6,600
6000AN312-8T	○			1.781 (45.2mm)	16	8	6.000 (152.4mm)	1.500 (38.1mm)	2.250 (57.2mm)		1.665 (42.3mm)	.375 (9.52mm)	1.1	6,000
MSTB 4000AN375-3T	○	.375 (9.525mm)	.414 (10.52mm)	1.000 (25.4mm)	9	3	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.8mm)		1.386 (35.2mm)	.312 (7.92mm)	0.5	7,400
5000AN375-4T	○			1.500 (38.1mm)	12	4	5.000 (127mm)						0.8	6,600
6000AN375-5T	○			1.812 (46.0mm)	15	5	6.000 (152.4mm)	1.500 (38.1mm)	2.250 (57.2mm)		1.665 (42.3mm)	.375 (9.52mm)	1.3	6,000
MSTB 4000AN500-3T	○	.500 (12.7mm)	.539 (13.69mm)	1.060 (26.9mm)	9	3	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.8mm)		1.386 (35.2mm)	.312 (7.92mm)	0.6	4,900
5000AN500-4T	○			1.560 (39.6mm)	12	4	5.000 (127mm)						1.1	4,400
6000AN500-5T	○			1.875 (47.6mm)	15	5	6.000 (152.4mm)	1.500 (38.1mm)	2.250 (57.2mm)		1.665 (42.3mm)	.375 (9.52mm)	1.7	4,000

● : Std. Item
○ : Check Availability

With Boss





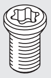
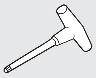
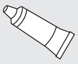
Toolholder Dimensions (Metric)

Description		Stock	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)										Weight (kg)	Max. Revolution (min^{-1})
			CW (min.)	CW (max.)	CDX (mm)			DC	DCB (H7)	DHUB	LF (min.)	CBDP	KDP	KWW	$DCCB_1$	$DCCB_2$			
MSTB	**80SN0607-4T**	●	6	7	16	8	4	80	22	40	50	23	6.3	10.4	18	12	0.7	9,240
	100SN0607-5T	●			21	10	5	100	27	50		24	7	12.4	20	14	1.0	8,270
	160SN0607-8T	●			41	16	8	160	40	70		28	9	16.4	33	22	1.9	6,540
MSTB	**80SN0809-4T**	●	8	9	16	8	4	80	22	40		23	6.3	10.4	18	12	0.8	9,240
	100SN0809-5T	●			21	10	5	100	27	50		24	7	12.4	20	14	1.2	8,270
	160SN0809-8T	●			41	16	8	160	40	70		28	9	16.4	33	22	2.2	6,540
MSTB	**125SN1011-4T**	●	10	11	26	12	4	125									2.0	7,390
	160SN1011-5T	●			43	15	5	160									2.5	6,540

Note) LF (min.) dimension shows in case of minimum of edge width (CW).

Spare Parts and Applicable Inserts

Spare Parts

Description				Spare Parts				Applicable Inserts	Recommended Cutting Conditions
				Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt		
									
Metric	Without Boss	**MSTB**	**○○○AN0607-○T**	SE-40050TRN	TT-15	P-37	-	**LN12... M188,M189**	**M190**
			○○○AN0809-○T	SE-40068TR					
			○○○AN1011-○T						
			160AN1213-5T	SE-40090TR					
	With Boss	**MSTB**	**80SN0607-4T**	SE-40050TRN	TT-15	P-37	HH10X35		
			100SN0607-5T				HH12X35		
			160SN0607-8T				HH20X40		
		MSTB	**80SN0809-4T**	SE-40068TR			HH10X35		
			100SN0809-5T				HH12X35		
			160SN0809-8T				HH20X40		
		MSTB	**○○○SN1011-○T**	SE-40068TR			HH20X40		
Inch spec	Without Boss	**MSTB**	**○○○○AN250-○T**	SE-40055TR	TT-15	P-37	-		
			○○○○AN312-○T	SE-40068TR					
			○○○○AN375-○T						
			○○○○AN500-○T	SE-40090TR					

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

Slot Mill LN Insert

Inserts Identification System

L N E U	12	35	-	03	S
(1)	(2)	(3)		(4)	(5)

(1) Insert Symbol

(2) Insert Length

Symbol	Insert Length
12	12.7mm

(3) Edge Width

Symbol	Edge Width
35	3.5mm
40	4.0mm

(4) Corner-R(RE)

Symbol	Corner-R(RE)
03	0.3mm
04	0.4mm

(5) Edge Preparation

Symbol	Cutting Edge Spec.
S	Chamfered + R-honed

LN

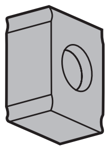
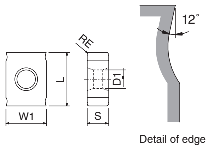
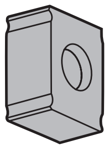
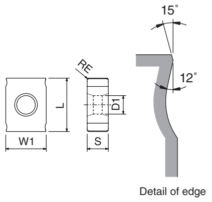
Applicable Inserts

(mm)

Description	L	W1
LNEU12	12.7	9.52

Classification of usage
● : 1st Choice
○ : 2nd Choice

		PR0725
P	Carbon Steel / Alloy Steel	●
M	Stainless Steel	●
K	Cast Iron	○
N	Non-ferrous Metals	
S	Heat-resistant Alloys	●
S	Titanium Alloys	○

Insert	Insert	Description	Usable edges	Dimension (mm)			PVD Coated Carbide	Applicable Clamp Screw	See Page for Applicable Toolholders	See Page for Recommended Cutting Conditions
				S	D1	RE	PR0725			
 Honed		**LNEU 1235-03-4**	4	3.5	4.4	0.3	●	**SE-40050TRN**	**M186** **M187**	**M190**
		1240-08-4	4	4.0	4.4	0.8	●	**SE-40055TR**		
		1245-04	4	4.5	4.2	0.4	●	**SE-40068TR**		
		1245-08				0.8	●			
		1250-04	4	5.0	4.2	0.4	●	**SE-40080TR**		
		1250-08				0.8	●			
		1255-04	4	5.5	4.2	0.4	●	**SE-40090TR**		
		1255-08				0.8	●			
		1260-04	4	6.0	4.2	0.4	●	**SE-40100TR**		
 Tough Edge		**LNEU 1235-03S-4**	4	3.5	4.4	0.3	●	**SE-40050TRN**		
		1240-03S-4	4	4.0	4.4	0.3	●	**SE-40055TR**		
		1245-04S	4	4.5	4.2	0.4	●	**SE-40068TR**		
		1245-08S				0.8	●			
		1250-04S	4	5.0	4.2	0.4	●	**SE-40080TR**		
		1250-08S				0.8	●			

Notes) 1. Please select the applicable clamp screw depending on each insert description.
2. See page **M189** for insert description and applicable clamp screw depending on edge width.

Features of Insert Grades

PR0725

- TiN+TiCN+TiN based Multi-layer PVD Coated Carbide
- For Carbon Steel, Alloy Steel, Stainless Steel, Heat-resistant Alloys and Cast Iron
- For middle speed machining

● : Std. Item

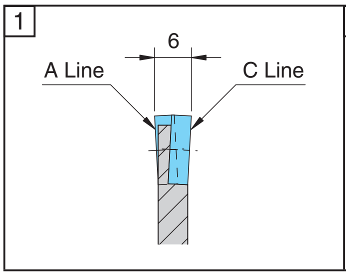
Inserts are
sold in 10 piece boxes

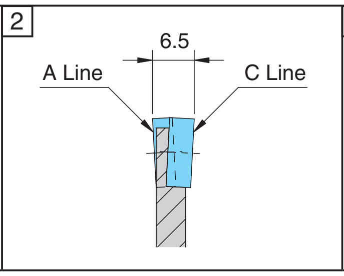
Combination of Applicable Inserts

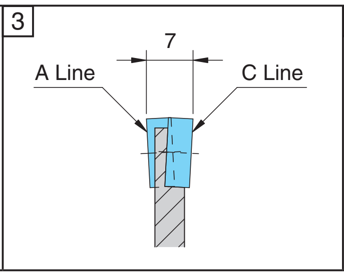
Description		Clamp Screw (Standard attachment parts)	Edge Width		A Line		B Line		C Line		Wrench for Clamp Screw	Tightening Torque (N·m)
			mm	inch (mm)	Applicable Inserts	Clamp Screw	Applicable Inserts	Clamp Screw	Applicable Inserts	Clamp Screw		
Metric	**MSTB ○○○AN0607-○T** **○○○SN0607-○T**	SE-40050TRN	6	-	LNEU1235..	SE-40050TRN	-	-	LNEU1235..	SE-40050TRN	TT-15	3
			6.5						LNEU1240..	SE-40055TR		
			7		LNEU1240..	SE-40055TR						
	MSTB ○○○AN0809-○T **○○○SN0809-○T**	SE-40068TR	8	-	LNEU1245..	SE-40068TR	-	-	LNEU1245..	SE-40068TR		
			8.5						LNEU1250..	SE-40080TR		
			9		LNEU1250..	SE-40080TR						
	MSTB ○○○AN1011-○T **○○○SN1011-○T**	SE-40068TR	10	-	LNEU1245..	SE-40068TR	LNEU1245..	SE-40068TR	LNEU1245..	SE-40068TR		
			10.5						LNEU1250..	SE-40080TR		
			11		LNEU1250..	SE-40080TR	LNEU1250..	SE-40080TR				
	MSTB ○○○AN1213-○T	SE-40090TR	12	-	LNEU1255...	SE-40090TR	LNEU1255...	SE-40090TR	LNEU1255...	SE-40090TR		
			12.5						LNEU1260...	SE-40100TR		
			13		LNEU1260...	SE-40100TR	LNEU1260...	SE-40100TR				
Inch spec	**MSTB ○○○○AN250-○T**	SE-40055TR	-	.250 (6.35mm)	LNEU1240..	SE-40055TR	-	-	LNEU1240..	SE-40055TR		
				.270 (6.86mm)					LNEU1245..	SE-40068TR		
				.289 (7.34mm)	LNEU1245..	SE-40068TR						
	MSTB ○○○○AN312-○T	SE-40068TR	-	.312 (7.92mm)	LNEU1245..	SE-40068TR	-	-	LNEU1245..	SE-40068TR		
				.332 (8.43mm)					LNEU1250..	SE-40080TR		
				.351 (8.91mm)	LNEU1250..	SE-40080TR						
	MSTB ○○○○AN375-○T	SE-40068TR	-	.375 (9.525mm)	LNEU1245..	SE-40068TR	LNEU1245..	SE-40068TR	LNEU1245..	SE-40068TR		
				.395 (10.33mm)					LNEU1250..	SE-40080TR		
				.414 (10.52mm)	LNEU1250..	SE-40080TR	LNEU1250..	SE-40080TR				
	MSTB ○○○○AN500-○T	SE-40090TR	-	.500 (12.7mm)	LNEU1255...	SE-40090TR	LNEU1255...	SE-40090TR	LNEU1255...	SE-40090TR		
				.520 (13.21mm)					LNEU1260...	SE-40100TR		
				.539 (13.69mm)	LNEU1260...	SE-40100TR	LNEU1260...	SE-40100TR				

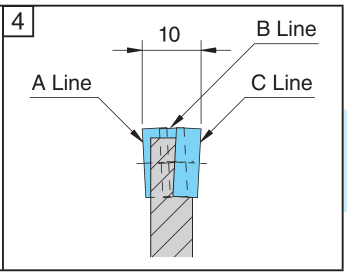
* For clamp screw, above listed “Standard attachment parts” are attached. In case of necessity of another size of clamp screw by changing slotting width, please purchase separately.

Slot width (edge width) adjustment









- **The slot width (edge width) of MSTB slot mills is adjustable by a maximum of 1mm (.039'') with the combination of inserts.**

1. In the case of MSTB○○○AN0607-○T the width (W) is 6mm by installing LNEU1235 on both A line and C line.
2. By replacing C line only with LNEU1240 the width (W) is 6.5mm.
3. By replacing A line and C line with LNEU1240 the width (W) is 7mm.
4. If the slotting width (edge width) is 10mm (.375''), the B line (middle edge) is necessary.

* Caution

1) There is no description such as “A line”, “B line”, and “C line” on the actual slot mill. These are only for explanation of the combination of insert.
2) Use proper clamp screws for applicable inserts on the basis of the above chart.
3) Please do not use any slot mills, that have a difference of width of more than 1mm (.039'').

Bottom cutting shape of MSTB Slot Mill

Slot bottom shape will be (Fig. 1) convex shape.

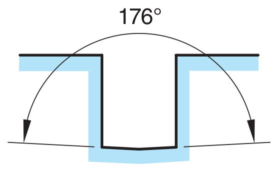
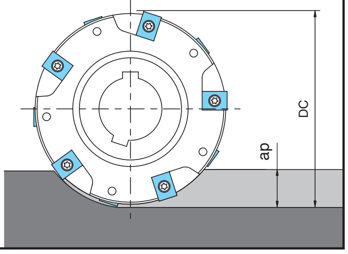


Fig. 1 Convex bottom shape

Recommended Cutting Conditions

Workpiece Material		Hardness (HB)	Recommended Insert Grades (Cutting Speed Vc: m/min)	fz (mm/t)		Remarks
			PVD Coated Carbide	Insert Thickness (mm)		
			PR0725	3.5~4.0	4.5~6.0	
Low Carbon Steel	SS400 S10C~S25C	125	170~210	0.07~0.20	0.10~0.22	Dry
Carbon Steel	S30C~S58C (Annealed)	190	100~140	0.07~0.20	0.10~0.22	
	S30C~S58C (Heat treated)	250	90~120	0.07~0.20	0.10~0.22	
Alloy Steel	Annealed	180	90~120	0.07~0.20	0.10~0.22	
	Heat treated	275	80~110	0.05~0.18	0.08~0.20	
High Carbon Alloy	SKD11, SKD61, etc.	280	70~ 90	0.05~0.18	0.08~0.20	
Stainless Steel	Austenitic related	220	110~140	0.05~0.18	0.08~0.20	Coolant
	Martensitic related	300	100~120	0.05~0.18	0.08~0.20	
Heat-resistant Alloys	Ni-base heat-resistant alloys	350	15~ 30	0.05~0.18	0.08~0.20	
Titanium Alloys	Ti-6Al-4V, etc.	270	20~50	0.05~0.18	0.08~0.20	
Gray Cast Iron	FC250~FC350	260	110~130	0.07~0.22	0.10~0.25	Dry
Nodular Cast Iron	FCD400~FCD500	160	80~100	0.07~0.22	0.10~0.25	
	FCD600~FCD800	250	70~ 90	0.07~0.22	0.10~0.25	

Note) 1. Use down-cut machining.
2. If ap is 1/10 or under of Cutter Dia.(DC),
it is possible to increase feed per tooth (fz) by 40%.



Slot Mill MSTC

Identification System

MSTC Slot Mill

Metric

MSTC ○○○ A N ○○○○ - ○○- ○○ T

- MSTC : Slot Mill with Lay-down type
- ○○○ : Cutting Dia. (mm)
- A : Without Boss
  S : With Boss
- N : Neutral
  R : Right-hand
  L : Left-hand
- ○○○○ : Edge Width (mm)
- ○○ : Applicable Inserts 10 : SP..10T3..
  12 : SD..1204..
- ○○ : No. of Inserts

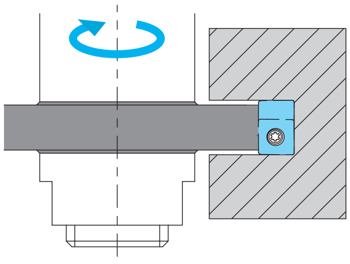
Inch spec

MSTC ○○○ A N ○○○ - ○○○ - ○○

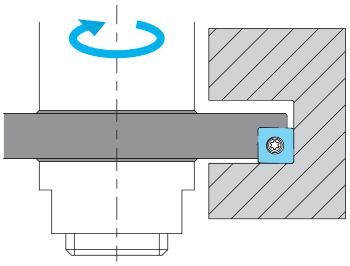
- MSTC : Slot Mill with Lay-down type
- ○○○ : Cutting Dia. (inch)
- A : Without Boss
- N : Neutral
  R : Right-hand
  L : Left-hand
- ○○○ - ○○○ : Edge Width (inch)
- ○○ : Applicable Inserts 10 : SP..10T3..
  12 : SD..1204..

Cutting Direction of MSTC Slot Mill

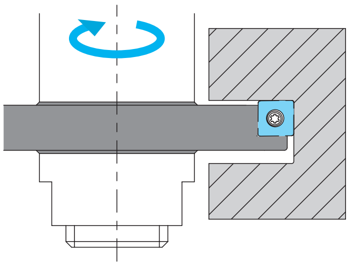
AN Type (Slotting)



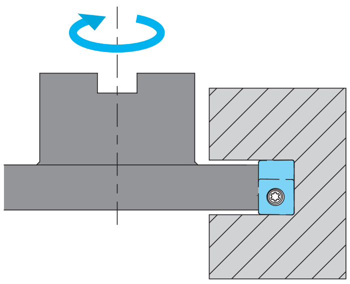
AR Type (Lower surface machining)



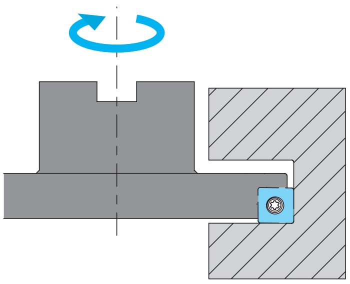
AL Type (Upper surface machining)



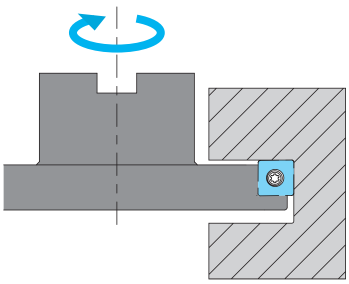
SN Type (Slotting)



SR Type (Lower surface machining)



SL Type (Upper surface machining)

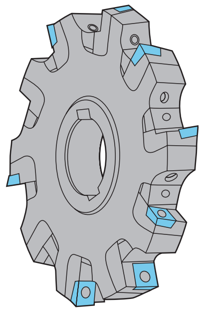


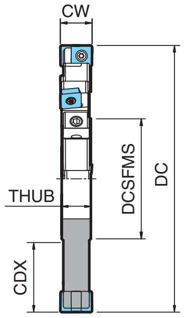
Insert Grades A
Turning Indexable Inserts B
CBN & PCD Tools C
External D
Small Parts Machining E
Boring F
Grooving G
Cut-off H
Threading J
Drilling K
Solid Tools L
Milling M
Tools for Turning Mill N
Spare Parts P
Technical Information R
Index T

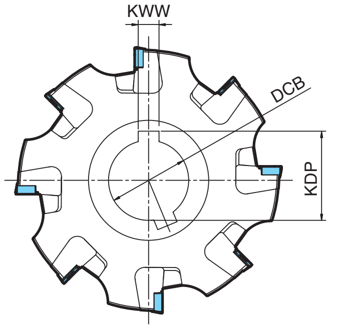
Slot Mill

Slotting
Slotting
Shouldering

Without Boss







In order to be used in combination with two or more mills, this slot mill has 2 key slots.

Toolholder Dimensions (Metric)

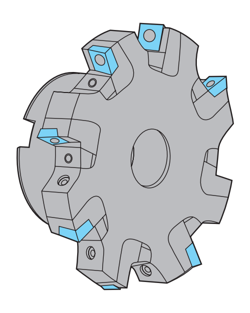
Description		Stock	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)						Weight (kg)	Max. Revolution (min^{-1})
			CW (min.)	CW (max.)	CDX (mm)			DC	DCB (H7)	DCSFMS	THUB	KDP	KWW		
MSTC	**100AN1416-10-3T**	●	14	16	25.9	6	3	100	32	46.8	13.9	34.8	8	0.5	17,250
	125AN1416-10-4T	●			34.4	8	4	125	40	54.8		43.5	10	0.8	15,450
	160AN1416-10-5T	●			51.9	10	5	160						1.5	13,650
MSTC	**125AN1618-10-4T**	●	16	18	34.4	8	4	125			15.9			1.0	15,450
	160AN1618-10-5T	●			51.9	10	5	160						1.8	13,650
MSTC	**125AN1820-12-4T**	●	18	20.6	34	8	4	125			18.2			1.0	10,350
	160AN1820-12-5T	●			51.5	10	5	160						1.8	9,150
MSTC	**125AN2123-12-4T**	●	20.6	23.3	34	8	4	125			20.8			1.2	10,350
	160AN2123-12-5T	●			51.5	10	5	160						2.1	9,150

Toolholder Dimensions (inch spec)

Description		Stock	Edge Width (inch)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (inch)						Weight (kg)	Max. Revolution (min^{-1})
			CW (min.)	CW (max.)	CDX (inch)			DC	DCB (H7)	DCSFMS	THUB	KDP	KWW		
MSTC	**400AN551-630-10**	○	.551 (14.0mm)	.630 (16.0mm)	1.030 (26.1mm)	6	3	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.75mm)	.545 (13.84mm)	1.386 (35.2mm)	.312 (7.92mm)	0.6	17,100
	500AN551-630-10	○			1.345 (34.1mm)	8	4	5.000 (127.0mm)	1.500 (38.1mm)	2.250 (57.15mm)		1.665 (42.3mm)	.375 (9.52mm)	0.9	15,300
	600AN551-630-10	○			1.845 (46.8mm)	10	5	6.000 (152.4mm)						1.4	14,000
MSTC	**500AN630-709-10**	○	.630 (16.0mm)	.709 (18.0mm)	1.345 (34.1mm)	8	4	5.000 (127.0mm)			.624 (15.85mm)			1.1	15,300
	600AN630-709-10	○			1.845 (46.8mm)	10	5	6.000 (152.4mm)						1.6	14,000
MSTC	**500AN709-813-12**	○	.709 (18.0mm)	.813 (20.6mm)	1.331 (33.8mm)	8	4	5.000 (127.0mm)			.716 (18.2mm)			1.1	10,300
	600AN709-813-12	○			1.831 (46.5mm)	10	5	6.000 (152.4mm)						1.7	9,400
MSTC	**500AN813-917-12**	○	.813 (20.6mm)	.917 (23.3mm)	1.331 (33.8mm)	8	4	5.000 (127.0mm)			.820 (20.8mm)			1.3	10,300
	600AN813-917-12	○			1.831 (46.5mm)	10	5	6.000 (152.4mm)						2.0	9,400

● : Std. Item
○ : Check Availability

With Boss



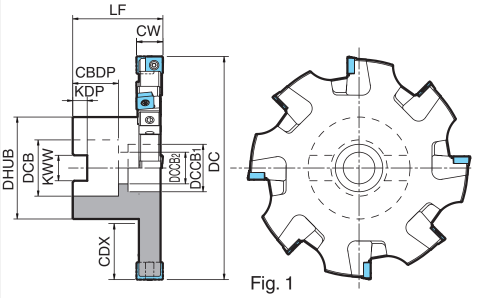


Fig. 1

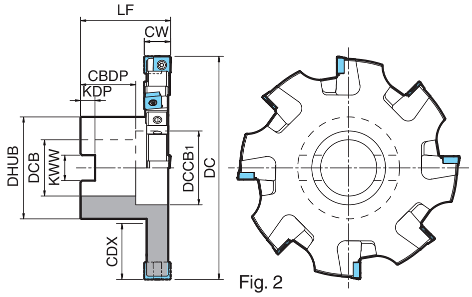


Fig. 2

Toolholder Dimensions (Metric)

Description	Stock	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)									Drawing	Weight (kg)	Max. Revolution (min^{-1})
		CW (min.)	CW (max.)	CDX (mm)			DC	DCB (H7)	DHUB	LF (min.)	CBDP	KDP	KWW	DCCB1	DCCB2			
MSTC 100SN1416-10-3T	●	14	16	24.4	6	3	100	27	48	50.8	24	7	12.4	20	14	Fig. 1	1.0	17,250
125SN1416-10-4T	●			31.9	8	4	125	32	58		26	8	14.4	27	18		1.6	15,450
160SN1416-10-5T	●			43.4	10	5	160	40	70		30	9	16.4	56	-	Fig. 2	2.0	13,650
MSTC 125SN1618-10-4T	●	16	18	31.9	8	4	125	32	58	50.8	26	8	14.4	27	18	Fig. 1	1.7	15,450
160SN1618-10-5T	●			43.4	10	5	160	40	70		30	9	16.4	56	-	Fig. 2	2.3	13,650
MSTC 125SN1820-12-4T	●	18	20.6	31.9	8	4	125	32	58	51.0	26	8	14.4	27	18	Fig. 1	1.6	10,350
160SN1820-12-5T	●			43.4	10	5	160	40	70		30	9	16.4	56	-	Fig. 2	2.3	9,150
MSTC 125SN2123-12-4T	●	20.6	23.3	31.9	8	4	125	32	58	51.0	26	8	14.4	27	18	Fig. 1	1.7	10,350
160SN2123-12-5T	●			43.4	10	5	160	40	70		30	9	16.4	56	-	Fig. 2	2.6	9,150

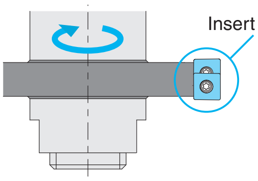
Note) LF (min.) dimension shows in case of minimum of edge width (CW).

Recommended Cutting Conditions ➡ **M202**

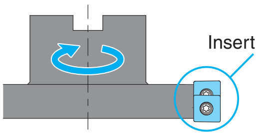
Applicable Insert Installation Method (common to Metric / Inch spec)

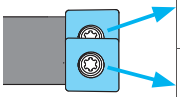
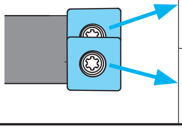
When installing handed inserts, it is necessary to equip same number of right-hand and left-hand inserts as shown in "No. of Edge Lines" respectively. Please Install as show in the figure below.

MSTC...AN... (Without Boss)



MSTC...SN... (With Boss)



Toolholder Description	Insert Location Indication	Applicable Inserts ➡ **M200-M201**	
		Handed	Neutral
MSTC...AN...10.. **MSTC...SN...10..**		**SP..10T3...L...** **SP..10T3...R...**	**SP..10T3...N...**
MSTC...AN...12.. **MSTC...SN...12..**		**SD..1204...L...** **SD..1204...R...**	**SD..1204...N...**

Spare Parts (common to Metric / Inch spec)

· See page **M198**

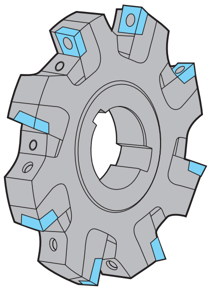
Slot width (edge width) adjustment

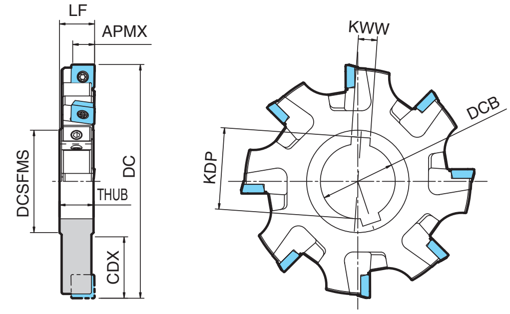
· See page **M202~M205**

● : Std. Item

Half Side Slot Mill

Without Boss Right-hand





- Right-hand shown

In order to be used in combination with two or more mills, this slot mill has 2 key slots.

Toolholder Dimensions (Metric)

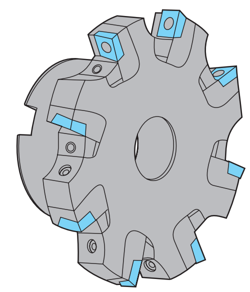
Description	Stock	No. of Inserts	Dimension (mm)										Weight (kg)	Max. Revolution (min^{-1})
			DC	DCB (H7)	DCSFMS	THUB	LF		CDX	APMX (max.)	KDP	KWW		
							(min.)	(max.)						
MSTC 100AR1416-10-6T	○	6	100	32	46.8	13.9	13.9	14.9	25.9	9.1	34.8	8	0.5	17,250
125AR1416-10-8T	○	8	125	40	54.8				34.4		43.5	10	0.8	15,450
160AR1416-10-10T	○	10	160						51.9				1.5	13,650
MSTC 125AR1618-10-8T	○	8	125			15.9	15.9	16.9	34.4				1.0	15,450
160AR1618-10-10T	○	10	160						51.9				1.8	13,650
MSTC 125AR1820-12-8T	○	8	125			18.2	18.1	19.4	34.0	11.7			1.0	10,350
160AR1820-12-10T	○	10	160						51.5				1.8	9,150
MSTC 125AR2123-12-8T	○	8	125			20.8	20.7	22.0	34.0				1.2	10,350
160AR2123-12-10T	○	10	160						51.5				2.1	9,150

Toolholder Dimensions (inch spec)

Description	Stock	No. of Inserts	Dimension (inch)										Weight (kg)	Max. Revolution (min^{-1})
			DC	DCB (H7)	DCSFMS	THUB	LF		CDX	APMX (max.)	KDP	KWW		
							(min.)	(max.)						
MSTC 400AR551-630-10	○	6	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.75mm)	.545 (13.84mm)	.548 (13.9mm)	.588 (14.9mm)	1.030 (26.1mm)	.359 (9.1mm)	1.386 (35.2mm)	.312 (7.92mm)	0.6	17,100
500AR551-630-10	○	8	5.000 (127.0mm)	1.500 (38.1mm)	2.250 (57.15mm)				1.345 (34.1mm)		1.665 (42.3mm)	.375 (9.52mm)	0.9	15,300
600AR551-630-10	○	10	6.000 (152.4mm)						1.845 (46.8mm)				1.4	14,000
MSTC 500AR630-709-10	○	8	5.000 (127.0mm)			.624 (15.85mm)	.627 (15.9mm)	.667 (16.9mm)	1.345 (34.1mm)				1.1	15,300
600AR630-709-10	○	10	6.000 (152.4mm)						1.845 (46.8mm)				1.6	14,000
MSTC 500AR709-813-12	○	8	5.000 (127.0mm)			.716 (18.2mm)	.712 (18.1mm)	.764 (19.4mm)	1.331 (33.8mm)	.461 (11.7mm)			1.1	10,300
600AR709-813-12	○	10	6.000 (152.4mm)						1.831 (46.5mm)				1.7	9,400
MSTC 500AR813-917-12	○	8	5.000 (127.0mm)			.820 (20.8mm)	.816 (20.7mm)	.868 (22.0mm)	1.331 (33.8mm)				1.3	10,300
600AR813-917-12	○	10	6.000 (152.4mm)						1.831 (46.5mm)				2.0	9,400

○ : Check Availability

With Boss Right-hand



- Right-hand shown

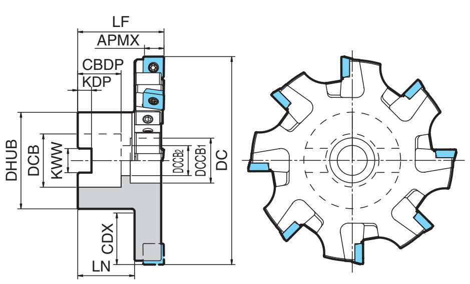


Fig. 1

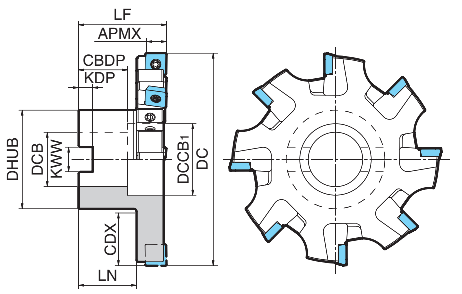


Fig. 2

Toolholder Dimensions (Metric)

Description	Stock	No. of Inserts	Dimension (mm)													Drawing	Weight (kg)	Max. Revolution (min^{-1})
			DC	DCB (H7)	DHUB	LN	LF		CDX	APMX (max.)	CBDP	KDP	KWW	DCCB₁	DCCB₂			
							(min.)	(max.)										
MSTC 100SR1416-10-6T	○	6	100	27	48	37.7	50.8	51.8	24.4	9.1	24	7	12.4	20	14	Fig. 1	1.0	17,250
125SR1416-10-8T	○	8	125	32	58				31.9		26	8	14.4	27	18		1.6	15,450
160SR1416-10-10T	○	10	160	40	70				43.4		30	9	16.4	56	-	Fig. 2	2.0	13,650
MSTC 125SR1618-10-8T	○	8	125	32	58	35.7			31.9		26	8	14.4	27	18	Fig. 1	1.7	15,450
160SR1618-10-10T	○	10	160	40	70				43.4		30	9	16.4	56	-	Fig. 2	2.3	13,650
MSTC 125SR1820-12-8T	○	8	125	32	58	34.0	51.0	52.3	31.9	11.7	26	8	14.4	27	18	Fig. 1	1.6	10,350
160SR1820-12-10T	○	10	160	40	70				43.4		30	9	16.4	56	-	Fig. 2	2.3	9,150
MSTC 125SR2123-12-8T	○	8	125	32	58	31.4			31.9		26	8	14.4	27	18	Fig. 1	1.7	10,350
160SR2123-12-10T	○	10	160	40	70				43.4		30	9	16.4	56	-	Fig. 2	2.6	9,150

Applicable Inserts (common to Metric / Inch spec)

Toolholder Description	Applicable Inserts ➡ **M200-M201**	
	Handed	Neutral
MSTC...AR...10.. **MSTC...SR...10..**	**SP..10T3...R...**	**SP..10T3...N...**
MSTC...AR...12.. **MSTC...SR...12..**	**SD..1204...R...**	**SD..1204...N...**

Recommended Cutting Conditions ➡ **M202**

Spare Parts (common to Metric / Inch spec)

· See page **M199**

Slot width (edge width) adjustment

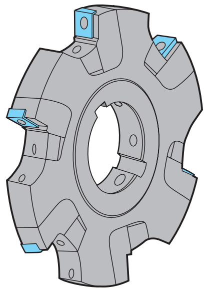
· See page **M202~M205**

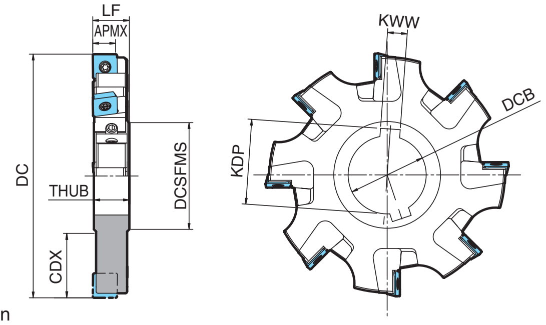
○ : Check Availability

Half Side Slot Mill

Shouldering
Back side milling

Without Boss Left-hand





- Left-hand shown

In order to be used in combination with two or more mills, this slot mill has 2 key slots.

Toolholder Dimensions (Metric)

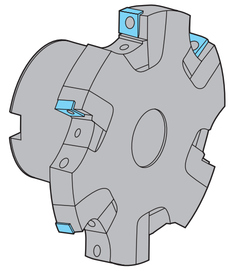
Description	Stock	No. of Inserts	Dimension (mm)										Weight (kg)	Max. Revolution (min^{-1})
			DC	DCB (H7)	DCSFMS	THUB	LF (min.)	LF (max.)	CDX	APMX (max.)	KDP	KWW		
MSTC 100AL1416-10-6T	○	6	100	32	46.8	13.9	13.9	14.9	25.9	9.1	34.8	8	0.5	17,250
125AL1416-10-8T	○	8	125	40	54.8				34.4		43.5	10	0.8	15,450
160AL1416-10-10T	○	10	160						51.9				1.5	13,650
MSTC 125AL1618-10-8T	○	8	125			15.9	15.9	16.9	34.4				1.0	15,450
160AL1618-10-10T	○	10	160						51.9				1.8	13,650
MSTC 125AL1820-12-8T	○	8	125			18.2	18.1	19.4	34.0	11.7			1.0	10,350
160AL1820-12-10T	○	10	160						51.5				1.8	9,150
MSTC 125AL2123-12-8T	○	8	125			20.8	20.7	22.0	34.0				1.2	10,350
160AL2123-12-10T	○	10	160						51.5				2.1	9,150

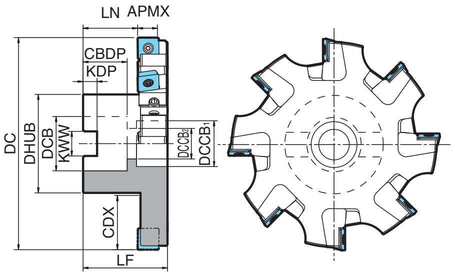
Toolholder Dimensions (inch spec)

Description	Stock	No. of Inserts	Dimension (inch)										Weight (kg)	Max. Revolution (min^{-1})
			DC	DCB (H7)	DCSFMS	THUB	LF (min.)	LF (max.)	CDX	APMX (max.)	KDP	KWW		
MSTC 400AL551-630-10	○	6	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.75mm)	.545 (13.84mm)	.548 (13.9mm)	.588 (14.9mm)	1.030 (26.1mm)	.359 (9.1mm)	1.386 (35.2mm)	.312 (7.92mm)	0.6	17,100
500AL551-630-10	○	8	5.000 (127.0mm)	1.500 (38.1mm)	2.250 (57.15mm)				1.345 (34.1mm)		1.665 (42.3mm)	.375 (9.52mm)	0.9	15,300
600AL551-630-10	○	10	6.000 (152.4mm)						1.845 (46.8mm)				1.4	14,000
MSTC 500AL630-709-10	○	8	5.000 (127.0mm)			.624 (15.85mm)	.627 (15.9mm)	.667 (16.9mm)	1.345 (34.1mm)				1.1	15,300
600AL630-709-10	○	10	6.000 (152.4mm)						1.845 (46.8mm)				1.6	14,000
MSTC 500AL709-813-12	○	8	5.000 (127.0mm)			.716 (18.2mm)	.712 (18.1mm)	.764 (19.4mm)	1.331 (33.8mm)	.461 (11.7mm)			1.1	10,300
600AL709-813-12	○	10	6.000 (152.4mm)						1.831 (46.5mm)				1.7	9,400
MSTC 500AL813-917-12	○	8	5.000 (127.0mm)			.820 (20.8mm)	.816 (20.7mm)	.868 (22.0mm)	1.331 (33.8mm)				1.3	10,300
600AL813-917-12	○	10	6.000 (152.4mm)						1.831 (46.5mm)				2.0	9,400

○ : Check Availability

With Boss Left-hand





● Left-hand shown

Fig. 1

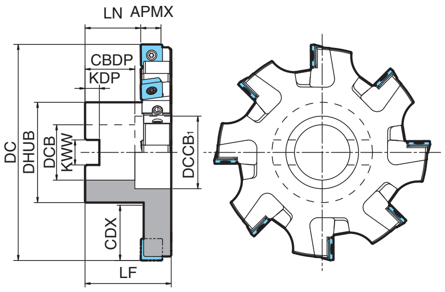


Fig. 2

Toolholder Dimensions (Metric)

Description		Stock	No. of Inserts	Dimension (mm)														Drawing	Weight (kg)	Max. Revolution (min^{-1})
				DC	DCB (H7)	DHUB	LF	LN (min.)	LN (max.)	CDX	APMX (max.)	CBDP	KDP	KWW	DCCB₁	DCCB₂				
MSTC	**100SL1416-10-6T**	○	6	100	27	48	50	35.8	36.8	24.4	9.1	24	7	12.4	20	14		Fig. 1	1.0	17,250
	125SL1416-10-8T	○	8	125	32	58				31.9		26	8	14.4	27	18			1.6	15,450
	160SL1416-10-10T	○	10	160	40	70				43.4		30	9	16.4	56	-		Fig. 2	2.0	13,650
MSTC	**125SL1618-10-8T**	○	8	125	32	58		33.8	34.8	31.9		26	8	14.4	27	18		Fig. 1	1.7	15,450
	160SL1618-10-10T	○	10	160	40	70				43.4		30	9	16.4	56	-		Fig. 2	2.3	13,650
MSTC	**125SL1820-12-8T**	○	8	125	32	58		31.7	33.0	31.9	11.7	26	8	14.4	27	18		Fig. 1	1.6	10,350
	160SL1820-12-10T	○	10	160	40	70				43.4		30	9	16.4	56	-		Fig. 2	2.3	9,150
MSTC	**125SL2123-12-8T**	○	8	125	32	58		29.1	30.4	31.9		26	8	14.4	27	18		Fig. 1	1.7	10,350
	160SL2123-12-10T	○	10	160	40	70				43.4		30	9	16.4	56	-		Fig. 2	2.6	9,150

Applicable Inserts (common to Metric / Inch spec)

Toolholder Description	Applicable Inserts ➡ **M200-M201**	
	Handed	Neutral
MSTC...AL...10.. **MSTC...SL...10..**	**SP..10T3...L...**	**SP..10T3...N...**
MSTC...AL...12.. **MSTC...SL...12..**	**SD..1204...L...**	**SD..1204...N...**

Recommended Cutting Conditions ➡ **M202**

Spare Parts (common to Metric / Inch spec)

· See page **M199**

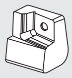
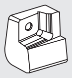
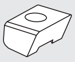
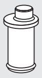
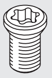
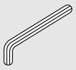
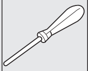
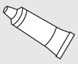
Slot width (edge width) adjustment

· See page **M202~M205**

○ : Check Availability

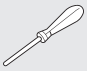
Slot Mill

Spare Parts (common to Metric / Inch spec)

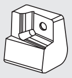
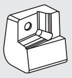
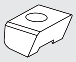
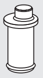
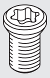
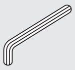
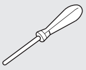
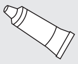
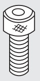
Description			Spare Parts											
			Cartridge		Wedge	Wedge Screw	Cam Pin	Clamp Screw	Wrench			Anti-seize Compound	Mounting bolt
			Right-hand	Left-hand					for Wedge Screw	for Cam Pin	for Clamp Screw		
													
Without Boss	Metric	**MSTC 100AN1416-10-3T**	C90SP1416-10R	C90SP1416-10L	WC-14	W6X18	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9	P-37	-
		125AN1416-10-4T				W6X20							
		160AN1416-10-5T											
		MSTC 125AN1618-10-4T	C90SP1618-10R	C90SP1618-10L	WC-16	W6X20							
		160AN1618-10-5T											
		MSTC 125AN1820-12-4T	C90SD1820-12R	C90SD1820-12L	WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		
		160AN1820-12-5T											
		MSTC 125AN2123-12-4T	C90SD2023-12R	C90SD2023-12L	WC-20								
		160AN2123-12-5T											
	Inch spec	**MSTC 400AN551-630-10**	C90SP1416-10R	C90SP1416-10L	WC-14	W6X18	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9		
		500AN551-630-10				W6X20							
		600AN551-630-10											
		MSTC 500AN630-709-10	C90SP1618-10R	C90SP1618-10L	WC-16	W6X20							
		600AN630-709-10											
		MSTC 500AN709-813-12	C90SD1820-12R	C90SD1820-12L	WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		
		600AN709-813-12											
		MSTC 500AN813-917-12	C90SD2023-12R	C90SD2023-12L	WC-20								
		600AN813-917-12											
With Boss	Metric	**MSTC 100SN1416-10-3T**	C90SP1416-10R	C90SP1416-10L	WC-14	W6X20	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9	P-37	HH12X35
		125SN1416-10-4T											HH16X35
		160SN1416-10-5T											-
		MSTC 125SN1618-10-4T	C90SP1618-10R	C90SP1618-10L	WC-16								HH16X35
		160SN1618-10-5T											-
		MSTC 125SN1820-12-4T	C90SD1820-12R	C90SD1820-12L	WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15	P-37	HH16X35
		160SN1820-12-5T											-
		MSTC 125SN2123-12-4T	C90SD2023-12R	C90SD2023-12L	WC-20								HH16X35
		160SN2123-12-5T											-

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Tightening Torque

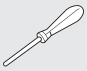
Wrench	TH-3L	DTP-9	DTP-15
			
Tightening Torque (N·m)	5~6	1.5	4

Spare Parts (common to Metric / Inch spec)

Description				Spare Parts										
				Cartridge		Wedge	Wedge Screw	Cam Pin	Clamp Screw	Wrench			Anti-seize Compound	Mounting bolt
				Right-hand	Left-hand					for Wedge Screw	for Cam Pin	for Clamp Screw		
														
Without Boss	Metric	**MSTC**	**100AR1416-10-6T**	C90SP1416-10R	-	WC-14	W6X18	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9	P-37	-
			125AR1416-10-8T				W6X20							
			160AR1416-10-10T											
		MSTC	**125AR1618-10-8T**	C90SP1618-10R		WC-16	W6X20							
			160AR1618-10-10T											
		MSTC	**125AR1820-12-8T**	C90SD1820-12R		WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		
			160AR1820-12-10T											
		MSTC	**125AR2123-12-8T**	C90SD2023-12R		WC-20								
			160AR2123-12-10T											
		MSTC	**100AL1416-10-6T**	-	C90SP1416-10L	WC-14	W6X18	AP-1416	SE-3070TRP		LW-2.5	DTP-9		
			125AL1416-10-8T				W6X20							
			160AL1416-10-10T											
		MSTC	**125AL1618-10-8T**		C90SP1618-10L	WC-16	W6X20							
			160AL1618-10-10T											
		MSTC	**125AL1820-12-8T**		C90SD1820-12L	WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		
			160AL1820-12-10T											
		MSTC	**125AL2123-12-8T**		C90SD2023-12L	WC-20								
			160AL2123-12-10T											
	Inch spec	**MSTC**	**400AR551-630-10**	C90SP1416-10R	-	WC-14	W6X18	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9		
			500AR551-630-10				W6X20							
			600AR551-630-10											
		MSTC	**500AR630-709-10**	C90SP1618-10R		WC-16	W6X20							
			600AR630-709-10											
		MSTC	**500AR709-813-12**	C90SD1820-12R		WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		
			600AR709-813-12											
		MSTC	**500AR813-917-12**	C90SD2023-12R		WC-20								
			600AR813-917-12											
		MSTC	**400AL551-630-10**	-	C90SP1416-10L	WC-14	W6X18	AP-1416	SE-3070TRP		LW-2.5	DTP-9		
			500AL551-630-10				W6X20							
			600AL551-630-10											
		MSTC	**500AL630-709-10**		C90SP1618-10L	WC-16	W6X20							
			600AL630-709-10											
		MSTC	**500AL709-813-12**		C90SD1820-12L	WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		
			600AL709-813-12											
		MSTC	**500AL813-917-12**		C90SD2023-12L	WC-20								
			600AL813-917-12											
With Boss	Metric	**MSTC**	**100SR1416-10-6T**	C90SP1416-10R	-	WC-14	W6X20	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9	P-37	HH12X35
			125SR1416-10-8T											HH16X35
			160SR1416-10-10T											-
		MSTC	**125SR1618-10-8T**	C90SP1618-10R		WC-16								HH16X35
			160SR1618-10-10T											-
		MSTC	**125SR1820-12-8T**	C90SD1820-12R		WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		HH16X35
			160SR1820-12-10T											-
		MSTC	**125SR2123-12-8T**	C90SD2023-12R		WC-20								HH16X35
			160SR2123-12-10T											-
		MSTC	**100SL1416-10-6T**	-	C90SP1416-10L	WC-14	W6X20	AP-1416	SE-3070TRP		LW-2.5	DTP-9		HH12X35
			125SL1416-10-8T											HH16X35
			160SL1416-10-10T											-
		MSTC	**125SL1618-10-8T**		C90SP1618-10L	WC-16								HH16X35
			160SL1618-10-10T											-
		MSTC	**125SL1820-12-8T**		C90SD1820-12L	WC-18	W6X20	AP-1820	SB-3590TRP		LW-3	DTP-15		HH16X35
			160SL1820-12-10T											-
		MSTC	**125SL2123-12-8T**		C90SD2023-12L	WC-20								HH16X35
			160SL2123-12-10T											-

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Tightening Torque

Wrench	TH-3L	DTP-9	DTP-15
			
Tightening Torque (N·m)	5~6	1.5	4

Inserts Identification System

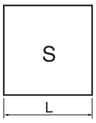
(1) Shape

Symbol	Shape
S	Square

(3) Tolerance

Symbol	Tolerance		
	Corner Height	Thickness	I.C. Size
C	±0.013mm	±0.025mm	±0.025mm
E	±0.025mm		

(5) Edge Length



(7) Corner-R(RE)

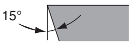
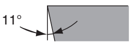
Symbol	Corner-R (RE)
16	1.6mm
12	1.2mm
08	0.8mm

(9) Hand of Tool

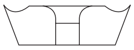
Symbol	Hand of Tool
N	Neutral
L	Left-hand
R	Right-hand

S	P	C	T	10	T3	08	E	R	-	SD
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)

(2) Relief Angle

Symbol	Relief Angle
D	
P	

(4) Hole / Chipbreaker

Symbol	Shape
T	 Single-sided chipbreaker, with hole

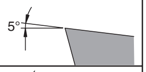
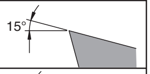
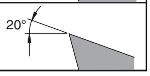
(6) Thickness

Symbol	Thickness
T3	3.97mm
04	4.76mm

(8) Edge Preparation

Symbol	Cutting Edge Spec.
E	Honed
F	Sharp Edge
S	Chamfered + R-honed

(10) Chipbreaker Symbol

Symbol	Rake Angle
SB	
SD	
SE	

SP..10T3

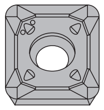
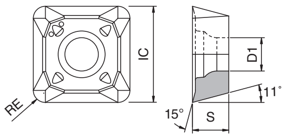
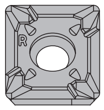
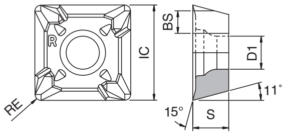
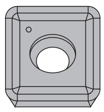
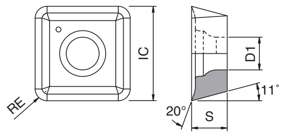
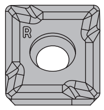
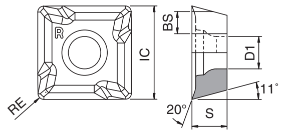
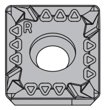
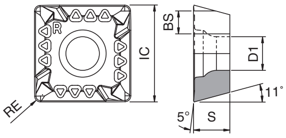
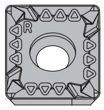
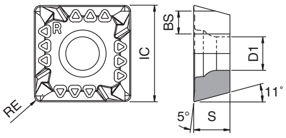
Applicable Inserts

(mm)

Description	IC	S	D1
SP..10T3	10.0	3.97	3.4

Classification of usage
● : 1st Choice
○ : 2nd Choice

		CA0835	PR0725	PR0110
P	Carbon Steel / Alloy Steel	●	●	
M	Stainless Steel	○	●	
K	Cast Iron	○	●	
N	Non-ferrous Metals			●
S	Heat-resistant Alloys		●	
	Titanium Alloys		●	○

Insert		Description	Usable edges	Dimension (mm)		CVD Coated Carbide	PVD Coated Carbide	
Handed Insert shows Right-hand				RE	BS (Wiper Edge)	CA0835	PR0725	PR0110
		**SPCT 10T316EN-SD**	4	1.6	-		●	
 With Wiper Edge		**SPCT 10T308E$^{R}/_{L}$-SD**		0.8	2.5		●	
		10T312E$^{R}/_{L}$-SD		1.2	1.8		●	
 Sharp Edge		**SPCT 10T316FN-SE**		1.6	-			●
 Sharp Edge / With Wiper Edge		**SPCT 10T308F$^{R}/_{L}$-SE**		0.8	2.7			●
		10T312F$^{R}/_{L}$-SE		1.2	2.2			●
 With Wiper Edge		**SPET 10T308E$^{R}/_{L}$-SB**		0.8	2.7	●	●	
 Tough Edge / With Wiper Edge		**SPET 10T308S$^{R}/_{L}$-SB**		0.8	2.7	●	●	

●: Std. Item

Inserts are
sold in 10 piece boxes

SD..1204

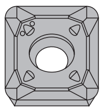
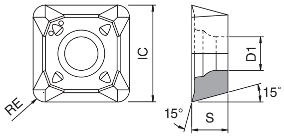
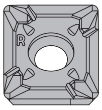
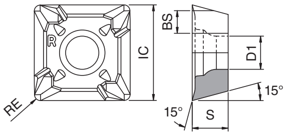
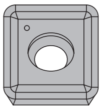
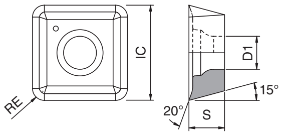
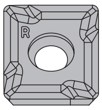
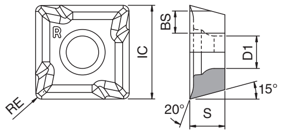
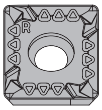
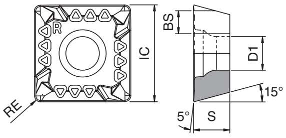
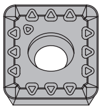
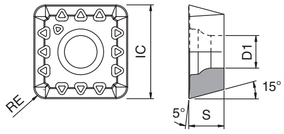
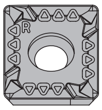
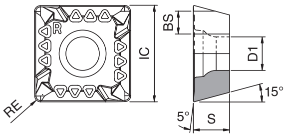
Applicable Inserts

(mm)

Description	IC	S	D1
SD..1204	12.7	4.76	4.4

Classification of usage
● : 1st Choice
○ : 2nd Choice

		CA0835	PR0725	PR0110
P	Carbon Steel / Alloy Steel	●	●	
M	Stainless Steel	○	●	
K	Cast Iron	○	●	
N	Non-ferrous Metals			●
S	Heat-resistant Alloys		●	
	Titanium Alloys		●	○

Insert Handed Insert shows Right-hand		Description	Usable edges	Dimension (mm)		CVD Coated Carbide	PVD Coated Carbide	
				RE	BS (Wiper Edge)	**CA0835**	**PR0725**	**PR0110**
		**SDCT 120416EN-SD**	4	1.6	-		●	
 With Wiper Edge		**SDCT 120408E$^{R}/_{L}$-SD**		0.8	2.5		●	
		120412E$^{R}/_{L}$-SD		1.2	1.8		●	
 Sharp Edge		**SDCT 120416FN-SE**		1.6	-			●
 Sharp Edge / With Wiper Edge		**SDCT 120408F$^{R}/_{L}$-SE**		0.8	2.7			●
		120412F$^{R}/_{L}$-SE		1.2	1.9			●
 With Wiper Edge		**SDET 120408E$^{R}/_{L}$-SB**		0.8	2.5	●	●	
		120412E$^{R}/_{L}$-SB		1.2	1.8	●	●	
		**SDET 120416SN-SB**		1.6	-	●	●	
 Tough Edge / With Wiper Edge		**SDET 120408S$^{R}/_{L}$-SB**		0.8	2.5	●	●	

Features of Insert Grades

CA0835

- TiN+TiCN+Al_2O_3 based CVD Coated Carbide
- For Carbon Steel, Alloy Steel, Stainless Steel and Cast Iron
- For middle to high speed machining

PR0725

- TiN+TiCN+TiN based Multi-layer PVD Coated Carbide
- For Carbon Steel, Alloy Steel, Stainless Steel, Heat-resistant Alloys and Cast Iron
- For middle speed machining

PR0110

- TiB_2 based PVD Coated Carbide
- For Non-ferrous Metals such as Aluminum Alloys (Si<10%) and titanium Alloys
- For high speed machining

● : Std. Item

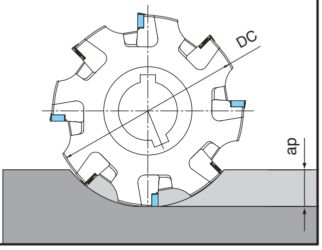
Inserts are
sold in 10 piece boxes

Slot Mill MSTC

◆Recommended Cutting Conditions

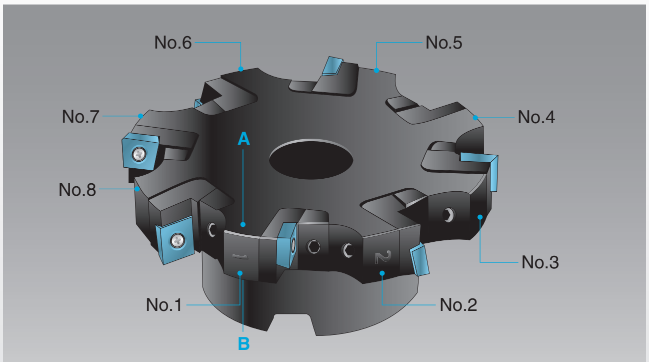
Workpiece Material		Hardness (HB)	Recommended Insert Grades (Cutting Speed Vc : m/min)			fz (mm/t)				Remarks
			CVD Coated Carbide	PVD Coated Carbide		Chipbreaker				
			CA0835	**PR0725**	**PR0110**	EN-SD ER-SD EL-SD	ER-SB EL-SB	SN-SB SR-SB SL-SB	FN-SE FR-SE FL-SE	
Low Carbon Steel	SS400 S10C~S25C	125	250~310	170~210	-	0.07~0.20	0.10~0.22	0.15~0.3	-	Dry
Carbon Steel	S30C~S58C (Annealed)	190	160~190	100~140	-	0.07~0.20	0.10~0.22	0.15~0.3	-	
	S30C~S58C (Heat treated)	250	140~180	90~120	-	0.07~0.20	0.10~0.22	0.15~0.3	-	
Alloy Steel	Annealed	180	140~180	90~120	-	0.07~0.20	0.10~0.22	0.15~0.3	-	
	Heat treated	275	120~160	80~110	-	0.05~0.18	0.08~0.20	0.12~0.25	-	
High Carbon Alloy	SKD11, SKD61, etc.	280	110~130	70~ 90	-	0.05~0.18	0.08~0.20	0.12~0.25	-	
Stainless Steel	Austenitic related	220	160~200	110~140	-	0.05~0.18	0.08~0.20	0.12~0.25	-	Coolant
	Martensitic related	300	150~180	100~120	-	0.05~0.18	0.08~0.20	0.12~0.25	-	
Heat-resistant Alloys	Ni-base heat-resistant alloys	350	-	15~ 30	-	0.05~0.18	0.08~0.20	0.12~0.25	-	
Titanium Alloys	Ti-6Al-4V, etc.	270	-	20~ 50	-	0.05~0.18	0.08~0.20	0.12~0.25	-	
Gray Cast Iron	FC250~FC350	260	160~200	110~130	-	0.07~0.22	0.10~0.25	0.15~0.35	-	Dry
Nodular Cast Iron	FCD400~FCD500	160	130~160	80~100	-	0.07~0.22	0.10~0.25	0.15~0.35	-	
	FCD600~FCD800	250	110~140	70~ 90	-	0.07~0.22	0.10~0.25	0.15~0.35	-	
Non-ferrous Metals	AC4A, A7050, etc.	-	-	-	750~950	-	-	-	0.07~0.20	Coolant

Note) 1. Use down-cut machining.
2. If ap is 1/10 or under of Cutter Dia.(DC),
it is possible to increase feed per tooth (fz) by 40%.

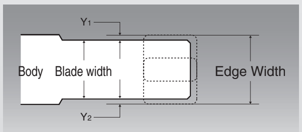


Slot width (edge width) adjustment of MSTC Slot Mill

Slot width (edge width) measurement and adjustment



"No.1-No.8" in the figure is for explanation. There are no indications on the slot mill body.



(1) Set up the slot mill on length measuring equipment such as tool presetters.

(2) Choose any one of the edges as a reference position. (No.1)

(3) Measure the blade width of the slot mill body at position No.1.
(between point A and B in the figure)

(4) Move the length measuring equipment to the insert corner part and measure the step (Y_1) between the point A and the insert No.1.

(5) Using the same procedure, measure (Y_2) dimension based on point B.

$$\text{Edge Width} = \text{Blade Width} + Y_1 + Y_2$$

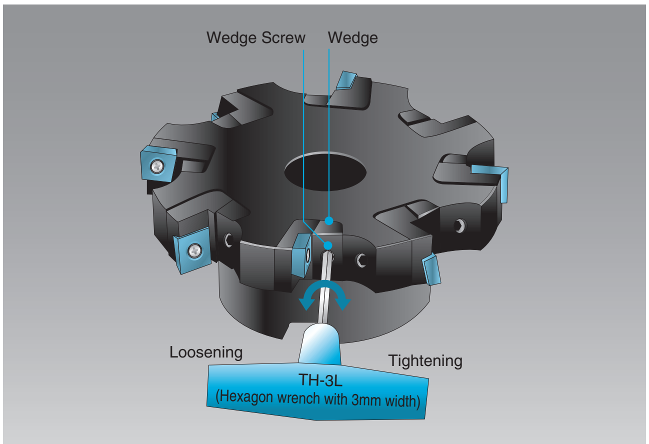
(6) Place the point A of the slot mill body near the position No.1 to "0 (zero)" of the length measuring equipment.

(7) Adjust the edge position of the inserts in odd numbered positions (No. 3, 5, 7) to "0 (zero)" with the length measuring equipment.

(8) Adjust the edge position of the inserts in even numbered positions (No. 2, 4, 6, 8) to the required edge width.

For steps (7) and (8), see "In the case of changing the slot width (edge width)" on next page.

In the case of changing the slot width (edge width)

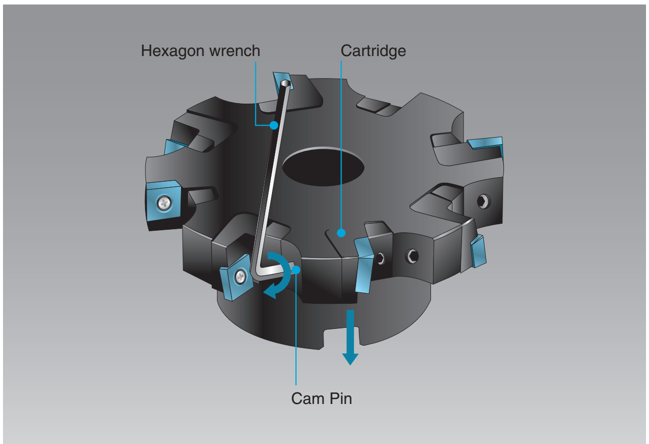


(1) Set up the slot mill on length measuring equipment such as tool presetters.

(2) Insert a Hexagon wrench with **3mm** width (**TH-3L**) into the Wedge Screw.

(3) Turn **TH-3L** counterclockwise to loosen the Wedge.

(4) Turn **TH-3L** clockwise by the torque of **1 N·m** to tighten the Wedge lightly and make the Wedge contact the Cartridge and the Slot Mill Body.
In doing so, some resistance occurs against the Cartridge.

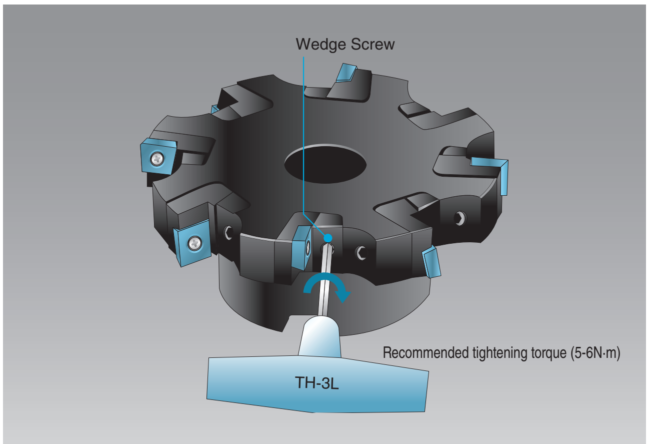


(5) Insert a Hexagon wrench (**LW-2.5** or **LW-3**) into the Cam Pin on the back of the Cartridge.

(6) Turn the wrench and adjust the position of the Cartridge.

(7) To secure the adjustment, back-turn the Cam Pin and make sure that it does not touch the groove surface of the back of the Cartridge.

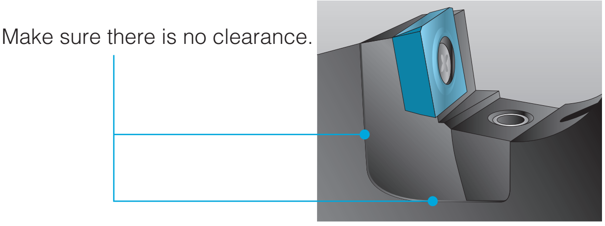
(8) Remove the Hexagon wrench from the Cam Pin.



(9) Insert **TH-3L** into the Wedge Screw.

(10) Tighten the Wedge Screw by the torque of **5-6N·m**.
(Use a torque wrench to get the correct torque.)

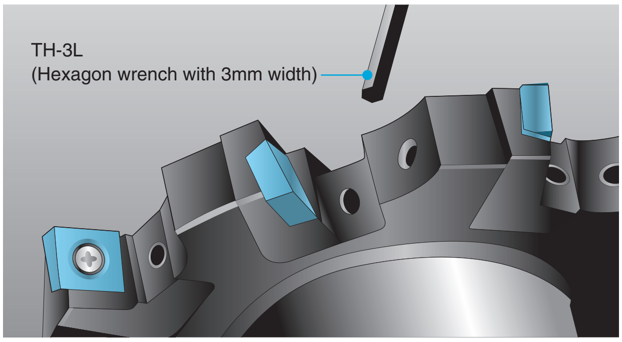
(11) Make sure there is no clearance between the Cartridge and the Slot Mill body.



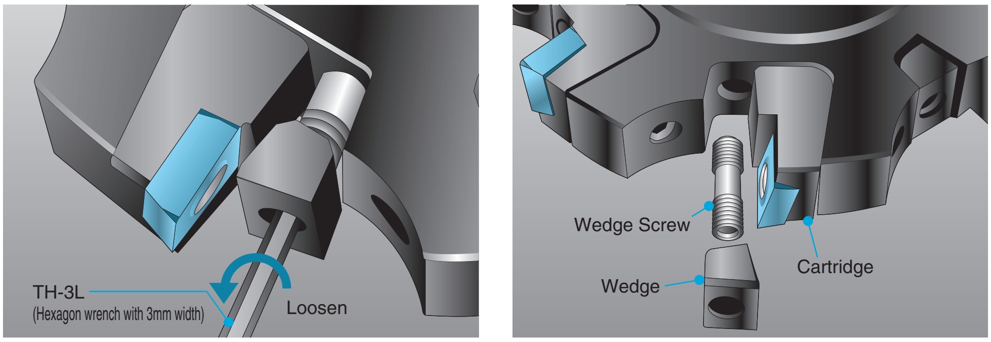
Slot Mill MSTC

Replacement of the Cartridge

Follow the instruction below to replace the Cartridge.

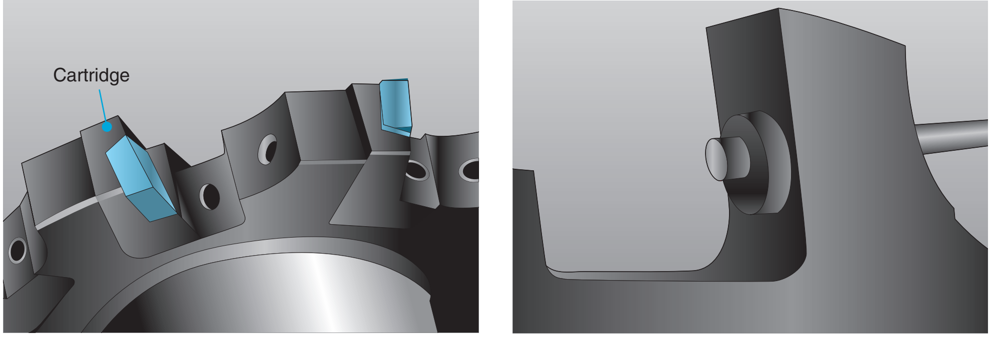


(1) Insert Hexagon wrench with 3mm width (TH-3L) into the Wedge Screw.

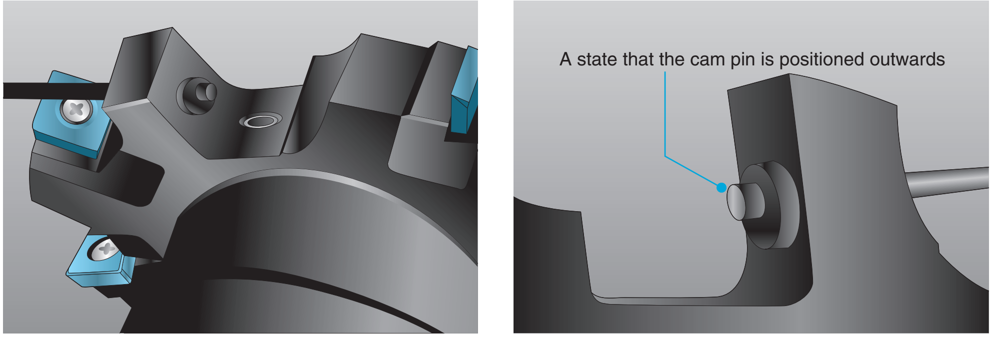


(2) Loosen the Wedge Screw.

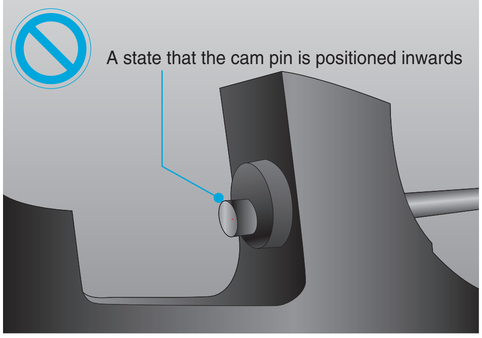
(3) Remove the Wedge Screw and Wedge.



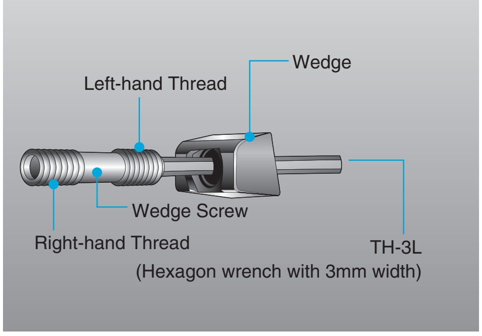
(4) Remove the Cartridge.

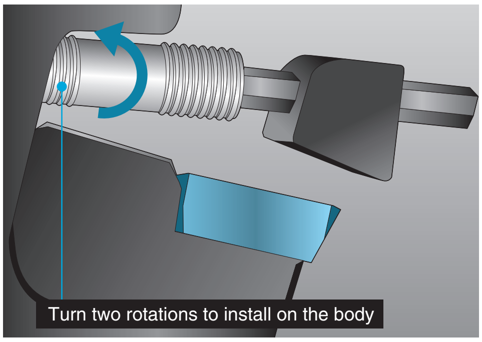


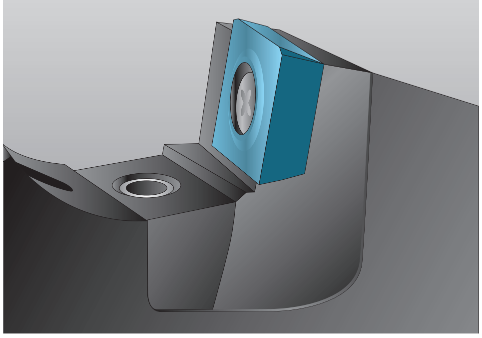
(5) Before replacing the Cartridge, make sure that the Cam Pin is positioned radially-outwards.



(6) If the Cam Pin is in the position shown in the left diagram, assembling the Cartridge is not possible.







(7) Place the wedge so that its larger slant surface faces toward the Cartridge.

(8) Turn the Wedge Screw two rotations to install the Wedge to the body.

(9) When installing the Wedge Screw to the body, keep the Wedge from rotating and screw it in.

(10) Tighten the Wedge Screw by the torque of 5-6N·m.
Keep the Screw head and the Wedge even
(prevent either of those from sticking out).

Ball-nose End Mill

MRF / MRFW (Carbide Shank)


MRF Standard Neck

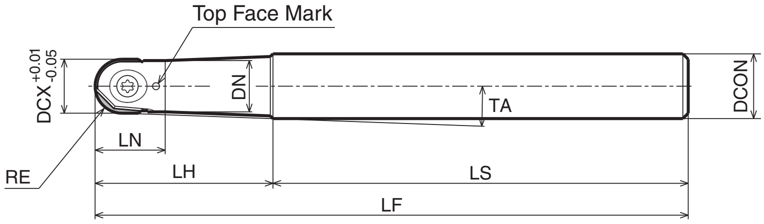
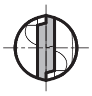


Fig. 1


MRF Long Neck



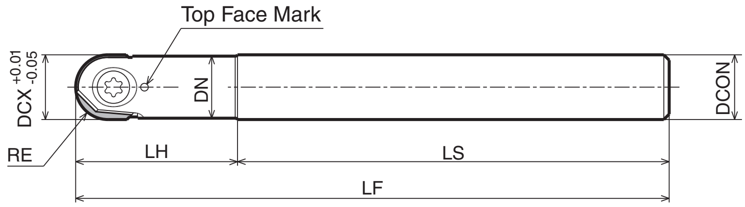
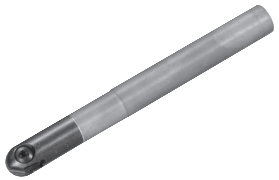
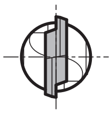


Fig. 2


MRFW Carbide Standard Neck



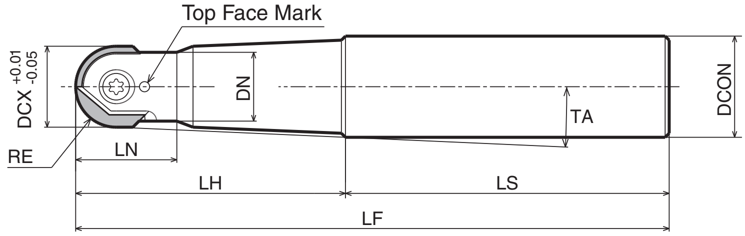
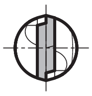


Fig. 3


MRFW Carbide Long Neck



● Top Face Shown

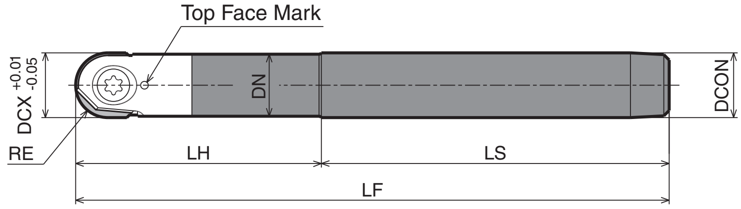
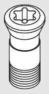
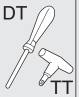
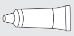
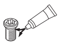


Fig. 4 (Carbide Shank)

Toolholder Dimensions

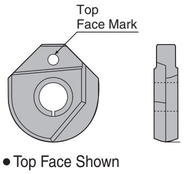
Description			Stock	No. of Inserts	Dimension (mm)									Drawing	Spare Parts			Applicable Inserts ➡ **M25**
					RE	DCX	DCON	DN	LF	LN	LH	LS	TA		Clamp Screw 	Wrench DT TT 	Anti-seize Compound 	
Standard Neck	**MRF**	**08-S12**	●	1	4	8	12	7.5	100	10	22	78	6°20'	Fig. 1	SC-30067	DT-8	P-37	RDFG08FR
		10-S12	●		5	10		9.5		13	25	75	3°		SC-35085	DT-10		RDFG10FR
		12-S12	●		6	12		11.5	110	-	30	80	-	Fig. 2	SC-40100	DT-15		RDFG12FR
		16-S20	●		8	16	20	14	130	20	50		2°50'	Fig. 1	SC-50130	DT-20		RDFG16FR
		20-S25	●		10	20	25	17	140	25	60		3°	Fig. 3	SC-60160	TT-25		RDFG20FR
		25-S32	●		12.5	25	32	22	150	31	70		3°30'		SC-60210	TT-30		RDFG25FR
Long Neck	**MRF**	**08-S12-130**	●	1	4	8	12	7.5	130	10	50	80	2°30'	Fig. 1	SC-30067	DT-8	P-37	RDFG08FR
		10-S16-150	●		5	10	16	9.5	150	15		100	3°50'		SC-35085	DT-10		RDFG10FR
		12-S16-160	●		6	12		11.5	160	16	60		2°10'		SC-40100	DT-15		RDFG12FR
		16-S20-160	●		8	16	20	14	160	20	65	95	2°		SC-50130	DT-20		RDFG16FR
		20-S25-180	●		10	20	25	17	180	25	80	100	2°10'	Fig. 3	SC-60160	TT-25		RDFG20FR
		25-S32-200	●		12.5	25	32	22	200	31	90	110	2°40'		SC-60210	TT-30		RDFG25FR
Carbide Standard Neck	**MRFW**	**08-S08**	●	1	4	8	8	7.4	100	-	30	70	-	Fig. 4	SC-30067	DT-8	P-37	RDFG08FR
		10-S10	●		5	10	10	9.5	100	-	35	65	-		SC-35085	DT-10		RDFG10FR
		12-S12	●		6	12	12	11.5	110	-	45		-		SC-40100	DT-15		RDFG12FR
Carbide Long Neck	**MRFW**	**08-S08-130**	●	1	4	8	8	7.4	130	-	65	65	-	Fig. 4	SC-30067	DT-8	P-37	RDFG08FR
		10-S10-140	●		5	10	10	9.5	140	-	75		-		SC-35085	DT-10		RDFG10FR
		12-S12-150	●		6	12	12	11.5	150	-	85		-		SC-40100	DT-15		RDFG12FR

· TA (Toolholder's interference angle) is the angle formed by the tangential line from insert dia. to toolholder's shank dia.


Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

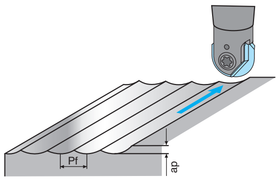
●: Std. Item

Applicable Inserts

Insert		Description
		**RDFG 08FR** **10FR** **12FR** **16FR** **20FR** **25FR**

· Check the Top Face Mark of both insert and toolholder.

Recommended Depth of Cut

Description		Depth of Cut (mm)		Applications
		ap	Pf	
Standard Neck	**MRF08-S12**	0.2(Max0.3)	0.8	
	MRF10-S12	0.2	1	
	MRF12-S12	0.5	1.2	
	MRF16-S20	0.5	1.6	
	MRF20-S25	1	2	
	MRF25-S32	1	2.5	
Long Neck	**MRF08-S12-130**	0.2(Max0.3)	0.8	
	MRF10-S12-150	0.2	1	
	MRF12-S12-160	0.5	1.2	
	MRF16-S20-160	0.5	1.6	
	MRF20-S25-180	1	2	
	MRF25-S32-200	1	2.5	
Carbide Standard Neck	**MRFW08-S08**	0.2(Max0.3)	0.8	
	MRFW10-S10	0.2	1	
	MRFW12-S12	0.5	1.2	
Carbide Long Neck	**MRFW08-S08-130**	0.2(Max0.3)	0.8	
	MRFW10-S10-140	0.2	1	
	MRFW12-S12-150	0.5	1.2	

For ø8, Holder may be broken because of over load if ap exceeds 0.3mm.

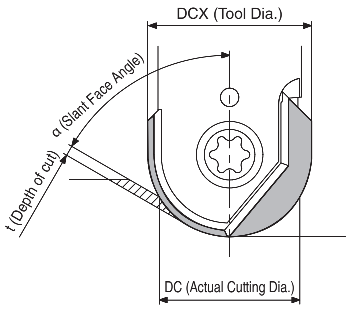
Recommended Cutting Conditions (At Cutting Dia. øD)

Workpiece Material	Insert Grades	Vc (m/min)	fz (mm/t)	ø8		ø10		ø12	
				Vc(m/min) (n:min^{-1})	fz(mm/t) (Vf:mm/min)	Vc(m/min) (n:min^{-1})	fz(mm/t) (Vf:mm/min)	Vc(m/min) (n:min^{-1})	fz(mm/t) (Vf:mm/min)
Carbon Steel	PR915	100~200	0.1~0.3	150 (5,970)	0.2 (2,390)	150 (4,770)	0.2 (1,910)	150 (3,980)	0.2 (1,590)
Alloy Steel	PR915	80~180	0.1~0.3	130 (5,170)	0.2 (2,070)	130 (4,140)	0.2 (1,660)	130 (3,450)	0.2 (1,380)
Mold Steel	PR915	50~150	0.1~0.2	100 (3,980)	0.15 (1,190)	100 (3,180)	0.15 (950)	100 (2,650)	0.15 (800)
Stainless Steel	PR915	50~150	0.1~0.2	100 (3,980)	0.15 (1,190)	100 (3,180)	0.15 (950)	100 (2,650)	0.15 (800)
Cast Iron	PR915	100~200	0.2~0.4	150 (5,970)	0.3 (3,580)	150 (4,770)	0.3 (2,860)	150 (3,980)	0.3 (2,390)

Workpiece Material	Insert Grades	Vc (m/min)	fz (mm/t)	ø16		ø20		ø25	
				Vc(m/min) (n:min^{-1})	fz(mm/t) (Vf:mm/min)	Vc(m/min) (n:min^{-1})	fz(mm/t) (Vf:mm/min)	Vc(m/min) (n:min^{-1})	fz(mm/t) (Vf:mm/min)
Carbon Steel	PR915	100~200	0.1~0.3	150 (2,980)	0.2 (1,190)	150 (2,390)	0.2 (950)	150 (1,910)	0.2 (760)
Alloy Steel	PR915	80~180	0.1~0.3	130 (2,590)	0.2 (1,030)	130 (2,070)	0.2 (830)	130 (1,660)	0.2 (660)
Mold Steel	PR915	50~150	0.1~0.2	100 (1,990)	0.15 (600)	100 (1,590)	0.15 (480)	100 (1,270)	0.15 (380)
Stainless Steel	PR915	50~150	0.1~0.2	100 (1,990)	0.15 (600)	100 (1,590)	0.15 (480)	100 (1,270)	0.15 (380)
Cast Iron	PR915	100~200	0.2~0.4	150 (2,980)	0.3 (1,790)	150 (2,390)	0.3 (1,430)	150 (1,910)	0.3 (1,150)

Actual Cutting Speed (Vd) Conversion Coefficient Table

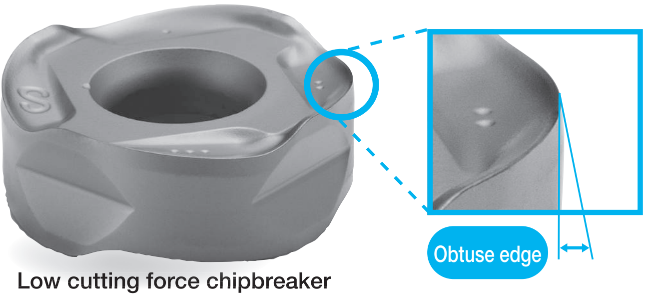
Vd varies depending on ap and slant face angle.
Vd can be obtained by dividing the conversion coefficient into the recommended cutting speed.

Model	Tool Dia. (DCX)		ø8		ø10		ø12	
	Depth of cut (t:mm)		0.1	0.2	0.1	0.2	0.2	0.5
	Slant Face Angle (α)	15°	1.00	1.00	1.00	1.00	1.00	1.00
		30°	1.05	1.02	1.05	1.03	1.04	1.01
		45°	1.18	1.12	1.20	1.14	1.16	1.07
		60°	1.47	1.34	1.51	1.38	1.42	1.24
		75°	2.15	1.82	2.24	1.92	2.02	1.60
		90°(Horizontal Plane)	4.48	3.22	5.06	3.57	3.92	2.50
	Tool Dia. (DCX)		ø16		ø20		ø25	
	Depth of cut (t:mm)		0.2	0.5	0.5	1	0.5	1
	Slant Face Angle (α)	15°	1.00	1.00	1.00	1.02	1.00	1.01
		30°	1.05	1.01	1.02	1.00	1.03	1.00
		45°	1.18	1.10	1.12	1.06	1.14	1.08
		60°	1.47	1.30	1.34	1.21	1.38	1.25
		75°	2.14	1.73	1.83	1.53	1.93	1.62
		90°(Horizontal Plane)	4.48	2.87	3.20	2.29	3.57	2.55

e.g.) Suppose tool dia. 8mm, ap=0.1mm, slant face angle 90°: The actual cutting speed Vd for carbon steel machining, when Vc is 150m/min at the biggest diameter, Vd can be obtained as Vd=150÷4.48=33.5m/min

MRW

Economical and high efficiency New radius cutter with double-sided insert for various types of workpieces

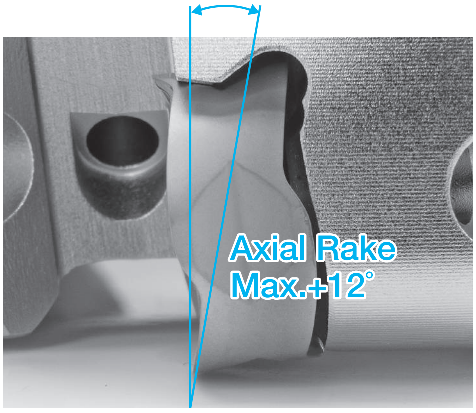


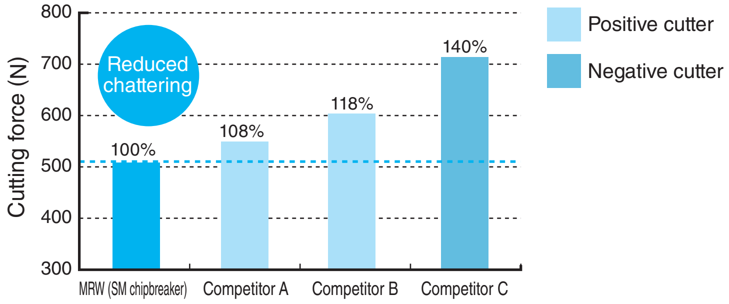
POINT.1 Economical Double-sided 8-edge Insert

POINT.2 Combine sharpness and cutting edge strength

Obtuse edge increases cutting edge toughness

POINT.3 Helical cutting edge design with maximum axial rake 12° reduced low cutting force equivalent to positive inserts

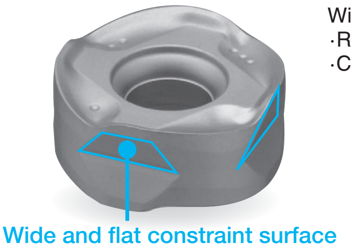




<Cutting Conditions>
Vc=120m/min, apxae=1×40mm, fz=0.2mm/t
SUS304, Cutter ø50

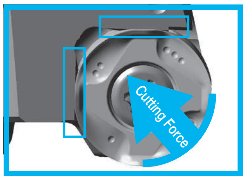
POINT.4 Flat Lock Structure to hold insert firmly.

Prevent insert rotation during machining and realizes stable machining



Flat Lock Structure

Wide flat constraint surface
·Receives even cutting forces
·Controls insert rotation



Long tool life by wide lineup with 4 grades and 3 chipbreakers, available for steel, stainless steel and heat-resistant alloys

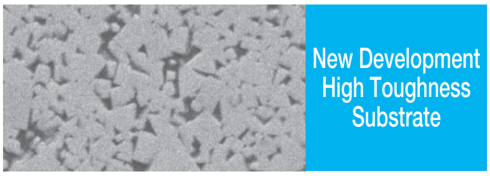
Workpiece Material		Applicable Insert Grades	Applicable Chipbreaker
P Carbon Steel / Alloy Steel / Mold Steel		PR1525	GM/SM/GH Chipbreaker
K Cast Iron		PR1510	GH/GM Chipbreaker
S Ni-base heat-resistant alloys	M Stainless Steel (Martensitic related)	CA6535	SM/GM Chipbreaker
S Ni-base heat-resistant alloys S Titanium Alloys	M Stainless Steel (Austenitic related) M Stainless Steel (Precipitation Hardening)	PR1535	SM/GM Chipbreaker

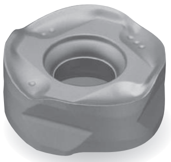
For Chipbreaker Selection and Recommended Cutting Conditions ➡ **M212**

POINT.5

Applicable for Variety of Workpieces from Steel to Heat-resistant Alloys

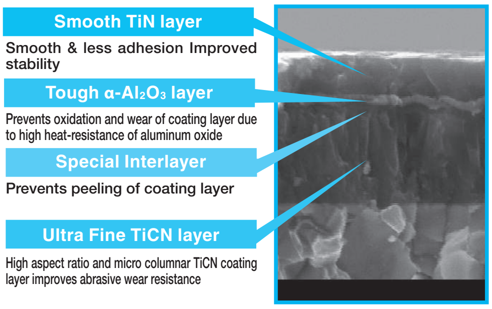
Controls sudden fracture and realizes stable machining
Suitable for high efficiency machining





CA6535

For Martensitic stainless steel and Ni-base heat-resistant alloys
High heat resistance and wear resistance with CVD coating
Improved stability with thin layer coating technology



Smooth TiN layer
Smooth & less adhesion Improved stability

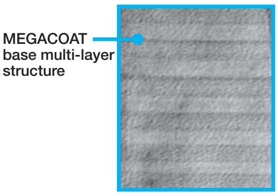
Tough α-Al_2O_3 layer
Prevents oxidation and wear of coating layer due to high heat-resistance of aluminum oxide

Special Interlayer
Prevents peeling of coating layer

Ultra Fine TiCN layer
High aspect ratio and micro columnar TiCN coating layer improves abrasive wear resistance

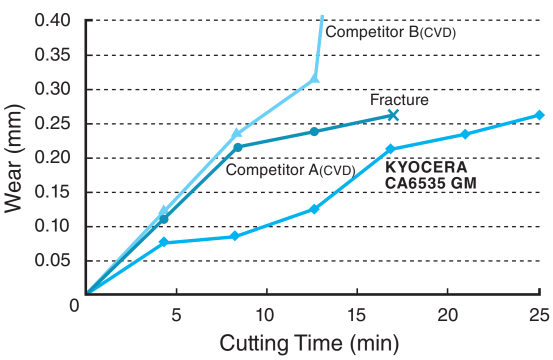
PR1535

For Ni-base heat-resistant alloys, titanium alloys and precipitation hardened stainless steel
Stable and longer tool life by special nano coating layer "MEGACOAT NANO"



Tool Life Comparison (Internal evaluation)

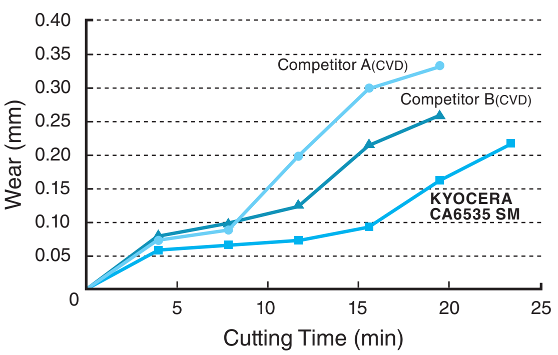
• Ni-base heat-resistant alloys



<Cutting Conditions> Vc=50m/min, ap=1.0mm, fz=0.15mm/t, Wet

1st Choice GM Chipbreaker

• Stainless Steel (Martensitic related)



<Cutting Conditions> Vc=300m/min, ap=2.0mm, fz=0.2mm/t, Wet

1st Choice SM Chipbreaker

MRW Face Mill

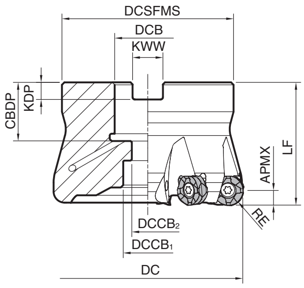


Fig. 1

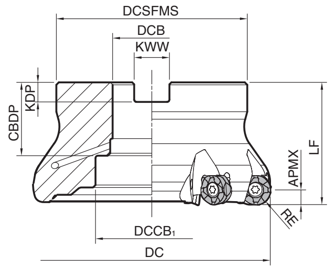


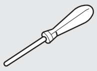
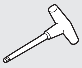
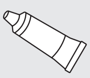
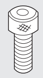
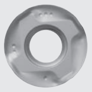
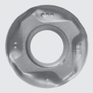
Fig. 2

Toolholder Dimensions

	Description	Stock	No. of Inserts	Dimension (mm)											Rake Angle		Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				RE	DC	DCSFMS	DCB	DCCB₁	DCCB₂	LF	CBDP	KDP	KWW	APMX	A.R.	R.R.				
Metric	**MRW 050R-12-5T-M**	●	5	6	50	48	22	18	11	40	21	6.3	10.4	6.0	+12°	-15.5°	Yes	Fig. 1	0.3	16,000
	050R-12-6T-M	●	6																0.3	
	063R-12-6T-M	●	6		63	60		19											0.6	14,000
	063R-12-7T-M	●	7																0.6	
	080R-12-6T-M	●	6		80	70	27	20	13	50	24	7	12.4						1.1	12,000
	080R-12-8T-M	●	8																1.1	
	100R-12-7T-M	●	7		100	78	32	46	-		30	8	14.4					Fig. 2	1.5	10,600
	100R-12-9T-M	●	9																1.4	
	MRW 063R-16-5T-M	●	5	8	63	60	22	19	11	40	21	6.3	10.4	8.0	+11°	-16.5°		Fig. 1	0.5	12,800
	063R-16-6T-M	●	6																0.5	
	080R-16-6T-M	●	6		80	70	27	20	13	50	24	7	12.4						1.1	11,000
	080R-16-7T-M	●	7																1.0	
	100R-16-6T-M	●	6		100	78	32	46	-		30	8	14.4					Fig. 2	1.4	9,600
	100R-16-8T-M	●	8																1.3	
	125R-16-8T-M	●	8		125	89	40	55		63	33	9	16.4						2.6	8,560
	125R-16-10T-M	●	10																2.5	
Bore Dia. Inch spec	**MRW 080R-12-6T**	●	6	6	80	70	25.4	20	13	50	27	6	9.5	6.0	+12°	-15.5°		Fig. 1	1.2	12,000
	080R-12-8T	●	8																1.1	
	100R-12-7T	●	7		100	78	31.75	46	-		34	8	12.7					Fig. 2	1.5	10,600
	100R-12-9T	●	9																1.4	
	MRW 080R-16-6T	●	6	8	80	70	25.4	20	13	50	27	6	9.5	8.0	+11°	-16.5°		Fig. 1	1.1	11,000
	080R-16-7T	●	7																1.1	
	100R-16-6T	●	6		100	78	31.75	46	-		34	8	12.7					Fig. 2	1.4	9,600
	100R-16-8T	●	8																1.4	
	125R-16-8T	●	8		125	89	38.1	55		63	38	10	15.9						2.6	8,560
	125R-16-10T	●	10																2.6	

- **Max. Revolution**
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.
- APMX is Maximum ap. For more details, see page ➡ **M212** below.

Spare Parts and Applicable Inserts

Description	Spare Parts					Applicable Inserts ➡ **M19**		
	Clamp Screw	Wrench		Anti-seize Compound	Mounting bolt			
		DTPM-15 	TTP-20 			 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)
MRW 050R-12...	SB-4085TRP	DTPM-15 Recommended tightening torque for Insert Clamp 3.5N·m		P-37	HH10X30	ROMU1204M0ER-GM	ROMU1204M0ER-SM	ROMU1204M0ER-GH
063R-12...								
080R-12...					HH12X35			
100R-12...					-			
MRW 063R-16...	SB-50140TRP	TTP-20 Recommended tightening torque for Insert Clamp 4.5N·m		P-37	HH10X30	ROMU1605M0ER-GM	ROMU1605M0ER-SM	ROMU1605M0ER-GH
080R-16...					HH12X35			
100R-16...					-			
125R-16...								

Recommended Cutting Conditions ➡ **M212**

● : Std. Item

MRW End Mill

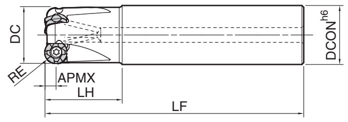


Fig. 1

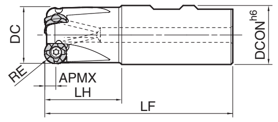


Fig. 3

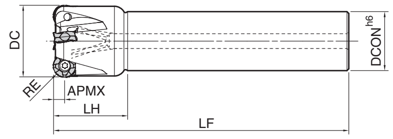


Fig. 2

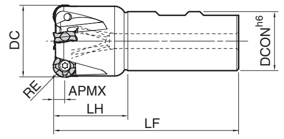


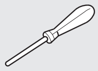
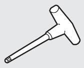
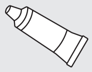
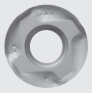
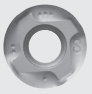
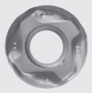
Fig. 4

Toolholder Dimensions

Description			Stock	No. of Inserts	Dimension (mm)						Rake Angle		Coolant Hole	Drawing	Max. Revolution (min^{-1})
					RE	DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			
Cylindrical	**MRW**	**32-S32-12-3T**	●	3	6	32	32	140	40	6.0	+12°	-20°	Yes	Fig. 1	22,000
		40-S32-12-4T	●	4		40		160				-16.5°		Fig. 2	18,800
		50-S42-12-5T	●	5		50	42	170				-15.5°			16,000
	MRW	**40-S32-16-3T**	●	3	8	40	32	160	40	8.0	+11°	-18°	Yes	Fig. 2	17,200
		50-S42-16-4T	●	4		50	42	170				-16.5°			14,800
		63-S42-16-5T	●	5		63			50						12,800
Long Shank	**MRW**	**32-S32-12-2T-200**	●	2	6	32	32	200	40	6.0	+12°	-20°	Yes	Fig. 1	22,000
		40-S32-12-3T-200	●	3		40						-16.5°		Fig. 2	18,800
		50-S42-12-4T-300	●	4		50	42	300				-15.5°			16,000
	MRW	**40-S32-16-2T-200**	●	2	8	40	32	200	40	8.0	+11°	-18°	Yes	Fig. 2	17,200
		50-S42-16-3T-300	●	3		50	42	300				-16.5°			14,800
		63-S42-16-4T-300	●	4		63			50						12,800
Weldon	**MRW**	**32-W32-12-3T**	●	3	6	32	32	102	40	6.0	+12°	-20°	Yes	Fig. 3	22,000
		40-W32-12-4T	●	4		40		100				-16.5°		Fig. 4	18,800
		50-W40-12-5T	●	5		50	40	110				-15.5°			16,000
	MRW	**40-W32-16-3T**	●	3	8	40	32	100	40	8.0	+11°	-18°	Yes	Fig. 4	17,200
		50-W40-16-4T	●	4		50	40	110				-16.5°			14,800
		63-W40-16-5T	●	5		63		120	50						12,800

- **Max. Revolution**
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.
- APMX is Maximum ap. For more details, see page ➡ **M212** below.

Spare Parts and Applicable Inserts

Description	Spare Parts				Applicable Inserts ➡ **M19**		
	Clamp Screw	Wrench		Anti-seize Compound			
		DTPM-15 	TTP-20 		 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)
MRW ...-12...	SB-4085TRP	DTPM-15 Recommended tightening torque for Insert Clamp 3.5N·m		P-37	ROMU1204M0ER-GM	ROMU1204M0ER-SM	ROMU1204M0ER-GH
MRW ...-16...	SB-50140TRP	TTP-20 Recommended tightening torque for Insert Clamp 4.5N·m		P-37	ROMU1605M0ER-GM	ROMU1605M0ER-SM	ROMU1605M0ER-GH

Recommended Cutting Conditions ➡ **M212**

● : Std. Item

◆ Recommended Cutting Conditions

Workpiece Material	Recommended Chipbreaker (fz : mm/t) * Recommended feed rate (Reference value) for ROMU12 type : ap=3mm / for ROMU16 type : ap=4mm			Recommended Insert Grades (Cutting Speed Vc : m/min)			
				MEGACOAT NANO			CVD Coated Carbide
	GM	SM	GH	PR1535	PR1525	PR1510	CA6535
Carbon Steel	★ 0.1~**0.2**~0.3	☆ 0.06~**0.15**~0.2	☆ 0.15~**0.3**~0.35	☆ 120~**180**~250	★ 120~**180**~250	-	-
Alloy Steel	★ 0.1~**0.2**~0.3	☆ 0.06~**0.15**~0.2	☆ 0.15~**0.3**~0.35	☆ 100~**160**~220	★ 100~**160**~220	-	-
Mold Steel	★ 0.1~**0.15**~0.25	☆ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.3	☆ 80~**140**~180	★ 80~**140**~180	-	-
Stainless Steel (Austenitic related)	☆ 0.1~**0.15**~0.2	★ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.25	★ 100~**160**~200	☆ 100~**160**~200	-	-
Stainless Steel (Martensitic related)	☆ 0.1~**0.15**~0.2	★ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.25	☆ 150~**200**~250	-	-	★ 180~**240**~300
Stainless Steel (Precipitation Hardening)	★ 0.1~**0.15**~0.2	☆ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.25	★ 90~**120**~150	-	-	-
Gray Cast Iron	★ 0.1~**0.2**~0.3	-	☆ 0.15~**0.3**~0.35	-	-	★ 120~**180**~250	-
Nodular Cast Iron	★ 0.1~**0.15**~0.25	-	☆ 0.15~**0.2**~0.3	-	-	★ 100~**150**~200	-
Ni-base heat-resistant alloys	★ 0.1~**0.12**~0.15	☆ 0.06~**0.1**~0.15	☆ 0.12~**0.15**~0.2	☆ 20~**30**~50	-	-	★ 20~**30**~50
Titanium Alloys	☆ 0.1~**0.12**~0.15	★ 0.06~**0.1**~0.15	-	★ 40~**60**~80	-	☆ 30~**50**~70	-

★ : 1st Recommendation ☆ : 2nd Recommendation

* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.
* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
* Recommended feed rate is the reference value when ap is RE/2 (3mm for ROMU12, 4mm for ROMU16).
For lower ap than the above conditions, the conversion factor in the following table is recommended.

Insert	ap (recommended)	Max. ap	Conversion factor for feed per tooth fz				
			ap=0.5mm	ap=1mm	ap=2mm	ap=3mm	ap=4mm
ROMU12 type	3mm or less	6mm	2.1	1.5	1.1	1.0 (Standard)	-
ROMU16 type	4mm or less	8mm	2.4	1.7	1.3	1.1	1.0 (Standard)

* Example (ROMU12 type, Carbon Steel, GM chipbreaker, ap=1mm)

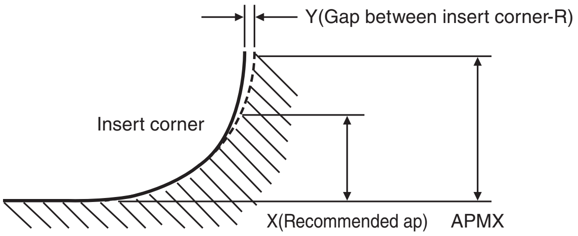
fz=0.2mm/t
(Reference value for carbon steel and GM chipbreaker)
×
1.5
(Conversion factor for ROMU12 type, ap=1mm)
=
fz=0.3mm/t
(Recommended feed rate)

* Recommended ap : 3mm or less for ROMU12, 4mm or less for ROMU16
Except the case that ap temporally surpass the recommended ap, machining under the recommended ap is recommended.

Corner-R shape during processing

Corner-R shape during processing with MRW (Ref. to the right figure)

Insert	APMX	X	Y
ROMU12 type	6mm	3mm	0.1mm
ROMU16 type	8mm	4mm	0.1mm



* When machining with larger ap than recommended ap (X), there is a gap (Y) between the workpiece corner and insert corner-R(RE).
* The above figure is estimation. There would be ±0.2mm variation depending on the cutting conditions.

How to mount an insert

1. Be sure to remove dust and chips from the insert mounting pocket.
2. Clamp screw
   (1) Apply anti-seize compound on portion of taper and thread of clamp screw.
   (2) Attach the screw to the front end of the wrench. While lightly pressing the insert against the constraint surfaces, put the screw into the hole of the insert and tighten. (Ref. to Fig. 1)
3. Wrenches and clamp screws are "Torx Plus".
   (1) Fig. 2 wrench is for MRW-12. (Straight grip)
   (2) Fig. 3 wrench is for MRW-16. (T-shaped grip)
   Please use a "Torx Plus" Wrench for tightening cramp screw.
   * If a "Torx" Wrench (Fig. 4) is used to tighten, the screw head might become damaged and then the screw cannot be removed.
4. When tightening the screw, make sure that the wrench is parallel to the screw.
   Recommended tightening torque, see page **M210, M211**
5. After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the toolholder or between the insert side surfaces and the constraint surface of the toolholder. If there is any clearance, remove the insert and mount it again according to the above steps.

Fig. 1

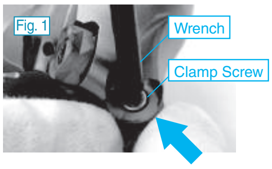
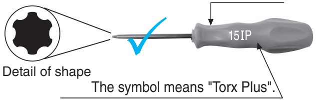
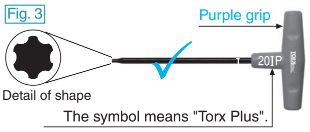


Fig. 2



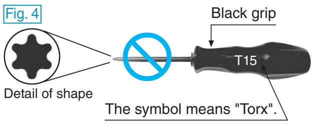
Straight grip wrench for MRW-12

Fig. 3



T-shaped grip wrench for MRW-16

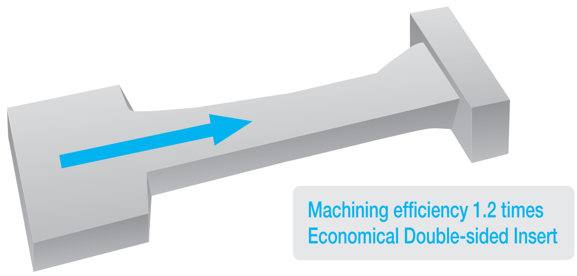
Fig. 4



Torx Wrench (Do NOT use it for MRW)

Case Studies

12Cr Steel



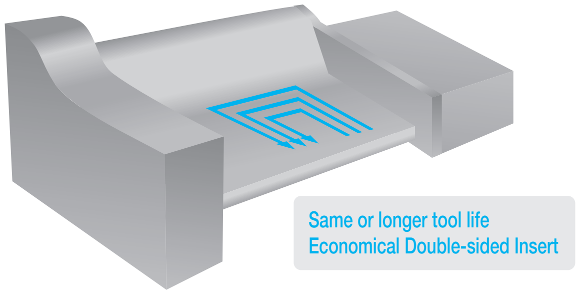
·Turbine Blade ·Vc=270m/min ·fz=0.278mm/t
·ap=0.5~1.0mm ae=max.35mm ·Dry
·MRW050R-12-6T-M (6 Flutes) ·ROMU1204M0ER-SM(CA6535)

CA6535	Stable machining
Competitor A (Positive Cutter)	Unstable machining with large noise

MRW improved machining efficiency by 1.2 times with same tool life compared with Competitor A.
MRW has cost advantage due to double-sided inserts.

(User Evaluation)

12Cr Steel



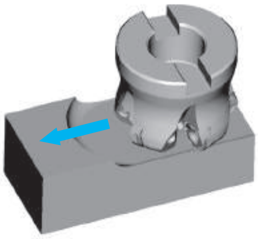
·Turbine Blade ·Vc=250m/min ·fz=0.16mm/t
·ap=2.0mm ae=5~30mm ·Wet
·MRW050R-12-5T-M (5 Flutes) ·ROMU1204M0ER-SM(CA6535)

CA6535	Stable, available for further machining
Competitor B (Positive Cutter)	Unstable machining with large noise

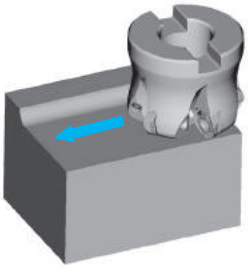
MRW showed less damage on the cutting edge and reduced machining noise.
MRW has equal or longer tool life and cost advantage due to double sided inserts.

(User Evaluation)

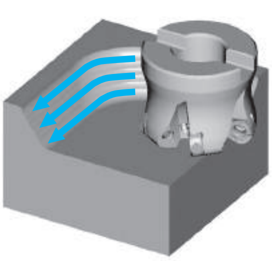
Applications



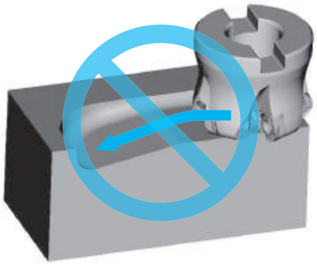
Facing



Shouldering



Contouring



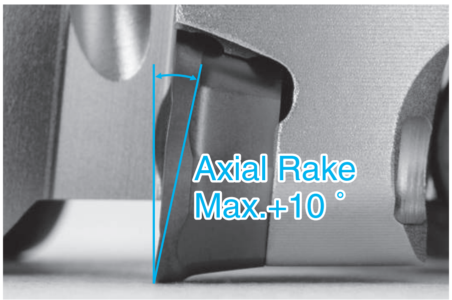
Plunging / Profiling

* MRW type is not available for 3D machining such as Plunging and Profiling.

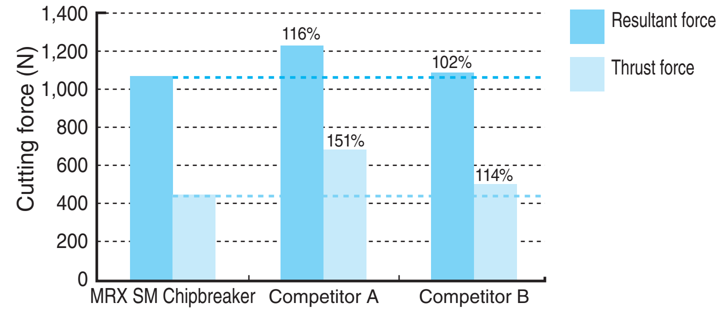
MRX

Excellent cutting performance with low cutting force design High efficiency radius cutter

POINT.1 Low cutting force with helical cutting-edge design



● Cutting Force Comparison (Internal evaluation)



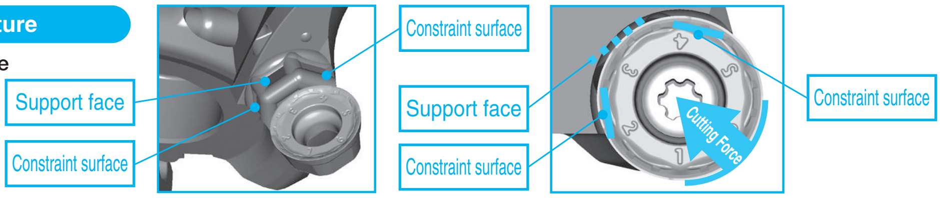
<Cutting Conditions>
Vc=120m/min, ap×ae=2×25mm, fz=0.2mm/t, SUS304, Cutter ø50

POINT.2 Flat Lock Structure to hold insert firmly

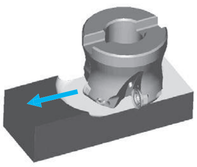
Prevent insert rotation during machining and realizes stable machining

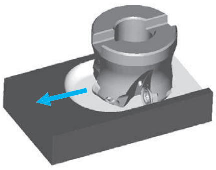
Flat Lock Structure

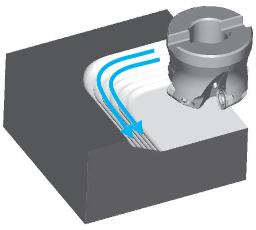
Wide flat constraint surface
- Receives even cutting forces
- Controls insert rotation

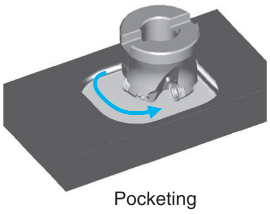


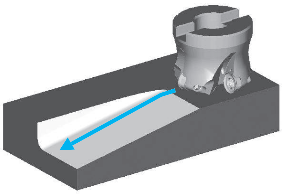
POINT.3 Various applications


Facing


Slotting


Shouldering


Pocketing


Plunging / Profiling

POINT.4 Insert grades CA6535 / PR1535 for difficult-to-cut material are available

Long tool life by wide lineup with 4 grades and 3 chipbreakers, available for steel, stainless steel and heat-resistant alloys

Cost-effective M class inserts are available

MRX Face Mill

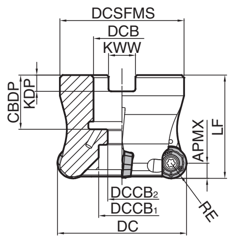


Fig. 1

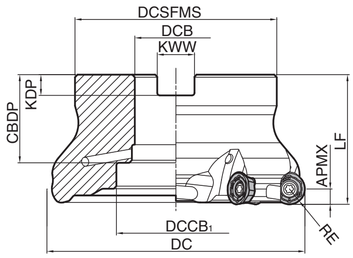
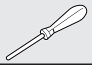
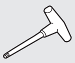
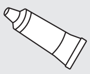
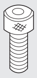


Fig. 2

Toolholder Dimensions

	Description	Stock	No. of Inserts	Dimension (mm)											Rake Angle		Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				RE	DC	DCSFMS	DCB	DCCB_1	DCCB_2	LF	CBDP	KDP	KWW	APMX	A.R.	R.R.				
Metric	MRX 040R-10-5T-M	●	5	5	40	38	16	15	9	40	19	5.6	8.4	5	+10°	-5.5°	Yes	Fig. 1	0.2	20,000
	050R-10-6T-M	●	6		50	48	22	18	11		21	6.3	10.4						0.3	17,500
	063R-10-7T-M	●	7		63	60													0.6	15,000
	MRX 040R-12-4T-M	●	4	6	40	38	16	13.5	9	40	19	5.6	8.4	6	+10°	-5.5°		Fig. 1	0.2	21,000
	050R-12-4T-M	●	4		50	48	22	18	11		21	6.3	10.4						0.3	18,000
	050R-12-5T-M	●	5																0.3	18,000
	063R-12-5T-M	●	5		63	60													0.6	15,500
	063R-12-6T-M	●	6																0.6	15,500
	080R-12-6T-M	●	6		80	70	27	20	13	50	24	7	12.4						1.2	13,500
	080R-12-8T-M	●	8																1.1	13,500
	100R-12-7T-M	●	7		100	78	32	46	-		30	8	14.4					Fig. 2	1.4	12,000
	100R-12-9T-M	●	9																1.4	12,000
	MRX 063R-16-4T-M	●	4	8	63	60	22	18	11	40	21	6.3	10.4	8	+10°	-5.5°		Fig. 1	0.5	13,500
	063R-16-5T-M	●	5																0.5	13,500
	080R-16-5T-M	●	5		80	70	27	20	13	50	24	7	12.4						1.1	11,500
	080R-16-6T-M	●	6																1.1	11,500
	100R-16-6T-M	●	6		100	78	32	46	-		30	8	14.4					Fig. 2	1.4	10,000
	100R-16-7T-M	●	7																1.4	10,000
	125R-16-6T-M	●	6		125	89	40	55		63	33	9	16.4						2.6	9,000
	125R-16-8T-M	●	8																2.6	9,000
Bore Dia. Inch spec	MRX 080R-12-6T	●	6	6	80	70	25.4	20	13	50	27	6	9.5	6	+10°	-5.5°		Fig. 1	1.2	13,500
	080R-12-8T	●	8																1.1	13,500
	100R-12-7T	●	7		100	78	31.75	46	-		34	8	12.7					Fig. 2	1.5	12,000
	100R-12-9T	●	9																1.5	12,000
	MRX 080R-16-5T	●	5	8	80	70	25.4	20	13	50	27	6	9.5	8	+10°	-5.5°		Fig. 1	1.1	11,500
	080R-16-6T	●	6																1.1	11,500
	100R-16-6T	●	6		100	78	31.75	46	-		34	8	12.7					Fig. 2	1.4	10,000
	100R-16-7T	●	7																1.4	10,000
	125R-16-6T	●	6		125	89	38.1	55		63	38	10	15.9						2.7	9,000
	125R-16-8T	●	8																2.7	9,000

Spare Parts and Applicable Inserts

Description	Spare Parts					Applicable Inserts ➡ M19
	Clamp Screw	Wrench		Anti-seize Compound	Mounting bolt	
		DTPM	TTP			
						
MRX 040R-10...	SB-3070TRP	DTPM-10		P-37	HH8X25	RPMT10T3M0ER-GM RPGT10T3M0ER-GM RPGT10T3M0ER-SM RPMT10T3M0EN-GH *1
050R-10...		Recommended tightening torque for Insert Clamp 2.0N·m			HH10X30	
063R-10...						
MRX 040R-12...	SB-4090TRPN	DTPM-15		P-37	HH8X25	RPMT1204M0ER-GM RPGT1204M0ER-GM RPGT1204M0ER-SM RPMT1204M0EN-GH *2
050R-12...					HH10X30	
063R-12...						
080R-12...		Recommended tightening torque for Insert Clamp 3.5N·m			HH12X35	
100R-12...					-	
MRX 063R-16...	SB-50120TRP	TTP-20		P-37	HH10X30	RPMT1605M0ER-GM RPGT1605M0ER-GM RPGT1605M0ER-SM RPMT1605M0EN-GH *3
080R-16...					HH12X35	
100R-16...		Recommended tightening torque for Insert Clamp 4.5N·m			-	
125R-16...						

- Max. Revolution
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

*1··· Not compatible with the conventional RPMT10T3M0.

*2··· Not compatible with the conventional RPMT1204M0 and RPMT1204M0-H.

*3··· Not compatible with the conventional RPMT1606M0-H.

Recommended Cutting Conditions ➡ M218

● : Std. Item

MRX End Mill

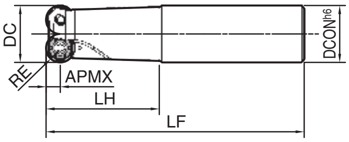


Fig. 1

Fig. 5

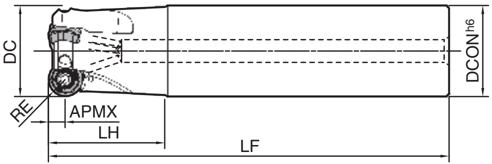


Fig. 2

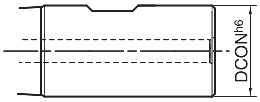


Fig. 6

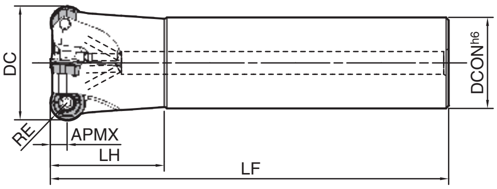


Fig. 3

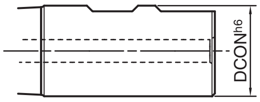


Fig. 7

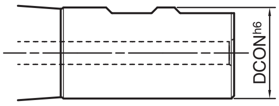


Fig. 8

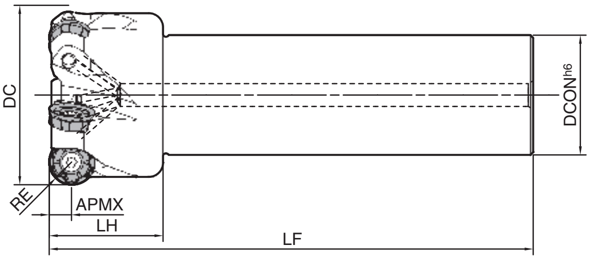


Fig. 4

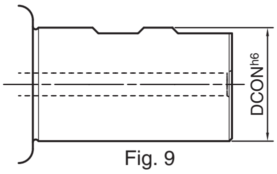


Fig. 9

Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)						Rake Angle		Coolant Hole	Drawing	Max. Revolution (min^{-1})
				RE	DC	DCON	LF	LH	APMX	A.R. (MAX.)	R.R.			
Cylindrical	**MRX 16-S16-08-2T**	●	2	4	16	16	110	40	4.0	+3°	-5.5°	No	Fig. 1	38,000
	20-S20-08-2T	●	2		20	20	120			+10°		Yes	Fig. 2	32,000
	25-S25-08-4T	●	4		25	25								28,000
	MRX 20-S20-10-2T	●	2	5	20	20	120	40	5.0	+5°	-8°	No	Fig. 1	30,000
	25-S25-10-3T	●	3		25	25				+10°	-5.5°	Yes	Fig. 2	28,000
	32-S32-10-4T	●	4		32	32	140							22,500
	MRX 32-S32-12-3T	●	3	6	32	32	140	40	6.0	+10°	-5.5°	Yes	Fig. 2	24,500
	40-S32-12-4T	●	4		40								Fig. 3	21,000
	50-S42-12-5T	●	5		50	42	170							18,000
	MRX 40-S32-16-2T	●	2	8	40	32	140	40	8.0	+10°	-5.5°	Yes	Fig. 3	18,000
	50-S42-16-4T	●	4		50	42	170							15,500
	63-S42-16-5T	●	5		63								Fig. 4	13,500
Weldon	**MRX 16-W16-08-2T**	●	2	4	16	16	89	40	4.0	+3°	-5.5°	No	Fig. 5	38,000
	20-W20-08-2T	●	2		20	20	91			+10°		Yes	Fig. 6	32,000
	25-W25-08-4T	●	4		25	25	97						Fig. 7	28,000
	MRX 20-W20-10-2T	●	2	5	20	20	91	40	5.0	+5°	-8°	No	Fig. 5	30,000
	25-W25-10-3T	●	3		25	25	97			+10°	-5.5°	Yes	Fig. 7	28,000
	32-W32-10-4T	●	4		32	32	101							22,500
	MRX 32-W32-12-3T	●	3	6	32	32	101	40	6.0	+10°	-5.5°	Yes	Fig. 7	24,500
	40-W32-12-4T	●	4		40								Fig. 8	21,000
	50-W40-12-5T	●	5		50	40	111							18,000
	MRX 40-W32-16-2T	●	2	8	40	32	101	40	8.0	+10°	-5.5°	Yes	Fig. 8	18,000
	50-W40-16-4T	●	4		50	40	111							15,500
	63-W40-16-5T	●	5		63		112						Fig. 9	13,500
Long Shank	**MRX 16-S16-08-2T-160**	●	2	4	16	16	160	70	4.0	+3°	-5.5°	No	Fig. 1	38,000
	20-S20-08-2T-180	●	2		20	20	180	80		+10°		Yes	Fig. 2	32,000
	25-S25-08-4T-180	●	4		25	25								28,000
	MRX 20-S20-10-2T-180	●	2	5	20	20	180	80	5.0	+5°	-8°	No	Fig. 1	30,000
	25-S25-10-2T-180	●	2		25	25				+10°	-5.5°	Yes	Fig. 2	28,000
	32-S32-10-4T-200	●	4		32	32	200							22,500
	MRX 32-S32-12-2T-200	●	2	6	32	32	200	80	6.0	+10°	-5.5°	Yes	Fig. 2	24,500
	40-S32-12-4T-200	●	4		40			40					Fig. 3	21,000
	50-S42-12-4T-300	●	4		50	42	300							18,000
	MRX 40-S32-16-2T-200	●	2	8	40	32	200	40	8.0	+10°	-5.5°	Yes	Fig. 3	18,000
	50-S42-16-4T-300	●	4		50	42	300							15,500
	63-S42-16-4T-300	●	4		63								Fig. 4	13,500

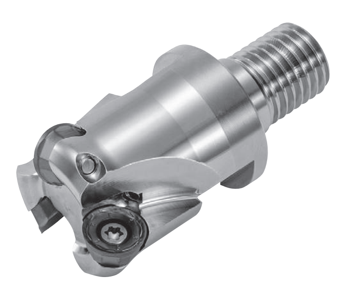
- **Max. Revolution**

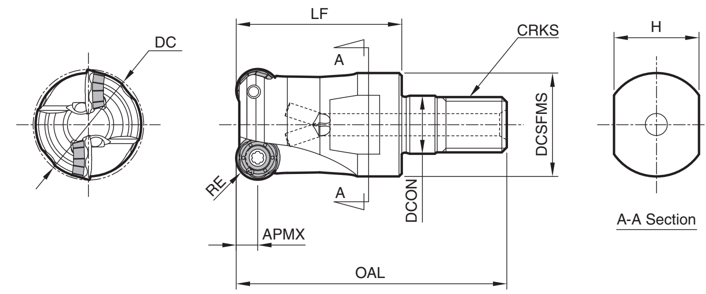
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

MRX Modular type

MRX Head





Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)									Rake Angle		Coolant Hole	Applicable Inserts	Max. Revolution (min^{-1})
			RE	DC	DCSFMS	DCON	OAL	LF	CRKS	H	APMX	A.R. (MAX.)	R.R.			
MRX 16-M08-08-2T	●	2	4	16	14.7	8.5	42	25	M8xP1.25	12	4	+3°	-5.5°	No	RDMT08 RDGT08	38,000
20-M10-08-2T	●	2		20	18.7	10.5	48	30	M10xP1.5	15		+10°		Yes		32,000
25-M12-08-4T	●	4		25	23	12.5	56	35	M12xP1.75	19						28,000
MRX 20-M10-10-2T	●	2	5	20	18.7	10.5	48	30	M10xP1.5	15	5	+5°	-8°	No	RPMT10 RPGT10	30,000
25-M12-10-3T	●	3		25	23	12.5	56	35	M12xP1.75	19		+10°	-5.5°	Yes		28,000
32-M16-10-4T	●	4		32	30	17	62	40	M16xP2.0	24						22,500
MRX 32-M16-12-3T	●	3	6	32	30	17	62	40	M16xP2.0	24	6	+10°	-5.5°	Yes	RPMT12 RPGT12	24,500
40-M16-12-4T	●	4		40												21,000
MRX 40-M16-16-2T	●	2	8	40	30	17	62	40	M16xP2.0	24	8	+10°	-5.5°	Yes	RPMT16 RPGT16	18,000

See page ➔ **M60** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

Spare Parts and Applicable Inserts

Description	Clamp Screw	Wrench		Anti-seize Compound	Applicable Inserts ➔ **M19**
		DTPM	TTP		
MRX ...-08...	SB-2555TRP	DTPM-8		P-37	RDMT0803M0ER-GM RDGT0803M0ER-GM RDGT0803M0ER-SM RDMT0803M0EN-GH * 1
	Recommended tightening torque for Insert Clamp 1.2N·m				
MRX ...-10...	SB-3070TRP	DTPM-10		P-37	RPMT10T3M0ER-GM RPGT10T3M0ER-GM RPGT10T3M0ER-SM RPMT10T3M0EN-GH * 2
	Recommended tightening torque for Insert Clamp 2.0N·m				
MRX ...-12...	SB-4090TRPN	DTPM-15		P-37	RPMT1204M0ER-GM RPGT1204M0ER-GM RPGT1204M0ER-SM RPMT1204M0EN-GH * 3
	Recommended tightening torque for Insert Clamp 3.5N·m				
MRX ...-16...	SB-50120TRP		TTP-20	P-37	RPMT1605M0ER-GM RPGT1605M0ER-GM RPGT1605M0ER-SM RPMT1605M0EN-GH * 4
	Recommended tightening torque for Insert Clamp 4.5N·m				

- Max. Revolution
  Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause inserts and parts to scatter even under no load.

- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

*1··· Not compatible with the conventional RDMT08T2M0-H.
*2··· Not compatible with the conventional RPMT10T3M0.
*3··· Not compatible with the conventional RPMT1204M0 and RPMT1204M0-H.
*4··· Not compatible with the conventional RPMT1606M0-H.

Recommended Cutting Conditions ➔ **M218**

● : Std. Item

Recommended Cutting Conditions

Workpiece Material	Recommended Chipbreaker (fz : mm/t) * RD**08 type : ap=2mm, RP**10 type : ap=2.5mm RP**12 type : ap=3mm, RP**16 type : ap=4mm				Recommended Insert Grades (Cutting Speed Vc : m/min)			
					MEGACOAT NANO			CVD Coated Carbide
	RDMT-GM RPMT-GM	RDGT-GM RPGT-GM	RDGT-SM RPGT-SM	RDMT-GH RPMT-GH	PR1535	PR1525	PR1510	CA6535
Carbon Steel	★ 0.1~**0.2**~0.3	☆ 0.1~**0.2**~0.3	☆ 0.06~**0.15**~0.2	☆ 0.15~**0.3**~0.35	☆ 120~**180**~250	★ 120~**180**~250	-	-
Alloy Steel	★ 0.1~**0.2**~0.3	☆ 0.1~**0.2**~0.3	☆ 0.06~**0.15**~0.2	☆ 0.15~**0.3**~0.35	☆ 100~**160**~220	★ 100~**160**~220	-	-
Mold Steel	★ 0.1~**0.15**~0.25	☆ 0.1~**0.15**~0.25	☆ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.3	☆ 80~**140**~180	★ 80~**140**~180	-	-
Stainless Steel (Austenitic related)	☆ 0.1~**0.15**~0.2	☆ 0.1~**0.15**~0.2	★ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.25	★ 100~**160**~200	☆ 100~**160**~200	-	-
Stainless Steel (Martensitic related)	☆ 0.1~**0.15**~0.2	☆ 0.1~**0.15**~0.2	★ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.25	☆ 150~**200**~250	-	-	★ 180~**240**~300
Stainless Steel (Precipitation Hardening)	☆ 0.1~**0.15**~0.2	★ 0.1~**0.15**~0.2	☆ 0.06~**0.12**~0.2	☆ 0.15~**0.2**~0.25	★ 90~**120**~150	-	-	-
Gray Cast Iron	★ 0.1~**0.2**~0.3	☆ 0.1~**0.2**~0.3	-	☆ 0.15~**0.3**~0.35	-	-	★ 120~**180**~250	-
Nodular Cast Iron	★ 0.1~**0.15**~0.25	☆ 0.1~**0.15**~0.25	-	☆ 0.15~**0.2**~0.3	-	-	★ 100~**150**~200	-
Ni-base heat-resistant alloys	☆ 0.1~**0.12**~0.15	★ 0.1~**0.12**~0.15	☆ 0.06~**0.1**~0.15	☆ 0.12~**0.15**~0.2	☆ 20~**30**~50	-	-	★ 20~**30**~50
Titanium Alloys	☆ 0.1~**0.12**~0.15	☆ 0.1~**0.12**~0.15	★ 0.06~**0.1**~0.15	-	★ 40~**60**~80	-	☆ 30~**50**~70	-

★ : 1st Recommendation ☆ : 2nd Recommendation

* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

* RDGT/RPGT are recommended for stainless steel, Ni-base heat-resistant alloys and titanium alloy.

* The bold-faced number indicates a center value of recommended cutting condition. Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.

* Recommended feed rate in the table is the reference value when ap is RE/2. (2mm for RD**08 / 2.5mm for RP**10 / 3mm for RP**12 / 4mm for RP**16)
For other ap, calculate the recommended feed rate based on the conversion factor below.

* For MRX16-S16-08-2T(-160), MRX16-W-08-2T, MRX20-S20-10-2T(-180) and MRX20-W20-10-2T, set the feed rate not higher than 50% of the recommended cutting conditions.

Conversion factor for feed per tooth by depth of cut (ap)

Insert	Max. ap	Conversion factor for feed per tooth fz									
		ap=0.5mm	ap=1mm	ap=1.5mm	ap=2mm	ap=2.5mm	ap=3mm	ap=4mm	ap=5mm	ap=6mm	ap=8mm
RD08 type (GM/SM/GH chipbreaker)**	4mm	1.7	1.3	1.1	1 (Standard)	0.9	0.8	0.8	-	-	-
RP10 type (GM/SM/GH chipbreaker)**	5mm	1.9	1.4	1.2	1	1 (Standard)	0.9	0.8	0.8	-	-
RP12 type (GM/SM/GH chipbreaker)**	6mm	2.1	1.5	1.3	1.1	1	1 (Standard)	0.9	0.8	0.8	-
RP16 type (GM/SM/GH chipbreaker)**	8mm	2.4	1.7	1.4	1.3	1.1	1.1	1 (Standard)	0.9	0.8	0.8

* Example (RPMT12 type, Carbon Steel, GM chipbreaker, ap=1mm)

fz=0.2mm/t
(Reference value for carbon steel and GM chipbreaker)

×

1.5
(Conversion factor for RP**12 type, ap=1mm)

=

fz=0.3mm/t
(Recommended feed rate)

Recommended cutting conditions for Drilling / Ramping / Helical milling

Tool spec.		Max. ap	Drilling		Ramping (Slant Milling)			Helical Milling		
Insert	Tool Dia.	ap	Max. Cutting Depth Pd	Min. cutting length X for flat bottom surface	Max. ramping angle RMPX	tan RMPX	Cutting Length L at Max. Ramping Angle	Min. Cutting Dia. øDh1	Min. Cutting Dia. for flat bottom facing øDh2	Max. Cutting Dia. øDh3
RD08 type**	16	4	0.7	9	8°	0.141	28	20	24	30
	20		1.4	13	9°	0.158	25	26	32	38
	25			18	5°	0.087	45	36	42	48
RP10 type**	20	5	0.6	11	5°	0.087	57	26	30	38
	25		1.9	16	10°	0.176	28	33	40	48
	32			23	6°	0.105	47	47	54	62
	40			31	4°	0.070	71	63	70	78
	50			41	3°	0.052	95	83	90	98
	63			54	2°	0.035	143	109	116	124
RP12 type**	32	6	2.4	21	9°	0.158	37	43	52	62
	40			29	5°	0.087	68	59	68	78
	50			39	4°	0.070	85	79	88	98
	63			52	2°	0.035	171	105	114	124
	80			69				139	148	158
	100			89	1°	0.017	343	179	188	198
RP16 type**	40	8	3.4	25	11°	0.194	41	51	64	78
	50			35	7°	0.123	65	71	84	98
	63			48	4°	0.070	114	97	110	124
	80			65	3°	0.052	152	131	144	158
	100			85	2°	0.035	229	171	184	198
	125			110	1°	0.017	458	221	234	248

* Above is the value considering the clearance 1mm between the tool body and the workpiece.

Unit : mm

Guide for Drilling

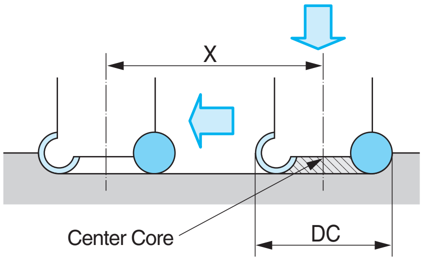
[Depth of Drilling]

Refer to Max. Cutting Depth (Pd) shown in the lower table of **M218**.
(Pd Shows the maximum plunge depth.)

[When Traversing after Drilling]

(1) Reduce the table feed by 50% until the center core part (do not forget to grind) is completely cut off.
(The internal cutting edge's radial rake angle is large in the negative direction)

(2) The min. cutting length "X" for flat bottom surface is as follows **M218**.

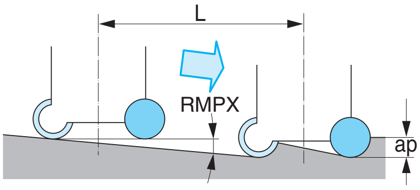


Guide for Ramping (Slant Milling)

- Ramping angle should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
- Feed rate should be 70% or under of the above cutting conditions.

Formula of the cutting length "L" at Max. ramping angle

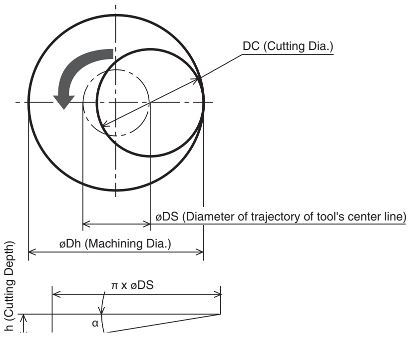
$$L = \frac{ap}{\tan RMPX}$$



Guide for Helical milling

- Sinking depth (h) per revolution when helical milling should be Max. ap or under in the above cutting conditions. Ramping angle α (with trajectory of the center line of tool) should be RMPX (Maximum ramping angle) or under in the above cutting conditions.
- Feed rate should be 70% or under of the above cutting conditions.
- Down-cut machining is recommended.

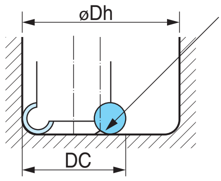
Helical Milling Factors



øDs (How to find diameter of trajectory of tool's center line)
øDs=øDh-DC

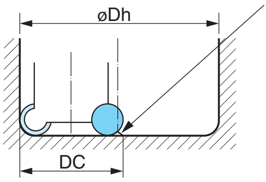
Formula for sinking depth (h)
h=π x øDs x tan α
(h should be ap or under)
(α should be RMPX or under)

[When cutting dia. øDh1≤øDh<øDh2]



Center core part remains after machining.
(Not removable with the same cutter)

[When cutting dia. øDh2≤øDh≤øDh3]



Center core part remains after machining.
(Removable by traversing with the same cutter)

Please refer to **M218** the list for øDh1 ~ Dh3.

Max. ap and usable edges

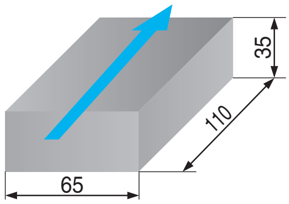
(mm)

Usable edges	Insert Corner-R			
	R4	R5	R6	R8
3 edges	ap=2.0~4.0	ap=2.5~5.0	ap=3.0~6.0	ap=4.0~8.0
6 edges	ap=2.0 Less than	ap=2.5 Less than	ap=3.0 Less than	ap=4.0 Less than

Case Studies

SUS304

- Nozzle parts
- Vc = 113m/min
- ap x ae = 1.0 x 65mm
- fz = 0.14mm/t
- Dry
- MRX100R-12-9T-M (9 Flutes)
- RPGT1204M0ER-SM (PR1535)



4.5 times longer tool life

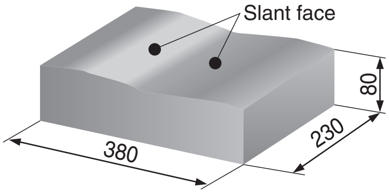
PR1535	450 pcs/edge
Conventional	100 pcs/edge

- High cost efficiency with 4.5 times longer tool life and 1.5 times more insert edges.
- MRX prevented burr formation and improved surface finish.

(User Evaluation)

SKD61(47~49HRC)

- Mold Part
- Vc = 125m/min
- ap x ae = 1.0~2.0 x 10mm
- fz = 0.25mm/t
- Dry
- MRX20-S20-08-2T (2 Flutes)
- RDGT0803M0ER-GM (PR1525)



More than double tool life

PR1525	2 pcs and more Stable tool life
Conventional	1 pc Unstable tool life

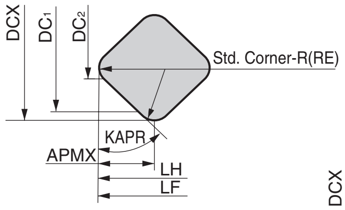
- Conventional tool machined only 1 pc of workpiece due to unstable tool life, but MRX doubled the tool life with stable machining.

(User Evaluation)

Chamfering End Mill MCSE

Chamfering | Back Chamfering | V Shape Slotting | Countersinking

MCSE



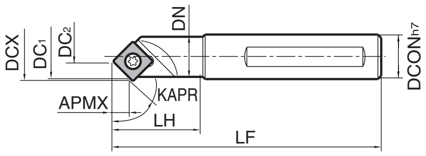


Fig. 1

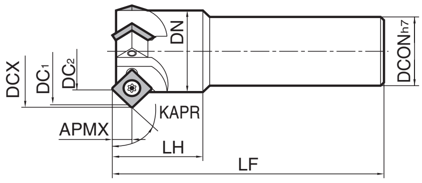


Fig. 4

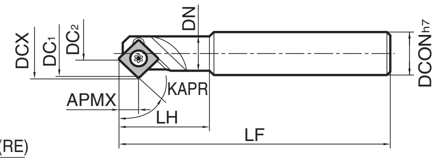


Fig. 2

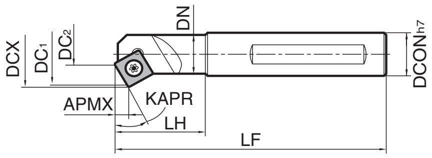


Fig. 5

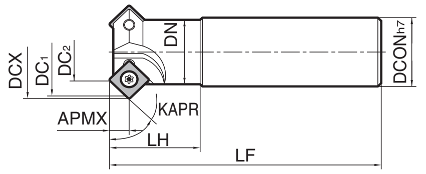


Fig. 3

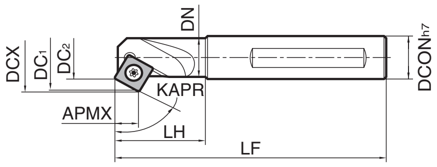
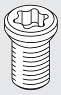
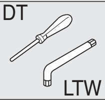


Fig. 6

Toolholder Dimensions

Description		Stock	No. of Inserts	Dimension (mm)								Std. Corner-R(RE)	Angle	Rake Angle		Drawing	Spare Parts	
				DCX	DC₁	DC₂	DCON	DN	LF	LH	APMX		KAPR	A.R.	R.R.		Clamp screw 	Wrench DT LTW 
MCSE	**104**	●	1	16	15	4	16	15	85	31	6.5	0.4	45˚	0˚	-4.5˚	Fig. 1	SB-3060TR	DT-10
	106	●		22	21	6	20	16	121	41	8.6	0.8			-1˚	Fig. 2	SB-5090TR	LTW-20
	115	●		31	30	15		18							+5˚			
	227	●	2	43	42	27	32	30							+8˚	Fig. 3		
	336	●	3	52	51	36		38							+10˚	Fig. 4		
MCSE	**104-30D**	●	1	19	18	4	16	15	85	31	4.7	0.4	30˚	0˚	-4˚	Fig. 5	SB-3060TR	DT-10
	108-30D	●		28	27	8	20	19	110	41	6.3	0.8			-2.5˚		SB-5090TR	LTW-20
	110-30D	●		30	28	10		18	120	40					0˚			
MCSE	**108-60D**	●		19.5	19	8	20	19	110	41	10	0.8	60˚	0˚	-3.5˚	Fig. 6	SB-5070TR	LTW-20
	120-60D	●		31	30	20		18	120	40					0˚		SB-5090TR	

Applicable Inserts

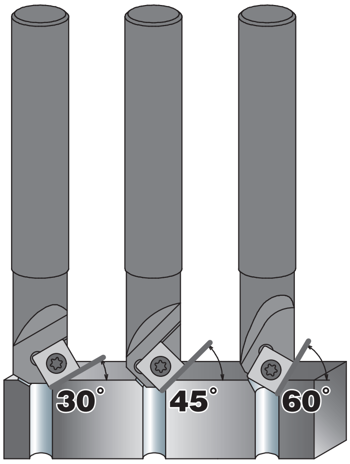
Description		Applicable Inserts ➡ **M26**		
				
MCSE	**104** **104-30D**	SDKW 09T204TN	SDKW 09T204FN	SDMT 09T204C
MCSE	**106** **115** **227** **336**	SEKW 120304TN 120308TN	SEKW 120304FN 120308FN	SEMT 120304C
MCSE	**108-30D** **110-30D**			
MCSE	**108-60D** **120-60D**			

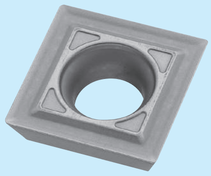
● : Std. Item

◆ Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc : m/min)		
			Cermet	MEGACOAT	Carbide
	DC_2 (ø4~ø20)	DC_2 (ø27~ø36)	**TN100M**	**PR1225**	**KW10**
Carbon Steel	0.05~0.25	0.2~0.4	★ 100~180	★ 120~250	-
Alloy Steel	0.05~0.25	0.2~0.4	★ 100~180	★ 100~220	-
Mold Steel	0.05~0.25	0.2~0.4	★ 100~150	★ 80~180	-
Stainless Steel	0.05~0.2	0.1~0.3	☆ 100~180	★ 120~220	-
Cast Iron	0.1~0.3	0.3~0.5	-	-	☆ 80~150
Non-ferrous Metals	0.1~0.3	0.3~0.5	-	-	★ 100~300

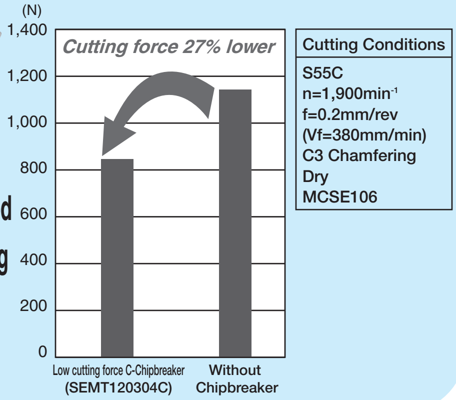
★ : 1st Recommendation ☆ : 2nd Recommendation





Cutting force is reduced by 27% with low cutting force C-Chipbreaker

■Cutting Performance of low cutting force C-Chipbreaker

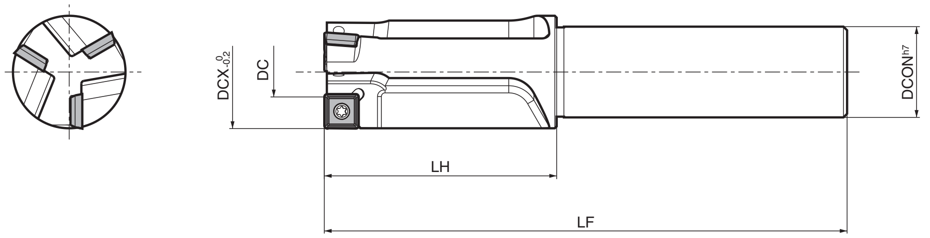


Cutting Conditions
S55C
n=1,900min^{-1}
f=0.2mm/rev
(Vf=380mm/min)
C3 Chamfering
Dry
MCSE106

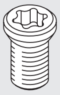
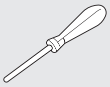
Bolt Countersink End Mill MEF

Bolt Countersinking | Shouldering | Facing

MEF

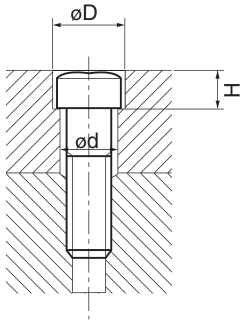


Toolholder Dimensions

Description	Stock	No. of Inserts	Dimension (mm)					Std. Corner-R(RE)	Rake Angle		Objective Bolt Size	Spare Parts		Applicable Inserts ➡ M28
			DCX	DC	DCON	LF	LH		A.R.	R.R.		Clamp Screw	Wrench	
														
MEF 11-S10	●	1	11	3.0	10	103	23	0.4	+5°	-13°	M6	SB-2250TR	DT-7	SPMT060204E-Z 060208E-Z
14-S12	●		14	4.5	12	108	28				M8	SB-2260TR		
17-S16	●	2	17.5	7.3	16	115	35				M10			
18-S16	●		18	7.7		117	38				-			
20-S16	●	3	20	9.5		120	40			-12°	M12			
22-S20	●		22	11.4	20	124	44				-			
23-S20	●		23	12.4		126	46				M14			
24-S20	●		24	13.4		128	48				-			
25-S20	●		25	14.4		130	50				-			
26-S25	●		26	9.8	25	132	52	0.8		-13°	M16	SB-3080TR	DT-10	SPMT090304E-Z 090308E-Z
27-S25	●		27	10.6		134	54				-			
28-S25	●		28	11.5		136	56				-			
29-S25	●		29	12.6		138	58				M18			
30-S25	●		30	13.5		140	60				-			
32-S25	●		32	15.5		144	64				M20			
35-S32	●		35	18.4	32	150	70				M22			
39-S32	●	4	39	22.5		158	78				M24			
43-S32	●		43	26.2		166	86			-12°	M27			
48-S32	●		48	31.3		176	96				M30			

· Although Corner-R(RE) pertains to MEF11-S10, DC=3.0mm.

Bolt Countersink (Hexagon Socket Head Cap Screw)



Nominal Screw Size	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
øD (mm)	11	14	17.5	20	23	26	29	32	35	39	43	48
H (mm)	6.5	8.6	10.8	13	15.2	17.5	19.5	21.5	23.5	25.5	29	32
ød (mm)	6.6	9	11	14	16	18	20	22	24	26	30	33
Applicable End Mill	MEF11	MEF14	MEF17	MEF20	MEF23	MEF26	MEF29	MEF32	MEF35	MEF39	MEF43	MEF48

● : Std. Item

◆ Recommended Cutting Conditions

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)		
		MEGACOAT		Carbide
		PR1225	**PR1210**	**KW10**
Carbon Steel	0.1~0.15	★ 120~220	-	-
Alloy Steel	0.1~0.15	★ 120~220	-	-
Mold Steel	0.05~0.1	★ 100~180	-	-
Stainless Steel	0.05~0.1	★ 80~180	-	-
Cast Iron	0.1~0.2	-	★ 100~220	☆ 80~120
Non-ferrous Metals	0.1~0.2	-	-	★ 100~300

★ : 1st Recommendation ☆ : 2nd Recommendation

Points at Bolt Countersinking

(1) Carbon Steel

Increase the feed rate to **fz=0.1 ~ 0.15 (mm/t)** for preventing long chips at low feed rates.
Chip control is good when setting **(Vc=80m/min)** for **MEF11~MEF25**, and **(Vc=120m/min)** for **MEF26~MEF48**.

Toolholder Description	Cutting Speed Vc(m/min)	fz(mm/t)
MEF11~MEF25	80	0.1~0.15
MEF26~MEF48	120	0.1~0.15

(2) Sticky Materials

Step feed is recommended for good chip control
Increase the feed rate to fz=0.1 ~ 0.15 (mm/t) for preventing long chips at low feed rate (fz=0.05mm/t).
Use cover to prevent accidents or injury by thick chips at higher feed rates.

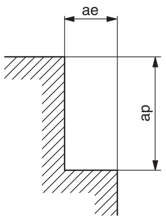
Toolholder Description	Cutting Speed Vc(m/min)	fz(mm/t)	Step Feed(mm)
MEF11~MEF48	80~150	0.1~0.15	0.5~1.5

(3) Stainless Steel

Use a lower Cutting Speed. High Cutting Speeds cause chattering.

Cutting Performance when Shouldering

MEF Bolt Countersink End Mill
is also recommended of shouldering.



Vc=80~120m/min
S55C
Dry
Overhang Length : Same as LH in the dimension table

- When shouldering, both side edge and bottom edges function. Both edges wear at the same time depending on ap. The insert uses 2 edges instead of 4. (Fig. 1)
- MEF type's side edge is designed to have a slight clearance for the countersinking. Therefore, worked side wall is approx. 1˚ inclined against the vertical face. (Fig. 2)

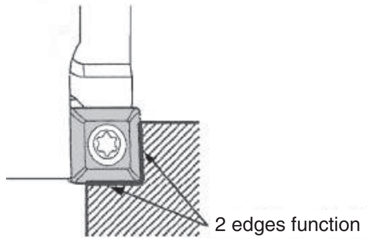


Fig. 1

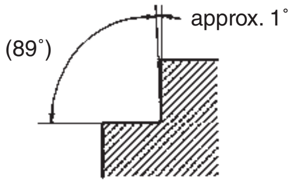


Fig. 2

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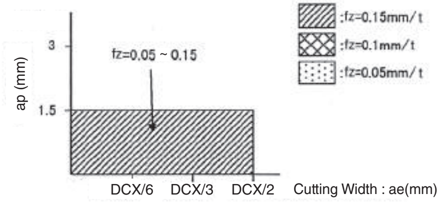
MEF14-S12
MEF17-S16
MEF18-S16</td><td> </td></tr>
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MEF22-S20
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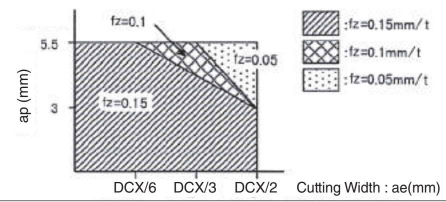
MEF25-S20</td><td> </td></tr>
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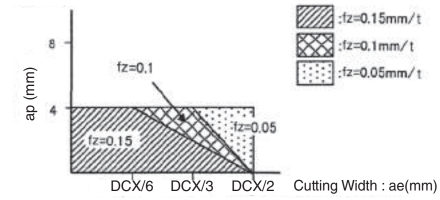
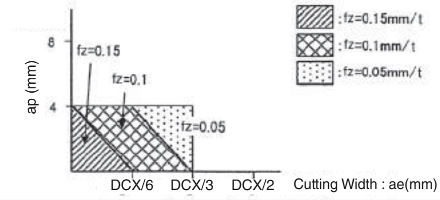
MEF32-S25
MEF35-S32</td><td> </td></tr>
<tr><td>MEF39-S32
MEF43-S32
MEF48-S32</td><td> </td></tr>
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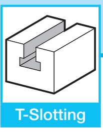
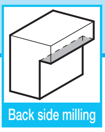
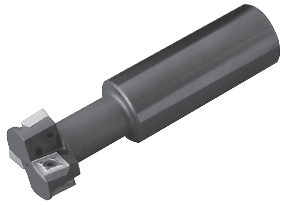
T-Slot Mill METS





METS



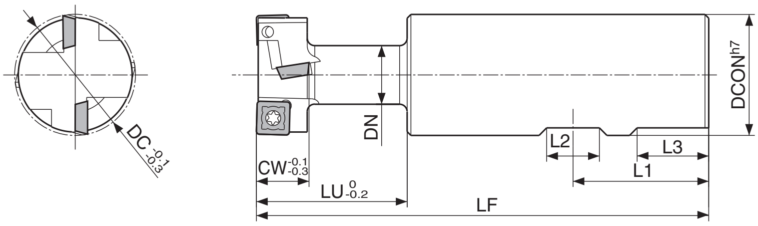


Fig. 1

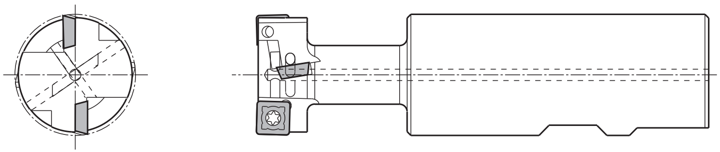
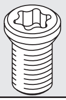
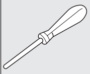


Fig. 2

Toolholder Dimensions

Description		Stock	No. of Inserts	No. of Flutes	Dimension (mm)									Rake Angle		Drawing	Spare Parts		Applicable Inserts ➡ **M26**
					DC	DCON	DN	CW	LF	LU	L1	L2	L3	A.R.	R.R.		Clamp Screw 	Wrench 	
METS	**21-S25**	●	2	1	21	25	10.5	9	109	29	32	12	17	+9°	-10°	Fig. 1	SB-2560TR	DT-8	SDMT060304E-K
	25-S25	●	4	2	25		12.5	11	112	32									
	32-S32	●	4	2	32	32	15.5	14	120	38	36	14	19				SB-3060TR	DT-10	SDMT080308E-K
	40-S32	●			40		20.5	18	130	50					-12°		SB-4085TR	DT-15	SDMT120408E-K
	50-S32	●			50		26.5	22	140	60									
METS	**21-S25-H**	●	2	1	21	25	10.5	9	109	29	32	12	17	+9°	-10°	Fig. 2	SB-2560TR	DT-8	SDMT060304E-K
	25-S25-H	●	4	2	25		12.5	11	112	32									
	32-S32-H	●	4	2	32	32	15.5	14	120	38	36	14	19				SB-3060TR	DT-10	SDMT080308E-K
	40-S32-H	●			40		20.5	18	130	50					-12°		SB-4085TR	DT-15	SDMT120408E-K
	50-S32-H	●			50		26.5	22	140	60									

· METS...-H has air holes

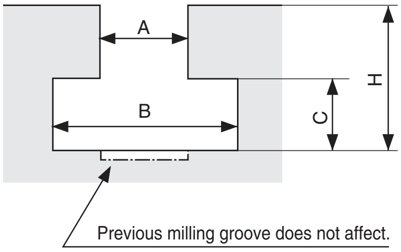
Applicable Inserts

Description		Applicable Inserts ➡ **M26** 
METS	**21-S25** **21-S25-H** **25-S25** **25-S25-H**	SDMT 060304E-K
METS	**32-S32** **32-S32-H**	SDMT 080308E-K
METS	**40-S32** **40-S32-H** **50-S32** **50-S32-H**	SDMT 120408E-K

JIS Standard of T-Slot (Extracted from B0952)

(Unit : mm)

A (Nominal Size)	B	C	H	
			Max.	Min.
12	19^{+2}_{0}	8^{+1}_{0}	25	20
14	23^{+2}_{0}	9^{+2}_{0}	28	23
18	30^{+2}_{0}	12^{+2}_{0}	36	30
22	37^{+3}_{0}	16^{+2}_{0}	45	38
28	46^{+4}_{0}	20^{+2}_{0}	56	48



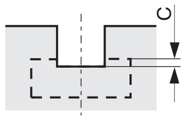
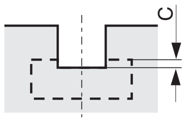
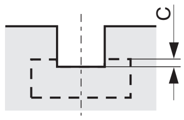
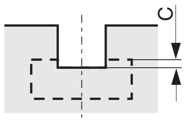
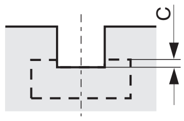
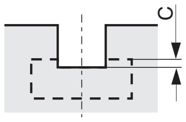
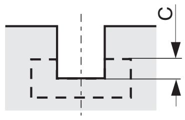
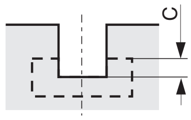
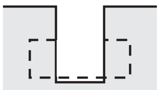
Previous milling groove does not affect.

● : Std. Item

◆ Recommended Cutting Conditions

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)		
		MEGACOAT		Carbide
		PR1230	**PR1210**	**KW10**
Carbon Steel	0.1~0.15	★ 100~200	-	-
Alloy Steel	0.08~0.12	★ 100~200	-	-
Mold Steel	0.05~0.1	★ 80~150	-	-
Cast Iron	0.1~0.15	-	★ 100~200	☆ 80~120
Non-ferrous Metals	0.1~0.15	-	-	★ 100~300

★ : 1st Recommendation ☆ : 2nd Recommendation

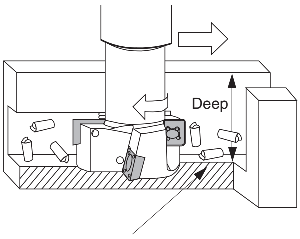
Description (T-Slot Nominal Size)	Steel			Cast Iron		
	Groove Shape at Pre-process	T-Slotting Conditions	Conditions to prevent chattering	Groove Shape at Pre-process	T-Slotting Conditions	Conditions to prevent chattering
METS21-S25(-H) (Nominal Size 12)	C=1~3mm 	Vc= 120 fz= 0.1 (n= 1,820) (Vf= 182)	Vc= 60 fz= 0.15 (n= 920) (Vf= 137)	C=1mm and over 	Vc= 120 fz= 0.12 (n= 1,820) (Vf= 218)	Vc= 80 fz= 0.15 (n= 1,210) (Vf= 182)
METS25-S25(-H) (Nominal Size 14)	C=1~3mm 	Vc= 120 fz= 0.1 (n= 1,530) (Vf= 306)	Vc= 60 fz= 0.15 (n= 760) (Vf= 228)	C=1mm and over 	Vc= 120 fz= 0.12 (n= 1,530) (Vf= 367)	Vc= 80 fz= 0.15 (n= 1,020) (Vf= 306)
METS32-S32(-H) (Nominal Size 18)	C=1~3mm 	Vc= 100 fz= 0.1 (n= 1,000) (Vf= 200)	Vc= 60 fz= 0.15 (n= 600) (Vf= 180)	C=1mm and over 	Vc= 120 fz= 0.12 (n= 1,190) (Vf= 286)	Vc= 80 fz= 0.15 (n= 800) (Vf= 240)
METS40-S32(-H) (Nominal Size 22)	C=9mm 	Vc= 80 fz= 0.15 Chattering is likely when set to shallower than C=9mm.	Vz= 60 fz= 0.15 (n= 480) (Vf= 144)	C=9mm and over 	Vc= 120 fz= 0.15 (n= 960) (Vf= 228)	Vc= 80 fz= 0.15 (n= 640) (Vf= 192)
METS50-S32(-H) (Nominal Size 28)	Not recommended for steel because of chattering				Vc= 120 fz= 0.15 (n= 760) (Vf= 228)	Vc= 80 fz= 0.15 (n= 510) (Vf= 153)

[Cutting Speed : Vc(m/min), Revolution : n (min^{-1}), Feed Rate fz(mm/t), Table Feed Vf(mm/min)]

· Chattering is likely when fz is less than fz=0.1mm/t. Keep feed rate between fz=0.1 ~ 0.15mm/t.

How to prevent damaging chips when steel machining

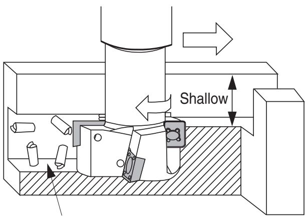
Before Improvement (Deep Groove at Pre-Process)



Chips stay in the pre-process groove.

Improvement of chip biting

After Improvement (Shallow Groove at Pre-Process)

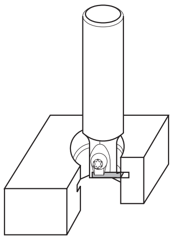


Chips are evacuated backward and chances of damaging chips are less.

Make pre-process groove shallower to prevent the tool damage from chips.
Use compressed air to aid in chip evacuation.

Grooving End Mill MGI

MGI



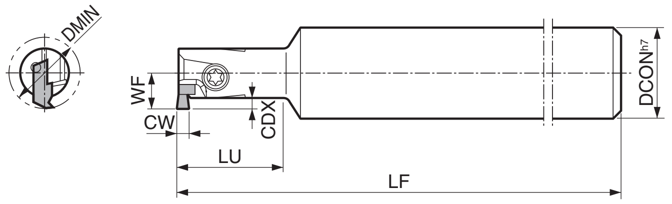


Fig. 1

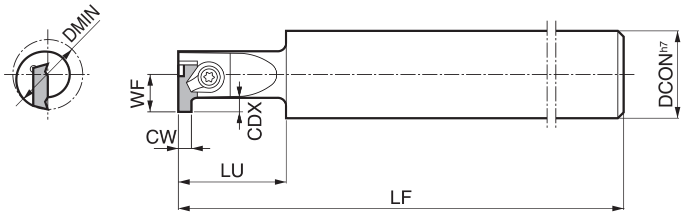
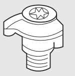
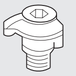
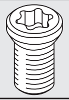
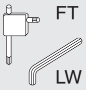


Fig. 2

Toolholder Dimensions

Description		Stock	Min. Bore Dia.	Dimension (mm)					Edge Width	Drawing	Spare Parts			Applicable Inserts M227
											Clamp Set	Clamp Screw	Wrench	
			DMIN	DCON	LF	LU	WF	CDX	CW		 5F  6F		 FT LW	
MGI	**1420-1SS**	●	14	20	100	20	6.8	2.2	1.0~3.0	Fig. 1	-	SB-4065TR	FT-15	GVR...-020SS
	1620-1S	●	16		110	25	7.8		1.0~3.4		-	SB-4085TR	FT-15	GVR...-020S
	2020-1A	●	20			30	9.8	2.2		Fig. 2	CPS-5F	-	FT-15	GVR...-020A GVR...-...AR
	2220-1B	●	22				11	2.8	1.45~4.0					GVR...-020B GVR...-...BR
	3225-1C	●	32	25	120	35	16	5.5 (4.5)	2.8~4.0		CPS-6F	-	LW-3	GVR...-020C

· CDX shows available grooving depth.

· GVR280-020C, GVR300-020C is available to the groove depth up to 4.5mm.

· GVR430 ~ 500-020C can be installed to MGI3225-1C and 4025-1C, but not recommended for steel machining because of toolholder's rigidity.

Recommended Cutting Conditions

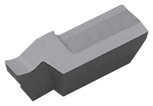
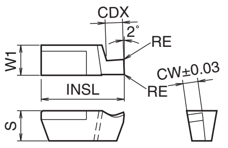
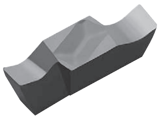
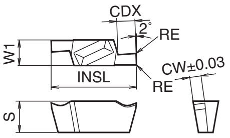
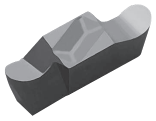
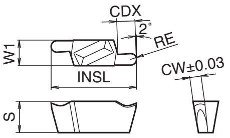
Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)					
		Cermet			MEGA COAT	PVD Coated Carbide	Carbide
		TN90	**TC40N**	**TC60M**	**PR1225**	**PR930**	**KW10**
Carbon Steel	0.05~0.15	★ 120~200	☆ 120~200	☆ 100~180	★ 80~150	☆ 80~150	-
Alloy Steel	0.05~0.15	★ 120~200	☆ 120~200	☆ 100~180	★ 80~150	☆ 80~150	-
Mold Steel	0.03~0.12	★ 100~180	☆ 100~180	☆ 80~150	★ 60~130	☆ 60~130	-
Stainless Steel	0.03~0.12	☆ 100~180	☆ 100~180	★ 80~150	★ 60~130	☆ 60~130	-
Cast Iron	0.05~0.2	★ 100~150	☆ 100~150	-	-	-	★ 80~150
Non-ferrous Metals	0.05~0.2	-	-	-	-	-	★ 100~300

· Use down-cut machining.

★ : 1st Recommendation ☆ : 2nd Recommendation

● : Std. Item

Applicable Inserts

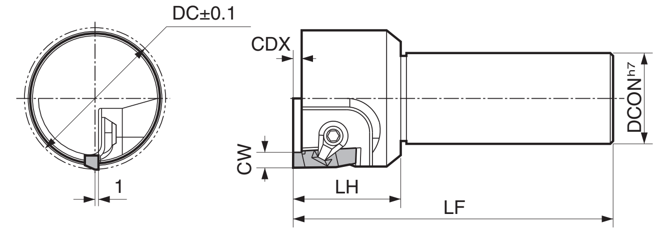
Insert		Description		Dimension (mm)						Insert Grades					
										Cermet			MEGA COAT	PVD Coated Carbide	Carbide
Handed Insert shows Right-hand				CW	CDX	RE	W1	INSL	S	TN90	TC40N	TC60M	PR1225	PR930	KW10
 1-edge		**GVR**	**100-020SS**	1.00	2.3	0.2	3.6	9	3.0	▲		●	●	●	●
			125-020SS	1.25								●	●	●	●
			145-020SS	1.45						▲		●	●	●	●
			200-020SS	2.00						▲		●	●	●	●
			250-020SS	2.50								●	●	●	●
			300-020SS	3.00								●	●	●	●
		GVR	**100-020S**	1.00	2.3	0.2	4.0	11	4.0	▲	●	●	●	●	●
			125-020S	1.25						▲	●	●	●	●	●
			145-020S	1.45							●	●	●	●	●
			185-020S	1.85							●	●	●	●	●
			200-020S	2.00						▲	●	●	●	●	●
			250-020S	2.50							●	●	●	●	●
			340-020S	3.40							●	●	●	●	●
 2-edge		**GVR**	**100-020A**	1.00	2.3	0.2	4.0	12	5.0	▲	●	●	●	●	●
			125-020A	1.25						▲	●	●	●	●	●
			145-020A	1.45						▲	●	●	●	●	●
			185-020A	1.85							●	●	●	●	●
			200-020A	2.00						▲	●	●	●	●	●
			250-020A	2.50						▲	●	●	●	●	●
			300-020A	3.00						▲	●	●	●	●	●
			340-020A	3.40							●	●	●	●	●
		GVR	**145-020B**	1.45	2.8	0.2	4.5	15	5.5	▲	●	●	●	●	●
			185-020B	1.85						▲	●	●	●	●	●
			200-020B	2.00	3.2					▲	●	●	●	●	●
			230-020B	2.30						▲	●	●	●	●	●
			250-020B	2.50						▲	●	●	●	●	●
			280-020B	2.80							●	●	●	●	●
			300-020B	3.00	4.2					▲	●	●	●	●	●
			340-020B	3.40							●	●	●	●	●
			400-020B	4.00						▲	●	●	●	●	●
		GVR	**280-020C**	2.80	4.5	0.2	5.8	21	6.5	▲	●	●	●	●	●
			300-020C	3.00						▲	●	●	●	●	●
			340-020C	3.40	5.5					▲	●	●	●	●	●
			400-020C	4.00						▲	●	●	●	●	●
			(430-020C)	4.30	6.3						●	●	●	●	●
			(460-020C)	4.60							●		●	●	●
			(500-020C)	5.00							●	●	●	●	●
 2-edge Full-R		**GVR**	**200-100AR**	2.00	2.3	1.00	4.0	12	5.0			●	●	●	●
			250-125AR	2.50		1.25						●	●	●	●
			300-150AR	3.00		1.50						●	●	●	●
		GVR	**200-100BR**	2.00	3.2	1.00	4.5	15	5.5	▲		●	●	●	●
			300-150BR	3.00	4.2	1.50				▲		●	●	●	●

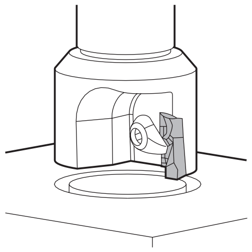
· Only Right-hand insert is applicable.

● : Std. Item
▲ : To be replaced by a new product

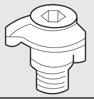
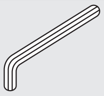
Ring Grooving End Mill MVG

MVG



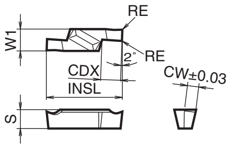


Toolholder Dimensions

Description		Stock	Dimension (mm)					Edge Width	Spare Parts	
			DC	DCON	LF	LH	CDX	CW	Clamp Set	Wrench
										
MVG	**3032**	●	30	32	120	40	5.2	4.00 ~ 4.90	CPS-6V	LW-3
	3532	●	35							
	4032	●	40							
	4532	●	45							
	5032	●	50							
	5532	●	55							
	6032	●	60							

· CDX shows available grooving depth.

Applicable Inserts

Insert Handed Insert shows Right-hand		Description		Dimension (mm)						Insert Grades					
										Cermet			MEGA COAT	PVD Coated Carbide	Carbide
				CW	CDX	RE	W1	INSL	S	TN90	TC40N	TC60M	PR1225	PR930	KW10
		**GVFR**	**400-020B**	4.00	5.3	0.2	5.8	20	5.0	▲	●	●	●	●	●
			430-020B	4.30							●	●	●	●	●
			460-020B	4.60							●		●	●	●
			490-020B	4.90							●	●	●	●	●

· GVFR430B-020B is applicable for sealing groove of G-series
For other ring grooving, GVFR400B ~ 490B-020B are applicable.
· Only Right-hand insert is applicable.

Recommended Cutting Conditions

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)					
		Cermet			MEGA COAT	PVD Coated Carbide	Carbide
		TN90	TC40N	TC60M	PR1225	PR930	KW10
Carbon Steel	0.05~0.15	☆ 100~180	★ 120~200	☆ 100~180	★ 80~170	☆ 80~150	-
Alloy Steel	0.05~0.15	☆ 100~180	★ 120~200	☆ 100~180	★ 80~170	☆ 80~150	-
Mold Steel	0.03~0.12	☆ 80~150	★ 100~180	☆ 80~150	★ 60~150	☆ 60~130	-
Stainless Steel	0.03~0.12	☆ 80~150	☆ 100~180	☆ 80~150	★ 60~150	☆ 60~130	-
Cast Iron	0.05~0.2		-	-	-	-	★ 80~150
Non-ferrous Metals	0.05~0.2		-	-	-	-	★ 100~300

★ :1st Recommendation ☆ : 2nd Recommendation

● : Std. Item
▲ : To be replaced by a new product