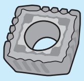
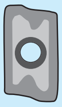
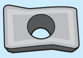
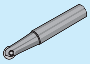
Milling

M1~M195



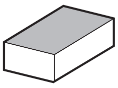
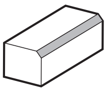
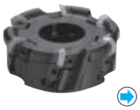
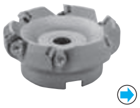
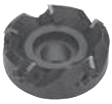


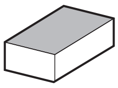
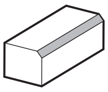
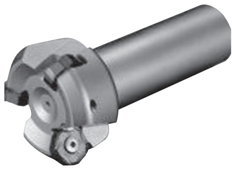
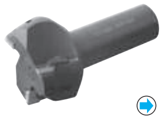




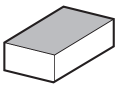
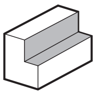
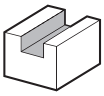
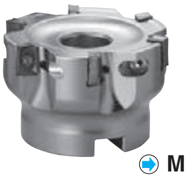
Product Lineup

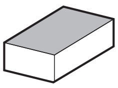
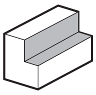
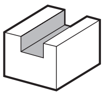
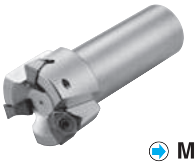
Lead Angle 45° / Lead Angle 20° / Lead Angle 15°

Lead Angle	Shape / Applications	Facing	Chamfering
			
45°	**MFPN45**  ➡ **M26**	●10-edge pentagonal inserts Double-sided pentagonal insert Economical with 10-edge insert ●Low cutting force due to helical cutting-edge design ●Dual Cutting Edge Design (High Toughness)	
	MOF45  ➡ **M34**	●Octagonal Insert with 8-Edge Insert ●Insert sizes are available in 05 and 07 types ●Silver coated	
	MOFX45  ➡ **M36**	●Octagonal Insert with 8-Edge Insert ●The insert is fixed by wedge clamp ●Easy edge adjustment ●SH Chipbreakers (for general purpose / low cutting force) and GT chipbreakers (tough edge)	
	MSE45 (Standard / Multi-edge)  ➡ **M38**	●The insert is fixed by wedge clamp ●Silver coated ●Standard edge type and fine pitch type	
	MSE45-SF (Easy edge adjustment)  ➡ **M40**	●Easy edge adjustment ●Silver coated	
	MSO45  ➡ **M44**	●Use insert size with 13.494mm internal circumference	
20°	**MFK**  ➡ **M32**	●High Efficiency Multi-edge Cutter for Cast Iron ●10-edge pentagonal inserts Economical Double-sided 10-edge Insert ●Low cutting force due to helical cutting-edge design Improved surface finish, minimizing chattering and prevented burr formation ●Dual Cutting Edge Design (High Toughness)	

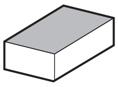
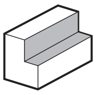
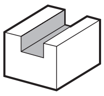
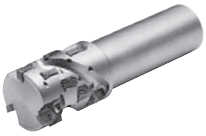
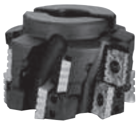
Lead Angle	Shape / Applications	Facing	Chamfering
			
45°	**MFPN45**  ➡ **M27**	●10-edge pentagonal inserts Double-sided pentagonal insert Economical with 10-edge insert ●Low cutting force due to helical cutting-edge design ●Dual Cutting Edge Design (High Toughness) ●With ϕ32 cylindrical shank	
	MSD45  ➡ **M43**	●Low cutting force ●For small machines and M/C ●For thin workpiece milling (Anti-vibration)	
	MSE45  ➡ **M39**	●Low cutting force ●For small machines and M/C ●For thin workpiece milling (Anti-vibration)	
	MSO45-S-09  ➡ **M45**	●Screw clamping and 09 size insert ●Smaller insert for MSO45 series	
	MSO45-S  ➡ **M44**	●High efficiency machining of Stainless steel ●Stronger edge with Insert Thickness 3.97 mm	
15°	**MSRS15**  ➡ **M48**	●For Heavy Milling ●Max. ap 12mm ●Chip evacuation per unit time is increased	
	MSP15  ➡ **M51**	●Facing ●Medium to Roughing of Steel / Cast iron	
	MSE15  ➡ **M51**	●Low cutting force	

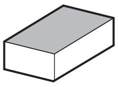
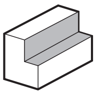
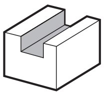
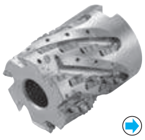
Lead Angle 0° (Double-sided Insert)

Lead Angle	Applications / Shape	Facing	Shouldering	Slotting
				
0°	**MEW End Mill**  ➡ **M54**	●Economical Double-sided 4-edge Insert ●Obtuse edge increases cutting edge toughness ●Smooth surface wall due to low cutting force and reduced chattering		
	MEW Face Mill  ➡ **M55**			
	MEW type Head (Modular type)  ➡ **M56**			

Lead Angle	Applications / Shape	Facing	Shouldering	Slotting
				
0°	**MFWN Face Mill**  ➡ **M90**	●Economical Double-sided 6-edge Insert ●Superior fracture resistance due to thick edge design ●"Large slant edge" Design reduces shock when cutting edge enters the workpiece ●Low cutting force and reduce chattering ●End mills have ϕ32 cylindrical shank		
	MFWN End Mill  ➡ **M91**			

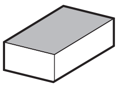
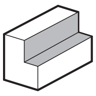
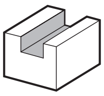
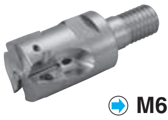
Lead Angle 0° (Heavy Milling)

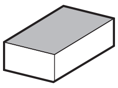
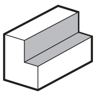
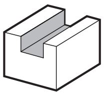
Lead Angle	Applications / Shape	Facing	Shouldering	Slotting
				
(Long Cutting Edge) 0°	**MEWH**  ➡ **M77**	●Low cutting force and sharp cutting performance ●Excellent surface finish quality ●Economical Double-sided 4-edge Insert ●High quality and stable machining with heavy milling		
	MEWH Shell Mill  ➡ **M78**	●MEWH Shell Mill		
	MSR  ➡ **M104**	●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  ➡ **M105**	●Highly rigid BT50 Arbor integrated for MSR		

Lead Angle	Applications / Shape	Facing	Shouldering	Slotting
				
(Long Cutting Edge) 0°	**MECH**  ➡ **M80**	●Notched insert improves higher productivity		
	MECH Shell Mill  ➡ **M81**	●MECH Shell Mill		
	MECH-BT50 **MECH-BT50SA**  ➡ **M81**	●High rigid BT50 Arbor integrated for MECH ●Head exchangeable type is available (MECH-BT50SA)		

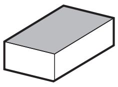
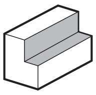
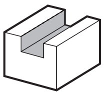
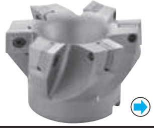
Product Lineup

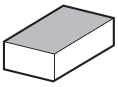
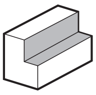
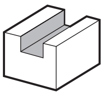
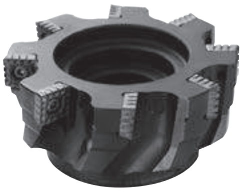
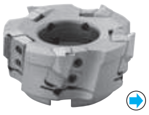
Lead Angle 0°

Lead Angle	Shape \ Applications	Facing	Shouldering	Slotting
				
0°	**MEC**  ➡ **M62**	●Good squareness ●Low cutting force ●The silver coating prevents chip wear on the tool body ●With coolant hole (Over ϕ16)		
	MEC type Head (Modular type)  ➡ **M65**			
	MECX  ➡ **M72**	●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		
	MSO90-S  ➡ **M97**	●Screw clamping & 4-edge insert reduces cost ●Good chip evacuation ●Low cutting force		
	MTE90  ➡ **M95**	●Low cutting force ●For shouldering of Cast iron, Non-ferrous Metals		
	MTP90  ➡ **M95**	●Medium to Roughing of Steel / Cast iron ●For small machines and M/C		

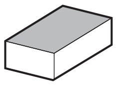
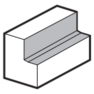
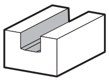
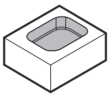
Lead Angle	Shape \ Applications	Facing	Shouldering	Slotting
				
0°	**DMC**  ➡ **M109**	●For small milling machine and M/C		
	DMC-H  ➡ **M111**	●High Rake ●For small milling machine and M/C		
	DMC-SX  ➡ **M110**	●For small milling machine and M/C		
	MTPS / MTES  ➡ **M113**	●For small dia., Low cutting force		
	MEAL  ➡ **M112**	●For Aluminum alloys ●With coolant hole		

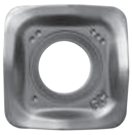
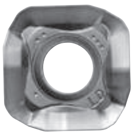
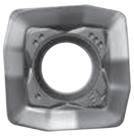
Lead Angle 0°

Lead Angle	Shape \ Applications	Facing	Shouldering	Slotting
				
0°	**MEC**  ➡ **M64**	●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		
	MECX  ➡ **M73**	●Efficient machining due to 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		
	MSO90  ➡ **M96**	●Highly efficient multiple insert design ●Safe design with shim ●Lower weight owing to slim design		

Lead Angle	Shape \ Applications	Facing	Shouldering	Slotting
				
0°	**MSRS90**  ➡ **M100**	●High efficiency, low cutting force and stable machining without chatter ●Various expansive possibilities due to combining neutral insert and custom-ordered cutter		
	MTE90-SF (Easy edge adjustment)  ➡ **M94**	●A simplified adjusting mechanism eases the task of adjusting cutting edge fluctuation ●Silver coated		

High Feed Cutter NEW

<table>
<tr><th rowspan="2">Applications
Shape</th><th>Facing</th><th>Shouldering</th><th>Slotting</th><th>Pocketing</th><th rowspan="2">Cutting Dia. φD
φ8 φ16 φ25 φ32 φ40 φ50 φ80 φ160</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>MFH Harrier
Face Mill

M116</td><td colspan="4" rowspan="3">●Applicable to various applications with 3 types of inserts
 GM (General purpose)
 LD (Large ap) MAX. ap=5mm
 FL (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)</td><td>φ50 φ160</td></tr>
<tr><td>MFH Harrier
End Mill

M119</td><td>(SOMT10 type) φ25 φ40
(SOMT14 type) φ50 φ80</td></tr>
<tr><td>MFH Harrier type Head
(Modular type)

M120</td><td>φ25 φ40</td></tr>
<tr><td>MFH Mini
End Mill

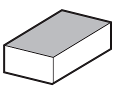
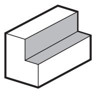
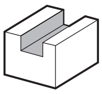
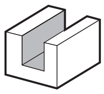
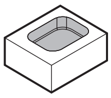
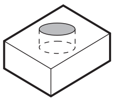
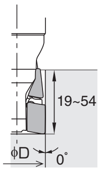
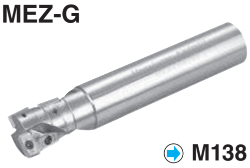
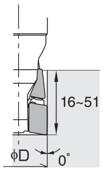
M124</td><td colspan="4" rowspan="2">●Economical Double-sided 4-edge Insert
 GM
●High efficiency and high feed machining at small dia. machining and small machining center</td><td>φ16 φ32</td></tr>
<tr><td>MFH Mini type Head
(Modular type)

M125</td><td>φ16 φ32</td></tr>
<tr><td>MFH Micro
End Mill

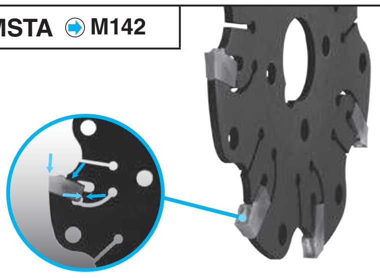
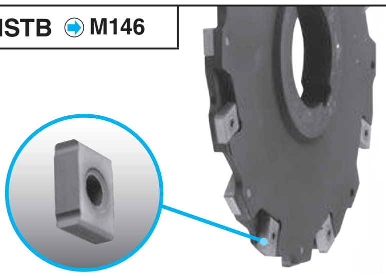
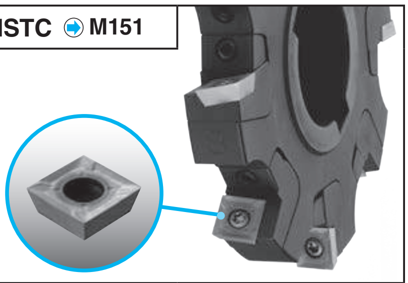
M130</td><td colspan="4">●Micro Dia. Cutter for High Feed Machining
●High efficiency machining due to low cutting force and reduced chattering
</td><td>φ8 φ16</td></tr>
</table>

Product Lineup

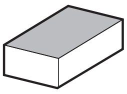
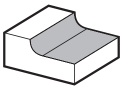
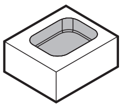
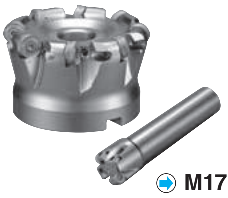
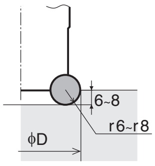
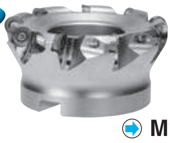
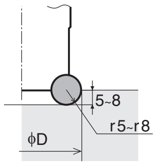
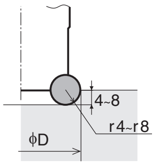
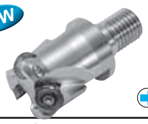
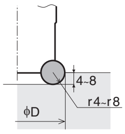
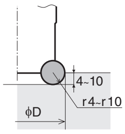
Multi-Function Machining End Mill

Applications Shape	Facing	Shouldering	Slotting	Deep Slotting	Pocketing	Drilling	Lead Angle and Max. ap	Cutting Dia. φD φ16 φ25 φ50
								
MEY  ➡ **M134**	●Multi-function machining (Drilling / Ramping / Shouldering / Grooving) ●High efficiency mold machining		●Low cutting force, Good chip evacuation ●Full 2-Flute 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			φ16 φ50
MEZ-G  ➡ **M138**	●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			φ16 φ49

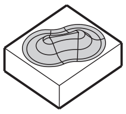
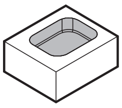
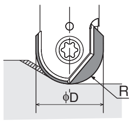
Slot Mill MST

MSTA ➡ **M142**	**MSTB** ➡ **M146**	**MSTC** ➡ **M151**
		
●Self-clamping type ●Remove insert with appropriate wrench	●Easy screw on tangential clamped insert	●Adjustable slotting width due to unique cam adjustment structure

Radius

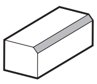
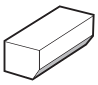
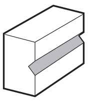
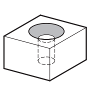
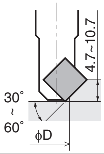
Applications Shape	Facing	Shouldering	Pocketing	Lead Angle and Max. ap	Cutting Dia. ϕD
					ϕ12 ϕ16 ϕ32 ϕ40 ϕ50 ϕ63 ϕ80 ϕ100 ϕ125
MRW Face Mill NEW **End Mill**  M170	●High efficiency radius cutter with double-sided insert ●Combine sharpness and cutting edge strength (A.R. Max. +12°) ●Prevent insert rotation during machining with Flat Lock Structure ●Wide application range from steel to heat-resistant alloys				ϕ32 ϕ125
MRX Face Mill NEW  M175	●Low cutting force and high performance Radius Cutter ●Low cutting force due to 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				ϕ40 ϕ125
MRX End Mill NEW  M176					ϕ16 ϕ63
MRX type Head (Modular type) NEW  M177					ϕ16 ϕ40
MRP-S  M180	●For mold machining ●Recommended for various types of machining (Contouring, Helical Milling, Ramping, etc.) ●Firm insert seat owing to ratchet design				ϕ12 ϕ63
MRP  M181					ϕ50 ϕ125

Ball-nose End Mill

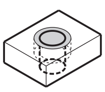
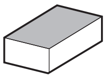
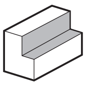
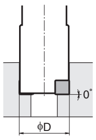
Applications Shape	Contouring / Profiling	Pocketing	Lead Angle and Max. ap	Cutting Dia. ϕD
				ϕ8 ϕ25 ϕ50 ϕ80
MRF  M166	●For high quality mold finishing ●High R-accuracy (Insert's R-accuracy: Under ±0.01mm) ●The bushing ensures insert installation accuracy			ϕ8 ϕ25
MRFW  M166	●Carbide Shank ●For high quality mold finishing ●High R-accuracy (Insert's R-accuracy: Under ±0.01mm) ●The bushing ensures insert installation accuracy ●Superior to anti vibration, and stable machining is possible with long overhang length without chattering			ϕ8 ϕ12

Product Lineup

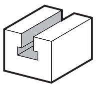
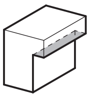
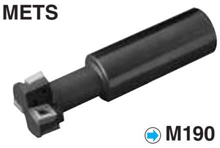
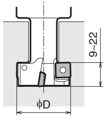
Chamfering

Applications Shape	Chamfering	Back Chamfering	V Shape Slotting	Countersinking	Lead Angle and Max. ap
					
MCSE  **M186**	●For 30°, 45°, 60° Chamfering ●Economical 4-edge Insert ●Available back chamfering				

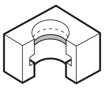
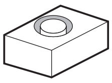
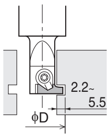
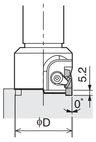
Bolt Countersinking

Applications Shape	Bolt Countersinking	Facing	Shouldering	Lead Angle and Max. ap
				
MEF  **M188**	●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  **M190**	●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  **M192**	●Edge Width 1.0~4.0mm ●Grooving for M/C		
MVG  **M194**		●Cutting Dia. φ30~φ75 ●Edge Width 4.0~4.9mm ●O-Ring Grooving (G Series)	

Milling Inserts Identification System

(1) Shape

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.

(2) Relief Angle

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

(3) Tolerance

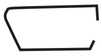
Symbol (Class)	Tolerance (mm)		
	Corner Height	Thickness	I.C. Size
A	**±0.005**	**±0.025**	**±0.025**
F			**±0.013**
C	**±0.013**		**±0.025**
H			**±0.013**
E	**±0.025**		**±0.025**
G		**±0.13**	
J	**±0.005**	**±0.025**	**±0.05~±0.15**
K*	**±0.013**		
L*	**±0.025**		
M*	**±0.08~±0.18**	**±0.13**	
N*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

(4) Chipbreaker / Hole

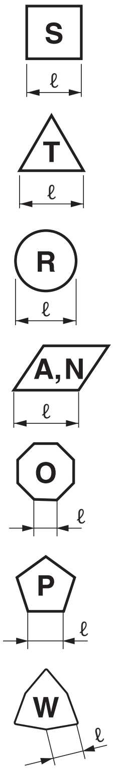
Symbol	Shape
W	 No chipbreaker, with hole
T	 Single-sided chipbreaker, with hole
F	 Double-sided chipbreakers, without hole
N	 No Chipbreaker, without hole
R	 Single-sided chipbreaker, without hole
M	 Single-sided chipbreaker, with hole
A	 No chipbreaker, with hole

(9) Edge Preparation

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

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

(5) Edge Length

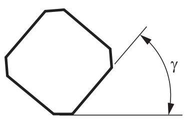


(6) Thickness

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

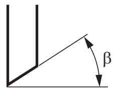
(7) Lead Angle

Symbol	Lead 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

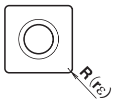
Symbol	Hand of Tool
R	Right-hand
L	Left-hand
N	Neutral

(11) Manufacturer's Option

Chipbreaker, etc.

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

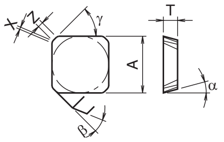
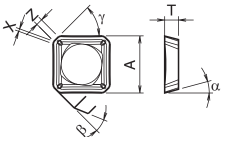
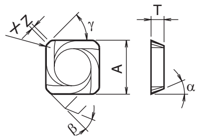
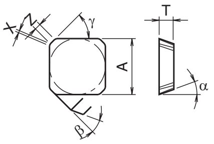
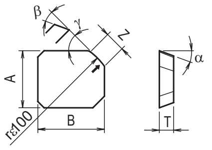
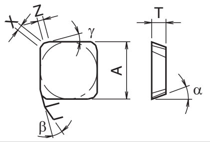
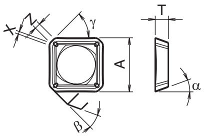
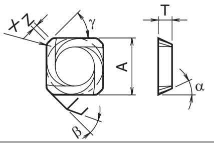
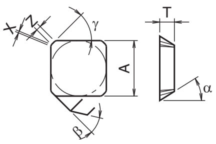
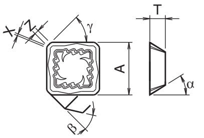
(7) (8) Corner-R (rε)(mm)

04	**0.4**	
08	**0.8**	
12	**1.2**	
16	**1.6**	
20	**2.0**	

Milling Inserts

Milling Inserts

Classification of usage			TN60	TN100M	TC60M	CA6535	CA420M	PR1535	PR1225	PR1210	PR830	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 under 45HRC)		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		PVD Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	X	Z	rε	α	β	γ	TN60	TN100M	TC60M	CA6535	CA420M	PR1535	PR1225	PR1210	PR830	KW10	
		**SDCN 1203AUTN**	12.70	3.18	0.5	1.2	-	15°	23°	45°		●									M43
		SDKN 1203AUTN										●					●	●			
		1203AUFN																		●	
		SDKN 1504AUTN	15.875	4.76								●					●				-
		**SDKR 1203AUEN-S**	12.70	3.18	0.5	1.7	-	15°	23°	45°		●					●				M43
		**SDMR 1203AUER-H**	12.70	3.18	R1.0	0.8	-	15°	23°	45°							●				
		**SEEN 1203AFTN**	12.70	3.18	0.5	1.4	-	20°	25°	45°		●									M38 M39 M40
		SEKN 1203AFTN										●					●	●	●		
		1203AFFN																		●	
		SEKN 1204AFTN		4.76													●				-
		SEKN 1504AFTN	15.875														●				
 1-Edge With Wiper Edge		**SEEN 1203AFTR-W**	12.70	3.18	-	3.5	B= 14.56	20°	25°	45°		●									M40
		1203AFFR-W																		●	
		**SEKN 1203EFTR**	12.70	3.18	1.2	1.4	-	20°	25°	15°		●									M51
		**SEKR 1203AFEN-S**	12.70	3.18	0.5	1.7	-	20°	25°	45°		●					●		●		M38 M39 M40
		**SEMR 1203AFER-H**	12.70	3.18	R1.0	1.0	-	20°	25°	45°							●		●		
		**SOKN 13T3AXTN**	13.494	3.97	0.5	1.1	-	27°	32°	45°		○					○	○			M44
		13T3AXFN																		○	
		**SOKR 13T3AXEN-J**	13.494	3.97	0.5	1.1	-	27°	32°	45°		○					○			○	

* MN indicates MEGACOAT NANO.

Inserts are sold in 10 piece boxes

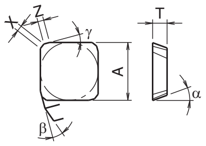
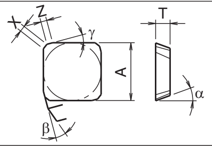
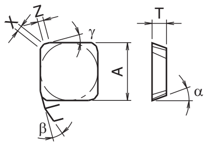
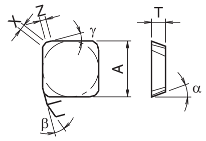
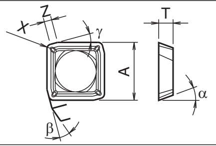
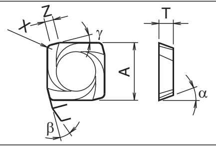
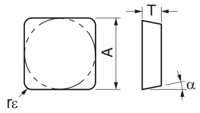
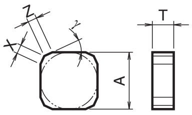
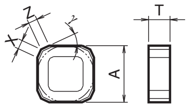
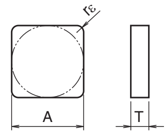
SEEN-W type Inserts are sold in 5 piece boxes

● : Std. Item
○ : Check Availability

Milling Inserts

Classification of usage			TN60	TN100M	TC60M	CA6535	CA420M	PR1535	PR1225	PR1210	PR830	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							☐			

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

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Angle			Cermet			CVD Coated Carbide		MN	MEGACOAT		PVD Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	X	Z	rε	α	β	γ	TN60	TN100M	TC60M	CA6535	CA420M	PR1535	PR1225	PR1210	PR830	KW10	
		**SPCN 1203EDTR**	12.70	3.18	R1.0	2.0	-	11°	15°	15°		●									**M51**
		SPKN 1203EDTR										●					●				
					1.0													●			
		1203EDTL			R1.0							●									-
		1203EDER			1.0	1.6									●						**M51**
		1203EDFR																		●	
		SPKN 1504EDTR	15.875	4.76		2.2						●					●	●			-
		1504EDFR																		●	
		**SPEN 1203EEER**	12.70	3.18	1.0	1.4	-	11°	20°	15°					●						-
		1203EESR																●			
		**SPCN 1203XPTR**	12.70	3.18	R1.0	2.0	-	11°	11°	25°		●									-
		SPKN 1203XPTR										●									
					1.0																
		1203XPTL			R1.0																
		1203XPFR			1.0															●	
		SPKN 1504XETR	15.875	4.76					20°			●									
		**SPCN 1904EETR1**	19.05	4.76	0.7	1.2	-	11°	20°	15°		●									-
		**SPKR 1203EDER-S**	12.70	3.18	R1.0	2.0	-	11°	15°	15°		●					●				**M51**
		**SPMR 1203EDER-H**	12.70	3.18	R1.0	2.0	-	11°	15°	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	-	-	-	25°		●									-
		SNKN 1204XNTN										●									
		**SNMF 1204XNTN**	12.70	4.76	2.0	2.0	-	-	-	25°		●									-
		**SNMN 120408**	12.70	4.76	-	-	0.8	-	-	-								●			-
		120412					1.2								●			●			
		120424					2.4								●						

* MN indicates MEGACOAT NANO.

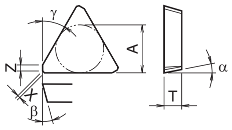
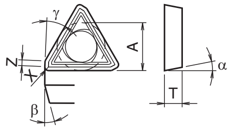
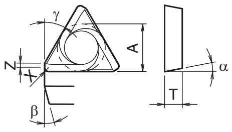
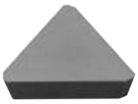
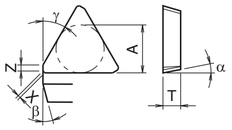
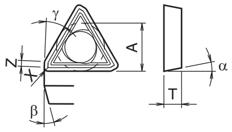
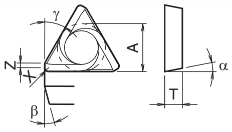
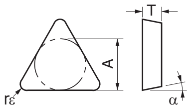
● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts

Milling Inserts

Classification of usage			TN60	TN100M	TC60M	CA6535	CA420M	PR1535	PR1225	PR1210	PR830	KW10
★ : Roughing / 1st Choice ☆ : Roughing / 2nd Choice ■ : Finishing / 1st Choice ☐ : Finishing / 2nd Choice (In case hardness is under 45HRC)	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		PVD Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	X	Z	rε	α	β	γ	TN60	TN100M	TC60M	CA6535	CA420M	PR1535	PR1225	PR1210	PR830	KW10	
		**TEKN 1603PTTR**	9.525	3.18	R0.8	1.0	-	20°	22°	30°		●					●				**M113**
					0.7	1.4												●			
		1603PTFR																		●	
		TEEN 2204PTTR	12.70	4.76	R1.0							●									**M94** **M95**
		TEKN 2204PTTR										●					●		●		
					0.7													●			
		2204PTFR																		●	
		**TEKR 2204PTER-S**	12.70	4.76	R1.0	1.4	-	20°	22°	30°		●					●		●		**M94** **M95**
		**TEMR 1603PTER-H**	9.525	3.18	R0.8	1.2	-	20°	22°	30°							●				**M113**
		TEMR 2204PTER-H	12.70	4.76	R1.0	1.4											●		●		**M94** **M95**
		**TPKN 1603PDTR**	9.525	3.18	0.7	1.2	-	11°	15°	30°		●					●	●			**-**
		1603PDFR																		●	
		TPKN 2204PDTR	12.70	4.76	0.7	1.6						●					●	●			**M95**
		2204PDFR																		●	
		**TPKR 2204PDER-S**	12.70	4.76	R1.0	1.4	-	11°	15°	30°		●					●				
		**TPMR 1603PDER-H**	9.525	3.18	R0.8	1.2	-	11°	15°	30°							●				**-**
		TPMR 2204PDER-H	12.70	4.76	R1.0	1.4											●				**M95**
		**TPMN 110304**	6.35	3.18	-	-	0.4	11°	-	-										●	**M113**
		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													●	**M113**
		110304					0.4				●									●	
		110308					0.8				●									●	
		160304	9.525				0.4				●									●	**-**
		160308					0.8				●									●	
		160312					1.2													●	

* MN indicates MEGACOAT NANO.

Cutting Range	Chipbreaker		Features
Finishing - Roughing	S		S chipbreaker 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 for general-purpose cutter. Smooth chip evacuation due to the chipbreaker's smooth rake face. 20% less cutting force than non-chipbreaker type due to 25° rake angled chipbreaker.

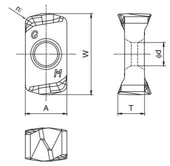
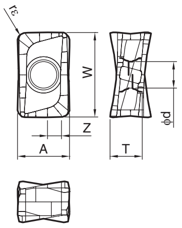
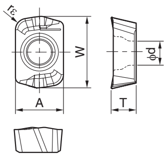
● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

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					☐					

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

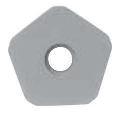
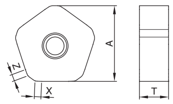
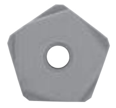
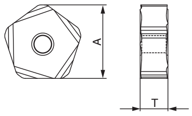
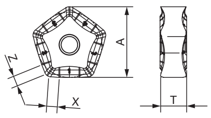
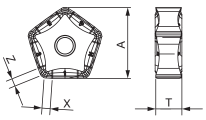
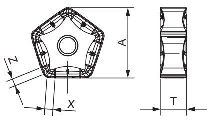
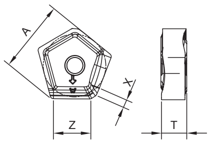
Insert		Description		Dimension (mm)						Angle			Cermet	CVD Coated Carbide		MEGACOAT NANO			MEGA COAT		Silicon Nitride Ceramic	CVD Coated Silicon Nitride Ceramic	Ref. to Page for Applicable Toolholders
Handed Insert shows Right-hand				A	T	ϕd	W (X)	Z	rε	α	β	γ	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	
 General purpose		LOGU	030310ER-GM	6.2	3.96	3.45	11.9	-	1.0	-	-	-		●		●	●	●					M124 M125
 General purpose		LOMU	100404ER-GM	6.6	4.0	3.4	10.9	2.1	0.4	-	-	-		●		●	●	●					M54 M55 M56
			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					●		●	●	●					
 General purpose		LPGT	010210ER-GM	4.19	2.19	2.1	6.26	-	1.0	-	-	-		●		●	●						M130

● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage			TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050
	P	Carbon Steel / Alloy Steel										
		Mold Steel										
★ : Roughing / 1st Choice	M Stainless Steel	Austenitic related										
☆ : Roughing / 2nd Choice		Martensitic related										
■ : Finishing / 1st Choice		Precipitation Hardening										
□ : Finishing / 2nd Choice	K	Gray Cast Iron			★			☆			★	☆
(In case hardness is under 45HRC)		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 NANO			MEGA COAT		Silicon Nitride Ceramic	CVD Coated Silicon Nitride Ceramic	Ref. to Page for Applicable Toolholders
Handed Insert shows Right-hand			A	T	φd	W (X)	Z	rε	α	β	γ	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	
 High speed machining		**PNEA 1106XNTN-T01020**	16.94	6.5	-	1.5	1.5	-	-	-	-									●	●	M32
 High speed machining (With Chipbreaker)		**PNEG 1106XNTR-T00515**	17.07	6.35	-	-	-	-	-	-	-									●	●	
 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**												●		●	●					
 2-Edge With Wiper Edge		**PNEG 1106XNER-W**	18.02				10.0							●		●	●					

M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

● : Std. Item

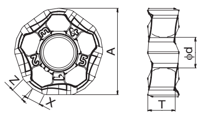
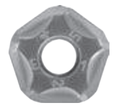
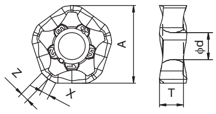
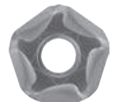
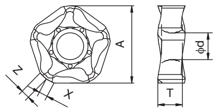
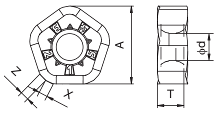
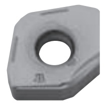
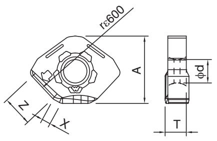
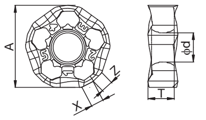
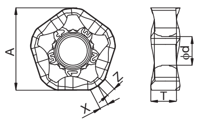
Inserts are sold in 10 piece boxes

PNEG1106XNER-W Inserts are sold in 5 piece boxes

Milling Inserts (With Hole)

Classification of usage			TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050
	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 under 45HRC)

Insert		Description	Dimension (mm)					Angle				Cermet	CVD Coated Carbide		MEGACOAT NANO			MEGA COAT		Silicon Nitride Ceramic	CVD Coated Silicon Nitride Ceramic	Ref. to Page for Applicable Toolholders
			A	T	ϕd	W (X)	Z	rε	α	β	γ	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	
 Surface-Finish Oriented (Precision Class)		**PNEU 1205ANER-GL**	17.51	5.56	6.2	2.7	2.7	-	-	-	-		●		●	●	●	●	●			M26 M27
 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									●		●	●	●	●	●			
 2-Edge With Wiper 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						●		●	●	●					M26
 General purpose		**PNMU 1205ANEL-GM**	17.88			2.0	2.0						●		●	●	●					

● : Std. Item

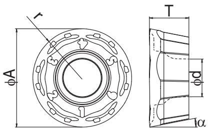
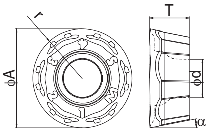
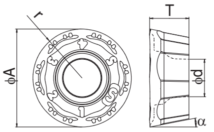
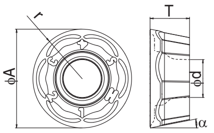
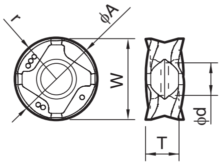
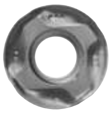
Inserts are sold in 10 piece boxes

PNEU1205ANER-W Inserts are sold in 5 piece boxes

Milling Inserts (With Hole)

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

Classification of usage		TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050
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					☐					

Shape Handed Insert shows Right-hand	Description	Dimension (mm)						Angle			Cermet	CVD Coated Carbide		MEGACOAT NANO			MEGA COAT		Silicon Nitride Ceramic	CVD Coated Silicon Nitride Ceramic	Ref. to Page for Applicable Toolholders
		A	T	ϕd	W (X)	Z	rε (r)	α	β	γ	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	
  General purpose (G Class)	**RDGT 0803M0ER-GM**	8	3.18	3.0	-	-	4	15°	-	-		●		●	●	●					M176 M177
	RPGT 10T3M0ER-GM	10	3.97	3.5			5	11°				●		●	●	●					M175
	1204M0ER-GM	12	4.76	4.6			6					●		●	●	●					M176
	1605M0ER-GM	16	5.56	5.8			8					●		●	●	●					M177
  General purpose (M Class)	**RDMT 0803M0ER-GM**	8	3.18	3.0	-	-	4	15°	-	-		●		●	●	●					M176 M177
	RPMT 10T3M0ER-GM	10	3.97	3.5			5	11°				●		●	●	●					M175
	1204M0ER-GM	12	4.76	4.6			6					●		●	●	●					M176
	1605M0ER-GM	16	5.56	5.8			8					●		●	●	●					M177
  Stainless Steel / Low cutting force	**RDGT 0803M0ER-SM**	8	3.18	3.0	-	-	4	15°	-	-		●		●	●						M176 M177
	RPGT 10T3M0ER-SM	10	3.97	3.5			5	11°				●		●	●						M175
	1204M0ER-SM	12	4.76	4.6			6					●		●	●						M176
	1605M0ER-SM	16	5.56	5.8			8					●		●	●						M177
  Tough Edge (For Heavy Milling)	**RDMT 0803M0EN-GH**	8	3.18	3.0	-	-	4	15°	-	-		●		●	●	●					M176 M177
	RPMT 10T3M0EN-GH	10	3.97	3.5			5	11°				●		●	●	●					M175
	1204M0EN-GH	12	4.76	4.6			6					●		●	●	●					M176
	1605M0EN-GH	16	5.56	5.8			8					●		●	●	●					M177
 General purpose	**ROMU 1204M0ER-GM**	12	4.75	4.6	11.8	-	6	-	-	-		●		●	●	●					M170 M171
	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					●		●	●	●					

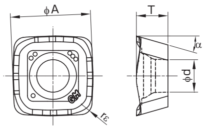
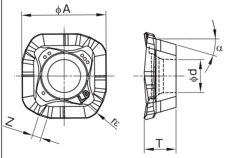
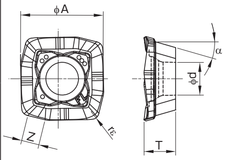
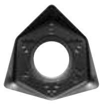
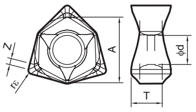
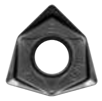
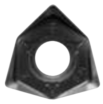
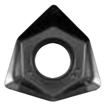
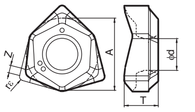
● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage		TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	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					□							

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

Insert		Description	Dimension (mm)						Angle			Cermet	CVD Coated Carbide		MEGACOAT NANO			MEGA COAT		Silicon Nitride Ceramic	CVD Coated Silicon Nitride Ceramic	DLC Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
Handed Insert shows Right-hand			A	T	φd	W (X)	Z	rε	α	β	γ	TN100M	CA6535	CA420M	PR1535	PR1525	PR1510	PR1225	PR1210	KS6050	CS7050	PDL025	GW25	
 General purpose		**SOMT 100420ER-GM**	10.30	4.58	4.6	-	-	2.0	16°	-	-		●		●	●	●							M116 M118 M119 M120
		140520ER-GM	14.14	5.56	5.8								●		●	●	●							
 Large ap		**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					●		●	●	●							
 Surface-Finish Oriented (Precision Class)		**WNEU 080608EN-GL**	14.02	6.65	6.2	-	1.5	0.8	-	-	-		●		●	●	●							M64 M91
 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 (3-edges)		**WNGT 080608FN-AM**					1.5															●	●	

● : Std. Item

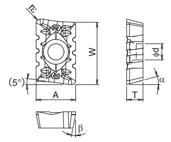
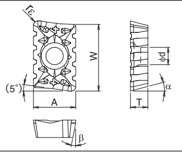
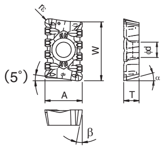
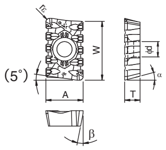
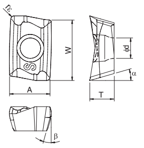
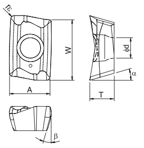
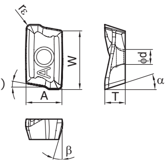
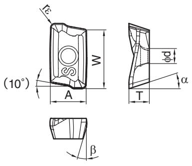
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

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

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	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			PVD Coated Carbide	DLC Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	φd	W (X)	rε (Z)	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	PDL025	GW25	
 3-Notched		**APMT 250608ER-NB3**	15.875	6.35	6.5	25	0.8	15°	11°	-					●	●	●			M104 M105
		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	15°	11°	-					●	●	●			M104 M105
		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	15°	11°	-					●	●	●			M104 M105
 4-Notched / Low Cutting Force		**APMT 250616ER-NB4P**	15.875	6.35	6.5	25	1.6	15°	11°	-					●	●	●			
		**BDMT 070302ER-JS**	4.6	2.6	2.3	6.7	0.2	16°	15°	-		●	●	●			●			M72 M73
		070304ER-JS					0.4					●	●	●			●			
		070308ER-JS					0.8					●	●	●			●			
		**BDMT 070302ER-JT**	4.6	2.6	2.3	6.7	0.2	16°	15°	-		●	●	●		●	●			
		070304ER-JT					0.4					●	●	●		●	●			
		070308ER-JT					0.8					●	●	●		●	●			
 Non-ferrous Metals		**BDGT 11T302FR-JA**	6.7	3.8	2.8	11.0	0.2	18°	13°	-								●	●	M62 M63 M64 M65
		11T304FR-JA					0.4											●	●	
		11T308FR-JA					0.8											●	●	
		BDGT 170404FR-JA	9.6	4.9	4.4	17.0	0.4	18°	13°	-								●	●	
		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	18°	15°	-		●	●	●			●			M62 M63
		110304ER-JS					0.4					●	●	●			●			
		110308ER-JS					0.8					●	●	●			●			
		BDMT 11T302ER-JS	6.7	3.8	2.8	11.0	0.2	18°	13°	-		●	●	●			●			M62 M63 M64 M65
		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					●	●	●			●			

* MN indicates MEGACOAT NANO.

● : Std. Item

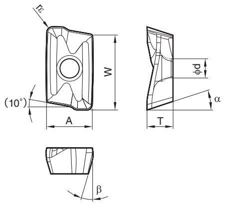
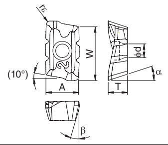
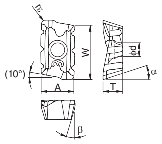
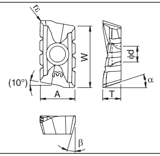
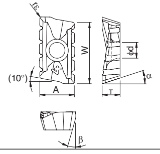
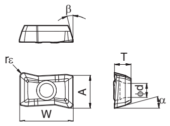
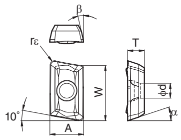
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

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

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			PVD Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	ϕd	W (X)	rε (Z)	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	GW25	
		BDMT 110302ER-JT	6.3	3.0	2.8	11.0	0.2	18°	15°	-		●	●	●		●	●		M62 M63
		110304ER-JT					0.4					●	●	●		●	●		
		110308ER-JT					0.8					●	●	●		●	●		
		BDMT 11T302ER-JT	6.7	3.8	2.8	11.0	0.2	18°	13°	-		●	●	●		●	●		M62 M63 M64 M65
		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	18°	13°	-		●	●	●		●	●		
		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	18°	13°	-			●	●	●	●	●		M80 M81 M82 M83
 3-Notched		BDMT 11T308ER-N3	6.7	3.8	2.8	11.0	0.8	18°	13°	-			●	●	●	●	●		
 3-Notched		BDMT 170408ER-N3	9.6	4.9	4.4	17.0	0.8	18°	13°	-			●	●	●	●	●		
 4-Notched		BDMT 170408ER-N4	9.6	4.9	4.4	17.0	0.8	18°	13°	-			●	●	●	●	●		
		GOMT 08T208ER-D	5.21	2.78	2.3	8.7	0.8	13°	17°	-				●		●	●		M134
		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	17°	13°	-				●		●	●		
		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

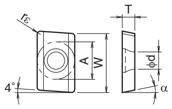
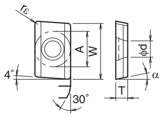
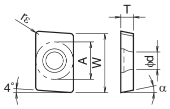
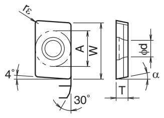
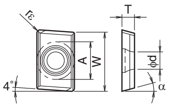
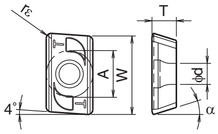
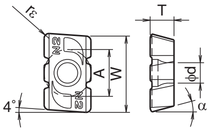
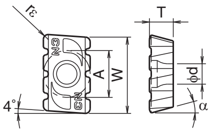
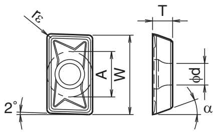
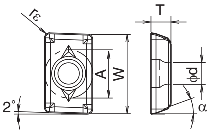
Milling Inserts

Milling Inserts (With Hole)

Classification of usage

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

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	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			PVD Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	ϕd	W (X)	rε (Z)	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	KW10	
		NDCT 090204TR	6.35	2.38	2.8	9.5	0.4	15°	-	-	●								M109
		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°	-	-	●								M110
		150308FR																●	
		NDCT 150308TRX	9.525	3.18	4.4	15.0	0.8	15°	-	-	●								M110 M111
		NDCW 150302TR	9.525	3.18	4.5	15.0	0.2	15°	-	-	●								M110
		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°	-	-	●								M110 M111
		150308FRX																●	
		NDMM 090204ER-SP	6.35	2.38	2.8	9.5	0.4	15°	-	-	●								M109
		NDMM 120204ER-SP	7.94	2.38	3.4	12.7	0.4				●								
		120208ER-SP					0.8				●								
		NDMM 150304ER-SP	9.525	3.18	4.4	15.0	0.4				●								M110
		150308ER-SP					0.8				●								M111
		NDMM 12T308ER-T	7.58	3.97	3.4	12.7	0.8	15°	-	-	●						●	●	-
 2-Notched		NDMM 12T308ER-N2	7.79	3.97	3.4	12.7	0.8	15°	-	-	●						●	●	
 3-Notched		NDMM 12T308ER-N3	7.79	3.97	3.4	12.7	0.8	15°	-	-	●						●	●	
		NDMT 080208ER-D	5.086	2.38	2.2	8.5	0.8	15°	-	-	●			●		●		●	M138
		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.

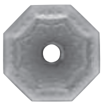
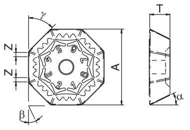
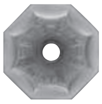
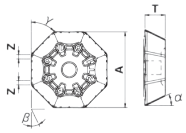
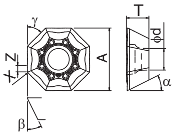
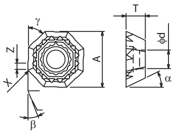
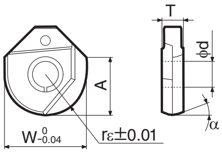
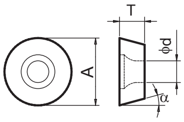
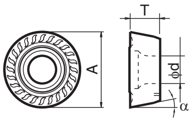
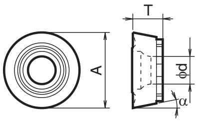
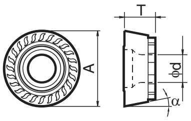
● : Std. Item

Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage			Cermet TN100M	CVD Coated Carbide CA6535	MN PR1535	MEGACOAT PR1225	MEGACOAT PR1230	MEGACOAT PR1210	PVD Coated Carbide PR830	PVD Coated Carbide PR915	Carbide 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					□	□		□		

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

Insert Handed Insert shows Right-hand		Description		A	T	ϕd	W	rε	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	PR915	KW10	Ref. to Page for Applicable Toolholders
		OFMR	070405EN-SH	17.98	4.94	-	-	Z= 1.2	26°	26°	45°				○		○	○			M36
		OFMR	070408EN-GT	17.85	5.14	-	-	Z= 1.1							○		○	□			
		OFMT	050405EN-GT	13.35	4.83	4.6	X= R0.5	Z= 1.4	26°	26°	45°				●		●	●			M34
			070408EN-GT	17.85	5.12	5.9	X= R0.8	Z= 1.2							●		●	●			
		OFMT	050405ER-SH	13.47	4.76	4.4	X= R0.5	Z= 1.7	26°	22°	45°				●		●	●			
			070405EN-SH	17.98	4.87	5.8		-		26°					●		●	●			
		RDFG	08FR	6.6	2.1	3.1	8.0	4.0	15°	-	-								●		M166
			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°	-	-					●	●			●	M180
 Low cutting force		RPMT	10T3M0	10.0	3.97	3.4	-	-	11°	-	-					●	●			●	M180 M181
			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										●	●			●	M181

* MN indicates MEGACOAT NANO.

● : Std. Item
○ : Check Availability
□ : Deleted from the next catalogue

RDFG Inserts are sold in 2 piece boxes

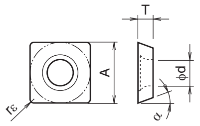
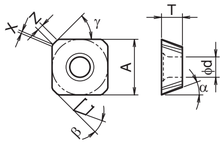
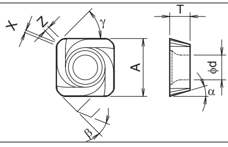
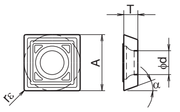
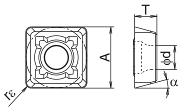
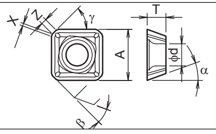
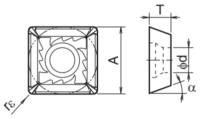
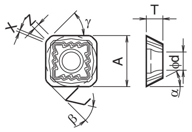
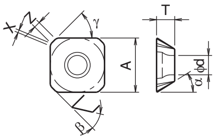
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

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

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	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	Ref. to Page for Applicable Toolholders
Handed Insert shows Right-hand				A	T	φd	W (X)	rε (Z)	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	KW10	
		SDKW	09T204TN	9.525	2.78	3.4	-	0.4	15°	-	-	●			●					M186
			09T204FN																●	
		SEKW	120304TN	12.70	3.18	5.5			20°			●			●					
			120304FN																●	
			120308TN					0.8				●			●					
			120308FN																●	
		SDKW	1204AESN	12.70	4.76	5.5	X=R1.0	Z=1.5	15°	20°	45°				●					-
			1204AETN														●			
		SEKW	1204AFTN				X=0.5	Z=1.7	20°	25°					●		●			-
		SDMT	1204AESR-H	12.70	4.76	5.5	X=R1.0	Z=0.8	15°	20°	45°				●					-
Low cutting force		SDMT	09T204C	9.525	2.78	3.4	-	0.4	15°	-	-	●			●				●	M186
		SEMT	120304C	12.70	3.18	5.5	-	0.4	20°	-	-				●				●	
		SDMT	060304E-K	6.35	3.18	2.8	-	0.4	15°	-	-					●	●		●	M190
			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	X=0.5	Z=1.7	20°	25°	45°				●					-
		SEMM	09T308PESR	9.525	3.97	3.4	-	0.8	20°	-	-	○							○	M97
			150408PESR	15.875	4.76	5.5						○			○		○	○	○	M96 M97
		SOMT	0903AXEN-J	9.525	3.18	3.4	X=0.5	Z=1.1	27°	32°	45°	○							○	M45
		SOMW	0903AXTN	9.525	3.18	3.4	X=0.5	Z=1.1	27°	32°	45°	○								
			0903AXFN																○	

* MN indicates MEGACOAT NANO.

Inserts are sold in 10 piece boxes

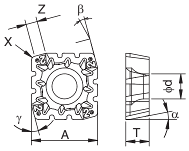
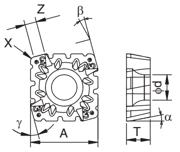
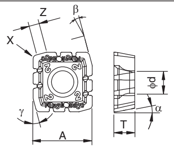
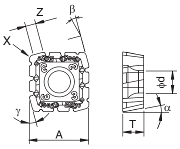
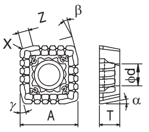
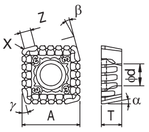
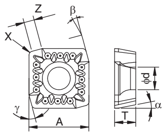
● : Std. Item
○ : Check Availability

Milling Inserts (With Hole)

Classification of usage

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

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	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	Ref. to Page for Applicable Toolholders
Handed Insert shows Right-hand			A	T	ϕd	W	rε	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	KW10	
 2-Notched / General purpose		**SPMT 1806EDER-NB2**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°				●	●	●	●		M48
 3-Notched / General purpose		**SPMT 1806EDER-NB3**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°				●	●	●	●		
 2-Notched / Tough Edge		**SPMT 1806EDSR-NB2T**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°					●	●	●		M48
		SPMT 1806EDSL-NB2T													●		☐		-
 3-Notched / Tough Edge		**SPMT 1806EDSR-NB3T**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°					●	●	●		M48
		SPMT 1806EDSL-NB3T													●		☐		-
 4-Notched / Low cutting force		**SPMT 1806EDER-NB2P**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°				●	●	●	●		M48
 5-Notched / Low cutting force		**SPMT 1806EDER-NB3P**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°				●	●	●	●		
 Without notch		**SPMT 1806EDER-V**	18	6.35	6.8	X= R1.2	Z= 3.1	11°	15°	15°				●	●	●	●		

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☐ : Deleted from the next catalogue

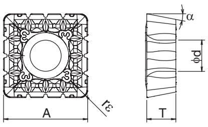
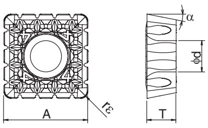
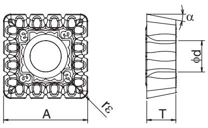
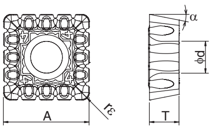
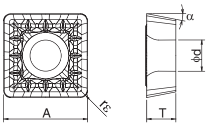
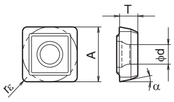
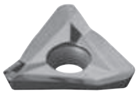
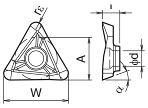
Inserts are sold in 10 piece boxes

Milling Inserts (With Hole)

Classification of usage

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

		TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	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			PVD Coated Carbide	Carbide	Ref. to Page for Applicable Toolholders
			A	T	ϕd	W	rε	α	β	γ	TN100M	CA6535	PR1535	PR1225	PR1230	PR1210	PR830	KW10	
 3-Notched		**SPMT 180616EN-NB3**	18	6.35	6.8	-	1.6	11°	-	-					●	●			M100
 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°	-	-				●		●		●	M188
		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°	-	-								●	M112

* MN indicates MEGACOAT NANO.

● : Std. Item

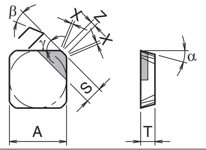
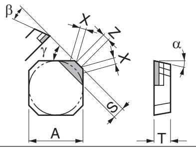
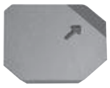
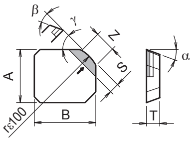
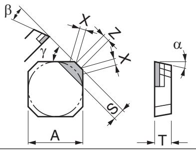
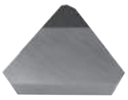
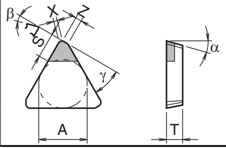
Inserts are sold in 10 piece boxes

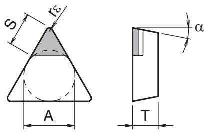
Milling Inserts (PCD)

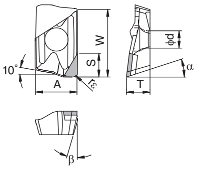
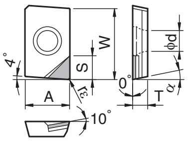
Classification of usage

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

		KPD001	KPD010	KPD230	
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			PCD				Ref. to Page for Applicable Toolholders
				A	T	X	Z	S	B	α	β	γ	KPD001	KPD010	KPD230		
		SDKN	1203AUFN-NE	12.70	3.18	0.5	1.2	3.1	-	15°	23°	45°	●				M43
			1203AUFN					3.6					●	●			
		SEEN	1203AFFN-NE	12.70	3.18	0.5	1.4	3.0	-	20°	25°	45°	●				M38 M39 M40
			1203AFFN					3.5					●	●			
 With Wiper Edge		SEEN	1203AFFR-W	12.50	3.18	-	3.5	1.7	14.56	20°	25°	45°	●				M40
		SOKN	13T3AXFN-NE	13.494	3.97	0.4	1.1	3.0	-	27°	32°	45°			○		M44
		TEEN	1603PTFR-NE	9.525	3.18	0.6	1.4	4.1	-	20°	22°	30°	●		●		M113
			1603PTFR					4.7					●	●			
		TEKN	2204PTFR-NE	12.70	4.76	0.7	1.8	4.2	-	20°	22°	30°	●		●		M94 M95
			2204PTFR					4.8					●	●			

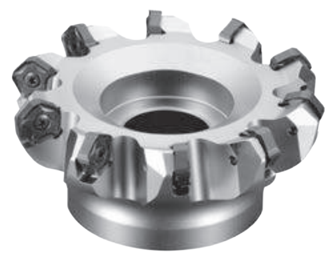
Insert		Description		Dimension (mm)						Angle			PCD				Ref. to Page for Applicable Toolholders
				A	T	rε	S			α			KPD001	KPD010	KPD230		
		TPGN	110302	6.35	3.18	0.2	3.9			11°			●	●			M113
			110304			0.4	3.7						●	●			
			110308			0.8	3.4							●			

Insert Handed Insert shows Right-hand		Description		Dimension (mm)						Angle			PCD				Ref. to Page for Applicable Toolholders
				A	T	φd	W	rε	S	α	β		KPD001	KPD010	KPD230		
		BDMT	11T302FR	6.7	3.8	2.8	11.0	0.2	3.6	18°	13°		●		●		M62 M63 M64 M65
			11T304FR					0.4					●		●		
		BDMT	170402FR	9.6	4.9	4.4	17.0	0.2	4.4	18°	13°		●		●		
			170404FR					0.4					●		●		
		NDCW	150302FRX-NE	9.525	3.18	4.4	15.0	0.2	5.1	15°	-		●		●		M111
			150302FRX						5.7				●	●			

● : Std. Item
○ : Check Availability

CBN & PCD Inserts are sold in 1 piece boxes

MFPN45 Face Mill



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

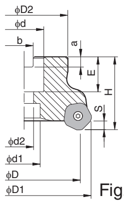


Fig.1

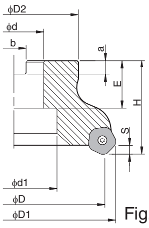


Fig.2

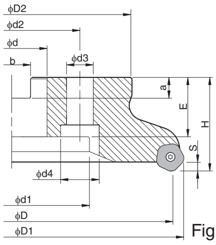


Fig.3

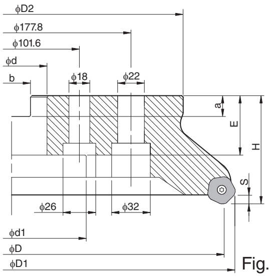


Fig.4

Toolholder Dimensions

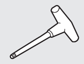
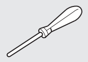
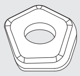
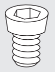
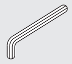
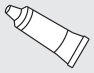
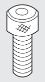
Description			Std.		No. of Inserts	Dimension (mm)												Drawing	Weight (kg)	Shim
			R	L		φD	φD1	φD2	φd	φd1	φd2	H	E	a	b	φd3	φd4			
Metric	Coarse pitch	MFPN 45063R-4T-M	●		4	63	76	47	22	19	11	40	21	6.3	10.4	-	-	Fig.1	0.5	Yes
		45080R-5T-M	●		5	80	93	60	27	22	13	50	24	7	12.4				1.1	
		45100R-6T-M	●		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	
		45160R-16T-M	●		16	160	173	102		68	66.7					14	20	Fig.3	3.9	
		45200R-18T-M	●		18	200	213	142	60	110	101.6		40	14	25.7	18	26		6.6	
		45250R-20T-M	●		20	250	263												9.3	
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	

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

Recommended Cutting Conditions ➡ M28

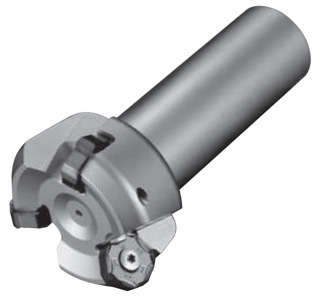
● : Std. Item
MTO : Made to order

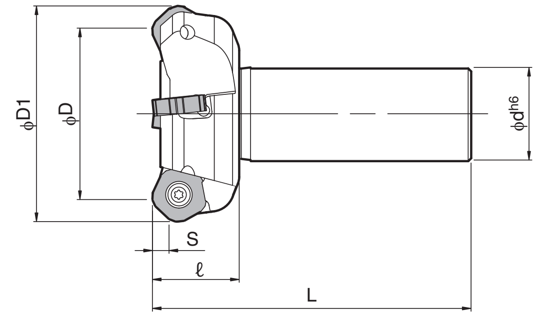
Spare Parts (common to Metric / Inch spec)

Description		Spare Parts							
		Clamp Screw	Wrench		Shim	Shim Screw	Wrench	Anti-seize Compound	Mounting bolt
			TT	DTM					
									
Coarse pitch	**MFPN 45063R-4T-M**	SB-50140TR	TT-15	-	MFPN-45	SPW-7050	LW-5	MP-1	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	TT-15	-	-	-	-	MP-1	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	-	-	-	MP-1	HH10X30
	MFPN 45080R-8T(-M)								HH12X35
	MFPN 45100R-10T(-M) ~ **45250R-20T(-M)**		for Insert Clamp Tightening torque 3.5N·m						-

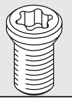
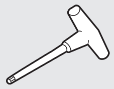
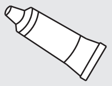
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

MFPN45 with cylindrical shank





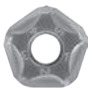
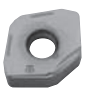
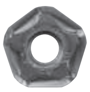
Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts		
											Clamp Screw	Wrench	Anti-seize Compound
			φD	φD1	φd	L	ℓ	S	A.R. (MAX.)	R.R.			
MFPN 45050R-S32-3T	●	3	50	63	32	110	30	6 (5)	+10°	-12°	SB-50140TR	TT-15	MP-1
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.

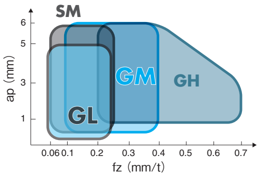
* Dimension S: 6 mm (GM, SM, GH Chipbreakers), 5 mm (GL Chipbreaker), 3 mm (W Chipbreaker)

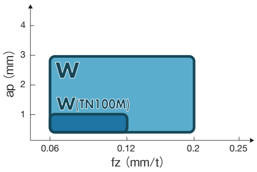
Applicable Inserts (Common for face mill and end mill)

Description	Applicable Inserts ➔ **M15**						
							
MFPN45...R-...	PNMU 1205ANER-GM	PNMU 1205ANER-SM	PNMU 1205ANER-GH	PNEU 1205ANER-GL	PNEU 1205ANER-W	-	-
MFPN45...L-...	-	-	-	-	-	PNMU 1205ANEL-GM	PNEU 1205ANEL-GL

Recommended Cutting Conditions ➔ **M28**

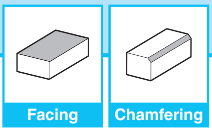
Applicable Chipbreaker Range





● : 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 Over, fz=0.35mm/t 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 Over, fz=0.35mm/t Over)	●					●		
Improved Surface Finish in High Efficiency Milling		●	●					●

How to use wiper insert

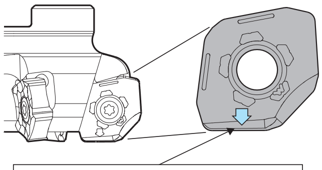
1) Please use one wiper insert on one cutter.
(If you use more than 2 inserts on one cutter, the workpiece surface may be muddy white.)

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)	Recommended Insert Grades (Cutting Speed Vc: m/min)			
			MEGACOAT NANO (MEGACOAT)			CVD Coated Carbide
			PR1535	PR1525 (PR1225)	PR1510 (PR1210)	CA6535
GM	**Carbon Steel**	0.1~**0.2**~0.4	☆ 120~**180**~250	★ 120~**180**~250	-	-
	Alloy Steel	0.1~**0.2**~0.4	☆ 100~**160**~220	★ 100~**160**~220	-	-
	Mold Steel	0.1~**0.2**~0.35	☆ 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 *1(GL)	**Carbon Steel**	0.06~**0.12**~0.25	☆ 120~**180**~250	☆ 120~**180**~250	-	-
	Alloy Steel	0.06~**0.12**~0.25	☆ 100~**160**~220	☆ 100~**160**~220	-	-
	Mold Steel	0.06~**0.1**~0.2	☆ 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

★: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 under fz=0.4mm/t)
Extra fine pitch (without shim)	✓	✓	N/A

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 (ref. to 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.

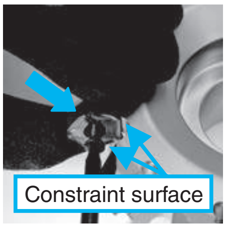


Fig.1

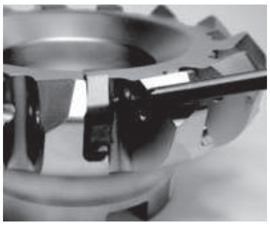


Fig.2

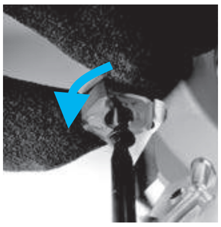


Fig.3

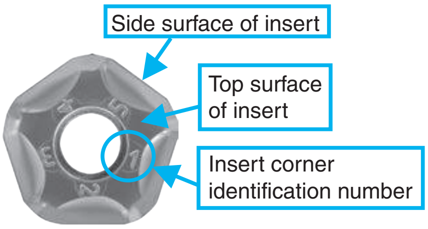


Fig.4 (Right-hand insert)

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.

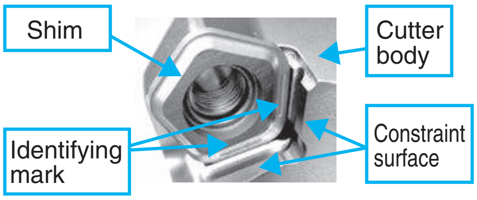


Fig.5

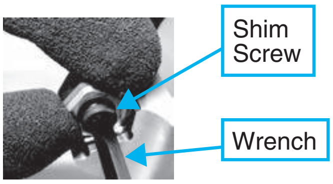


Fig.6

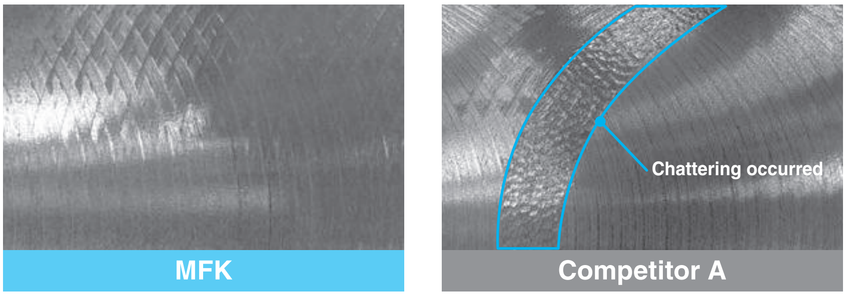
MFK Cutter for Cast Iron NEW

MFK

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

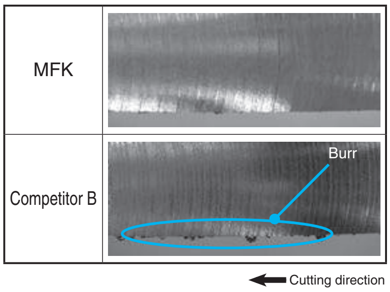
MFK reduces cutting force by good balanced design
Excellent surface finish by controlling chattering

Surface finish comparison



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

Burr comparison

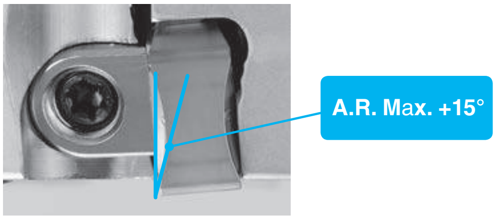


Sharp cutting prevents burr formation

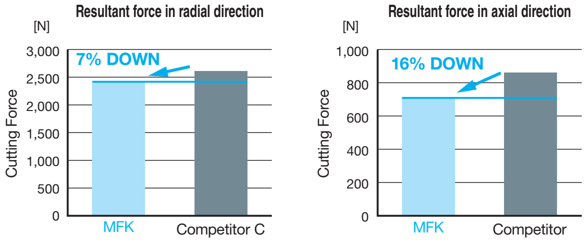
Two points

Two special insert structures reduce cutting force and improve edge strength

POINT.1 Low cutting force due to helical cutting-edge design

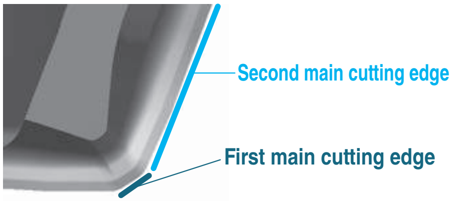


- **Cutting Force Comparison**

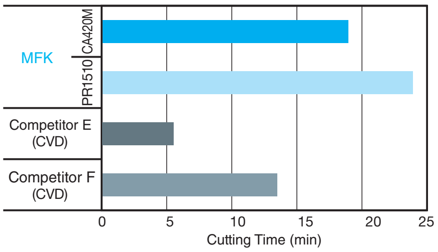


<Cutting Conditions>
Workpiece Material：FCD600, Dry, ϕ125
Vc=180m/min, fz=0.3mm/t, ap×ae=3.0×62mm

POINT.2 Dual Cutting Edge Design (High Toughness)



- **Fracture Resistance Comparison**



<Cutting Conditions>
Workpiece Material:
FCD450 with 4 bores
Vc=300m/min
fz=0.5mm/t
ap=2.0mm
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 : ϕ125 12 inserts)

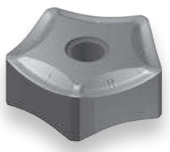
- Recommended for low rigid workpiece
- For wide application range

Extra fine pitch (Example : ϕ125 18 inserts)

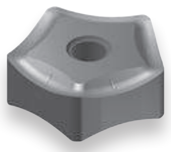
- Recommended for high rigid workpiece
- For high efficiency machining

Applicable to various applications with wide range lineup of chipbreakers

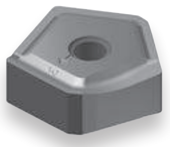
General purpose：
GM Chipbreaker



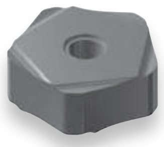
Tough Edge：
GH Chipbreaker



Finishing：
GL Chipbreaker (Ground)



With Wiper Edge：
W Chipbreaker (Ground)



High speed machining :
Ceramic with chipbreaker

New milling CVD grade CA420M realizes long tool life and stable machining

Kyocera's unique crystal control technology and advanced layer adhesion lead CVD coating to the next stage

Longer tool life

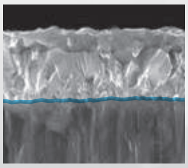
Control α-Al_2O_3 crystal growth for improving wear resistance and fracture resistance

CA420M

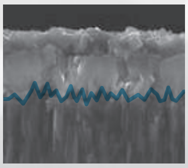
Conventional

Prevents peeling of coating layer

40% improved layer adhesion by optimized interface



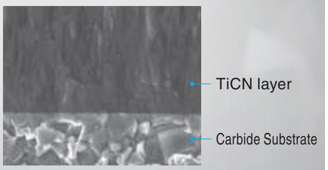
CA420M



Conventional

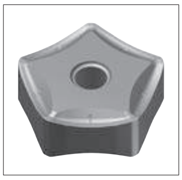
Control chipping

Higher layer strength and fracture resistance with high aspect ratio TiCN

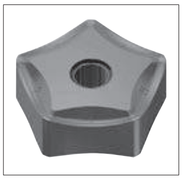


CA420M

Insert grade lineup

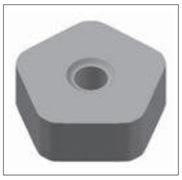


Long tool life
CA420M
(1st recommendation)



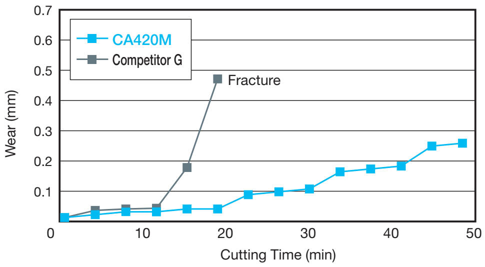
Stable machining
PR1510

Fracture resistance
PR1525



High speed machining
KS6050 / CS7050

Wear Resistance Comparison



<Cutting Conditions>
Workpiece Material：FCD450, Dry
V_C=200m/min, f_z=0.3mm/t, a_p×a_e=2.0×80mm

MFK Face Mill

MFK Face Mill

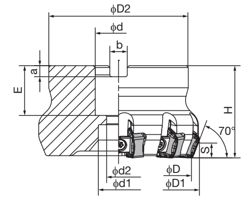


Fig.1

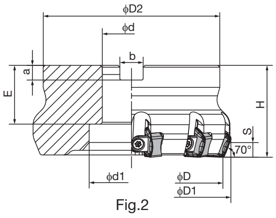


Fig.2

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

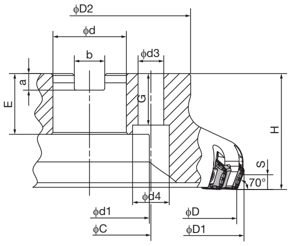


Fig.3

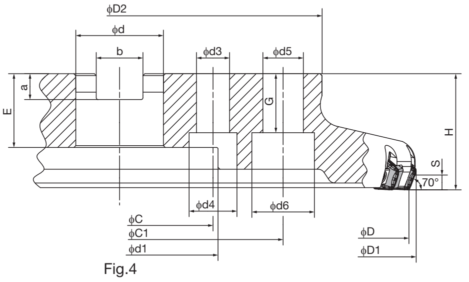
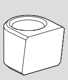
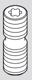
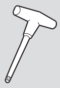
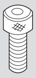


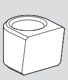
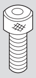
Fig.4

Toolholder Dimensions

		Description	Std.	No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)
					ϕD	ϕD1	ϕD2	ϕd	ϕd1	ϕd2	H	E	a	b	s	ϕd3	ϕd4	ϕd5	ϕd6	ϕC	ϕC1	G		
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
		100R-11-10T-M	●	10	100	109	96	32	26	17		28	8	14.4										2.99
		125R-11-12T-M	●	12	125	134	100	40	55	–		33	9	16.4									Fig.2	3.56
		160R-11-16T-M	●	16	160	169			70							14	20			66.7		28	Fig.3	4.51
		200R-11-20T-M	●	20	200	209	142	60	110			40	14	25.7		18	26			101.6		32		7.35
		250R-11-24T-M	●	24	250	259																		10.43
		315R-11-28T-M	MTO	28	315	324	220											22	32		177.8		Fig.4	19.41
	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
		100R-11-14T-M	●	14	100	109	96	32	26	17		28	8	14.4										2.86
		125R-11-18T-M	●	18	125	134	100	40	55	–		33	9	16.4									Fig.2	3.38
		160R-11-22T-M	●	22	160	169			70							14	20			66.7		28	Fig.3	4.32
		200R-11-28T-M	●	28	200	209	142	60	110			40	14	25.7		18	26			101.6		32		7.10
		250R-11-36T-M	●	36	250	259																		10.07
		315R-11-44T-M	MTO	44	315	324	220											22	32		177.8		Fig.4	18.92
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
		100R-11-10T	○	10	100	109	96																	2.98
		125R-11-12T	○	12	125	134	100	38.1	55	–		38	10	15.9									Fig.2	3.65
		160R-11-16T	○	16	160	169		50.8	70				11	19.1										4.62
		200R-11-20T	○	20	200	209	142	47.625	110			40	14	25.4		18	26			101.6		32	Fig.3	7.65
		250R-11-24T	○	24	250	259																		10.73
		315R-11-28T	MTO	28	315	324	220											22	32		177.8		Fig.4	19.71
	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
		100R-11-14T	○	14	100	109	96																	2.85
		125R-11-18T	○	18	125	134	100	38.1	55	–		38	10	15.9									Fig.2	3.44
		160R-11-22T	○	22	160	169		50.8	70				11	19.1										4.44
		200R-11-28T	○	28	200	209	142	47.625	110			40	14	25.4		18	26			101.6		32	Fig.3	7.40
		250R-11-36T	○	36	250	259																		10.36
		315R-11-44T	MTO	44	315	324	220											22	32		177.8		Fig.4	19.21

Spare Parts and Applicable Inserts

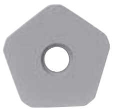
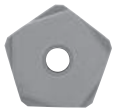
Description	Spare Parts				Applicable Inserts ➡M14
	Wedge	Wedge screw	Wrench	Mounting bolt	
					
MFK 080R-11-8T-M	C09N	W6X18N	TT-15	HH12X35	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTR-T01020 PNEG1106XNTR-T00515
100R-11-10T-M				HH16X40	
125R-11-12T-M				–	
160R-11-16T-M					
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 PNEA1106XNTR-T01020 PNEG1106XNTR-T00515
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 ➡M14
	Wedge	Wedge screw	Wrench	Mounting bolt	
					
MFK 080R-11-8T	C09N	W6X18N	TT-15	HH16X40	PNMG1106XNEN-GM PNMG1106XNEN-GH PNEG1106XNEN-GL PNEG1106XNER-W PNEA1106XNTR-T01020 PNEG1106XNTR-T00515
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 PNEA1106XNTR-T01020 PNEG1106XNTR-T00515
100R-11-14T					
125R-11-18T				–	
160R-11-22T					
200R-11-28T					
250R-11-36T					
315R-11-44T					

● : Std. Item
MTO : Made to order

Applicable Inserts

Description	Applicable Inserts ➡ **M14**			
	 General purpose	 Tough Edge	 Surface-Finish Oriented	 2-Edge With Wiper Edge
MFK...-11-...	PNMG1106XNEN-GM	PNMG1106XNEN-GH	PNEG1106XNEN-GL	PNEG1106XNER-W

Description	Applicable Inserts ➡ **M14**	
	 High speed machining	 High speed machining (With Chipbreaker)
MFK...-11-...	PNEA1106XNTN-T01020	PNEG1106XNTR-T00515

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
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 Recommended ☆:2nd Recommended

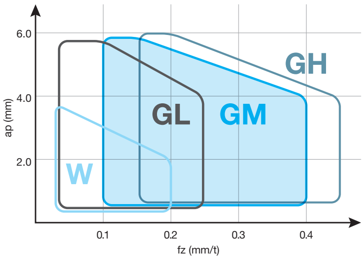
Recommended Cutting Conditions (Ceramic)

Workpiece Material	Insert Grades	Cutting Speed Vc (m/min)	Edge Prep.	fz (mm/t)
				0.05 0.1 0.2 0.3 0.4
Cast Iron	KS6050★ CS7050☆	600~**900**~1,200	0.10×20°	●0.1
Nodular Cast Iron	KS6050☆ CS7050★	400~**600**~900		

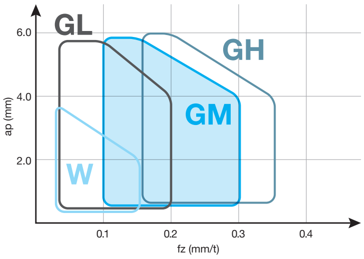
★:1st Recommended ☆:2nd Recommended

Recommended application range

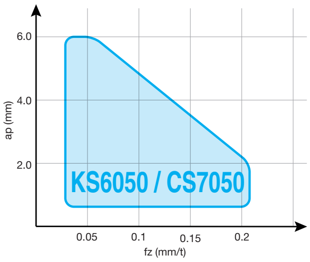
Workpiece Material:
Gray Cast iron
(Insert Grades : Coated Carbide)



Workpiece Material:
Nodular Cast Iron
(Insert Grades : Coated Carbide)



Workpiece Material:
Gray Cast Iron / Nodular Cast Iron
(Insert Grades : Ceramic)



* Notes)

1. When using W type, please use together with GM or GH.
2. If machining over fz=0.2, insert corner will be damaged.
   The main cutting edge of W type 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.

MOF45 Face Mill (05 type / 07 type)

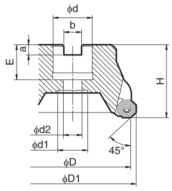


Fig.1

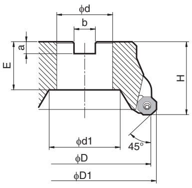


Fig.2

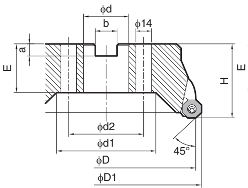


Fig.3

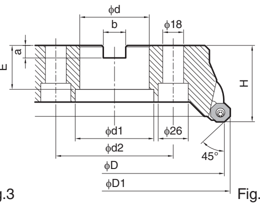


Fig.4

Rake Angle	
A.R.	R.R.
+15°	+5°

Toolholder Dimensions

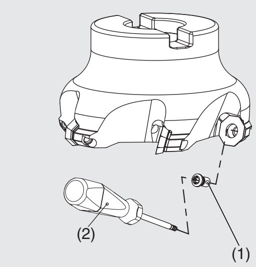
Description			Std.	No. of Inserts	Dimension (mm)										Drawing	Weight (kg)	Applicable Inserts M21
					ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S			
Metric	**MOF**	**45040R-05-3T-M**	●	3	40	49	16	13.5	8.5	40	19	5.6	8.4	-	Fig.1	0.3	OFMT05 type
		45050R-05-4T-M	●	4	50	59	22	17	11		21	6.3	10.4			0.4	
		45063R-05-5T-M	●	5	63	72										0.6	
		45080R-05-6T-M	●	6	80	89	27	20	13	50	24	7	12.4			1.1	
		45100R-05-7T-M	●	7	100	109	32	45	-		32	8	14.4		Fig.2	1.8	
		45125R-05-8T-M	●	8	125	134	40	55		63	33	9	16.4			3.7	
		45160R-05-10T-M	●	10	160	169	40	88	66.7		30				Fig.3	5.1	
		45200R-05-12T-M	●	12	200	209	60	68	101.6		38	14	25.7		Fig.4	8.0	
	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	
		45125R-07-8T-M	●	8	125	137	40	55		63	33	9	16.4			3.7	
		45160R-07-10T-M	●	10	160	172		88	66.7		30				Fig.3	5.1	
		45200R-07-12T-M	●	12	200	212	60	68	101.6		38	14	25.7		Fig.4	8.0	
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	
		45125R-05-8T	○	8	125	134	38.1	55		63	38	10	15.9			3.7	
		45160R-05-10T	○	10	160	169	50.8	88				11	19.1			5.1	
		45200R-05-12T	○	12	200	209	47.625	68	101.6			14	25.4		Fig.4	8.0	
	MOF	**45080R-07-5T**	○	5	80	92	25.4	20	13	50	26	6	9.5	-	Fig.1	1.2	OFMT07 type
		45100R-07-6T	○	6	100	112	31.75	45	-		32	8	12.7		Fig.2	1.8	
		45125R-07-8T	○	8	125	137	38.1	55		63	38	10	15.9			3.7	
		45160R-07-10T	○	10	160	172	50.8	88				11	19.1			5.1	
		45200R-07-12T	○	12	200	212	47.625	68	101.6			14	25.4		Fig.4	8.0	

Spare Parts

Description		(1) Clamp Screw	(2) Wrench	Mounting bolt
MOF	**45040R-05-3T-M**	SB-4082TPR	DTP-15	HH8X25
	45050R-05-4T-M			HH10X30M
	45063R-05-5T-M			
	45080R-05-6T-M			HH12X35M
	45100R-05-7T-M			-
	45125R-05-8T-M			
	45160R-05-10T-M			
	45200R-05-12T-M			
MOF	**45063R-07-4T-M**	SB-50120TRS	DTP-15	HH10X30S
	45080R-07-5T-M			HH12X35M
	45100R-07-6T-M			-
	45125R-07-8T-M			
	45160R-07-10T-M			
	45200R-07-12T-M			
MOF	**45080R-05-6T**	SB-4082TPR	DTP-15	HH12X35M
	45100R-05-7T			-
	45125R-05-8T			
	45160R-05-10T			
	45200R-05-12T			
MOF	**45080R-07-5T**	SB-50120TRS	DTP-15	HH12X35M
	45100R-07-6T			-
	45125R-07-8T			
	45160R-07-10T			
	45200R-07-12T			

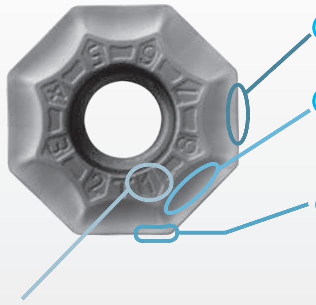
Max. ap and usable edges

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



● : Std. Item

General purpose “SH Chipbreaker”, Tough Edge type “GT Chipbreaker”

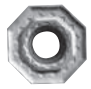


(1) High Fracture Resistance
Large land is applied

(2) Low Cutting Force
Great effect on high feed ratio range

(3) With Wiper Edge
Having best angle of full profile edge, surface finish is greatly improved

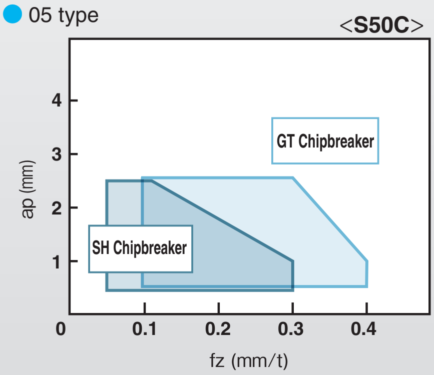
(4) With corner identification mark

	OFMT05 type	OFMT07 type
GT Chipbreaker (Tough Edge)		
SH Chipbreaker (General purpose)		

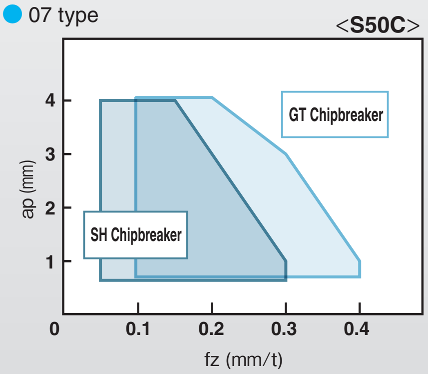
Note 1) OFMT07 type insets cannot be used for MOFX cutters (Ref. to page **M36**).

Applicable Chipbreaker Range

● 05 type



● 07 type



◆ Recommended Cutting Conditions (MOF / MOFX)

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)		
	GT Chipbreaker (Tough Edge)	SH Chipbreaker (General purpose)	MEGACOAT		PVD Coated Carbide
			PR1225	**PR1210**	**PR830**
Carbon Steel	0.10~**0.25**~0.40	0.10~**0.15**~0.30	★ 120~**180**~250	-	☆ 120~**150**~200
Alloy Steel	0.10~**0.25**~0.35	0.10~**0.15**~0.30	★ 100~**160**~220	-	☆ 100~**150**~180
Mold Steel	0.10~**0.20**~0.35	0.08~**0.12**~0.25	★ 80~**140**~180	-	☆ 80~**120**~150
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 Recommended ☆:2nd Recommended

MOFX45

Facing Chamfering

MOFX45 Face Mill

Rake Angle	A.R.	+15°
	R.R.	+5°

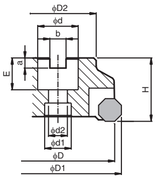


Fig.1

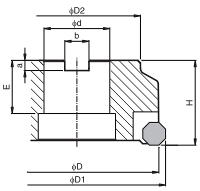


Fig.2

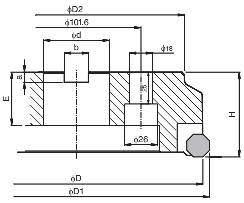


Fig.3

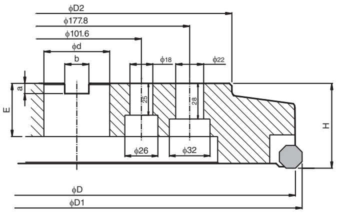
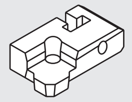
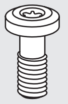
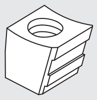
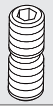
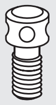


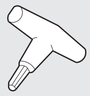
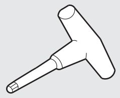
Fig.4

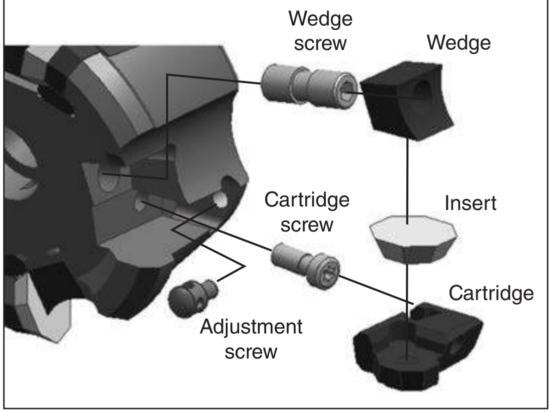
Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm) ϕD	ϕD1	ϕD2	ϕd	ϕd1	ϕd2	a	b	E	H	Drawing	Weight (kg)	Applicable Inserts ➡M21
Metric	**MOFX 45080R07-5T-MSF**	○	5	80	91	70	27	20	14	7	12.4	22	50	Fig.1	1.4	OFMR07 Type
	45100R07-6T-MSF	○	6	100	111	85	32	-	-	8	14.4	28		Fig.2	2.1	
	45125R07-8T-MSF	○	8	125	136	100	40			9	16.4	30	63		3.9	
	45160R07-10T-MSF	○	10	160	171	120				10					6	
	45200R07-12T-MSF	○	12	200	211	140	60			15	25.4	38		Fig.3	7.4	
	45250R07-16T-MSF	○	16	250	261	180									12.6	
	45315R07-20T-MSF	MTO	20	315	326	240								Fig.4	20.7	
Bore Dia. Inch spec	**MOFX 45080R-07-5T-SF**	○	5	80	91	70	25.4	20	14	6	9.5	25	50	Fig.1	1.4	OFMR07 Type
	45100R-07-6T-SF	○	6	100	111	80	31.75	-	-	8	12.7	32		Fig.2	2.1	
	45125R-07-8T-SF	○	8	125	136	100	38.1			10	15.9	38	63		3.9	
	45160R-07-10T-SF	○	10	160	171	120	50.8			11	19.0				5.8	
	45200R-07-12T-SF	○	12	200	211	130	47.625			14	25.4			Fig.3	7.6	
	45250R-07-16T-SF	○	16	250	261	180									12.9	
	45315R-07-20T-SF	MTO	20	315	326	240								Fig.4	20.7	

Spare Parts

Cartridge	Cartridge screw	Wedge	Wedge screw	Adjustment screw
				
LOF07R	SH-50150TR	WOF07R	W8×21	AJ-412

Wrench (for Wedge)	Wrench (for Cartridge)
	
TH-4	TTC-20

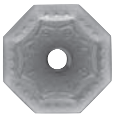


Features

1) The insert is fixed by wedge clamp
2) Good surface finish (Easy edge adjustment)
3) 8-edge insert provides high cost efficiency
4) High axial rake angle and double positive angle on chipbreaker provide low cutting force
5) SH chipbreaker (for general purpose / low cutting force) and GT chipbreaker (Tough edge)

○ : Check Availability
MTO : Made to order

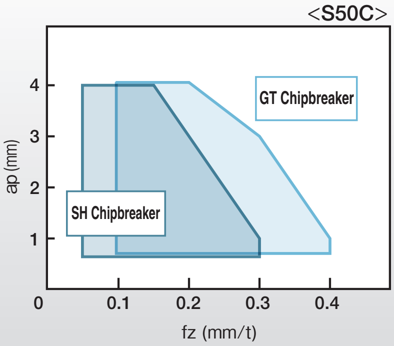
● Applicable Inserts

Description	Applicable Inserts ➡ **M21**	
		
MOFX45...-SF	OFMR 070405EN-SH	OFMR 070408EN-GT

Recommended Cutting Conditions ➡ **M35**

Note 1) OFMR0704○○EN-GT / SH is no hand type.
It can be also used for Left-hand (L) type cutter (special order item).
Note 2) Inserts for MOFX cutter cannot be used for MOF cutters (Ref. to page **M34**).

Chipbreaker range



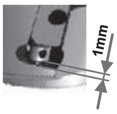
Max. ap and usable edges

Usable edges	Max. ap
	OFMR07 type
4 edges	10mm
8 edges	4mm

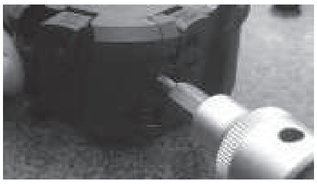
How to Adjust Cutting Edge height

1. Set the edge fluctuation adjustment screw

- Set the distance between the bottom of edge fluctuation adjustment screw and the cutter body to approximately 1 mm.

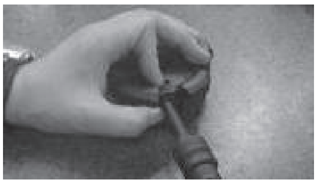


2. Set the cartridge



- Set the cartridge to the cutter body with the cartridge screw. Recommended torque: 5N·m

3. Set the wedge

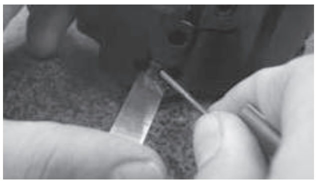


- After setting the insert to the cartridge, set the wedge with the wedge screw. Recommended torque: 6N·m

4. Loosen the screws (Preparation for edge fluctuation adjustment)

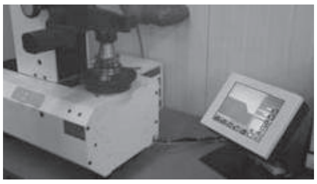
- Loosen the wedge screw by approximately 10°.
- Loosen the cartridge screw by approximately 45°.

5. Adjust the front edge fluctuation



- Measure the front edge fluctuation. With reference to the most protruding edge, turn the edge fluctuation adjustment screw counterclockwise to adjust the front edge fluctuation.

6. Make the final adjustment

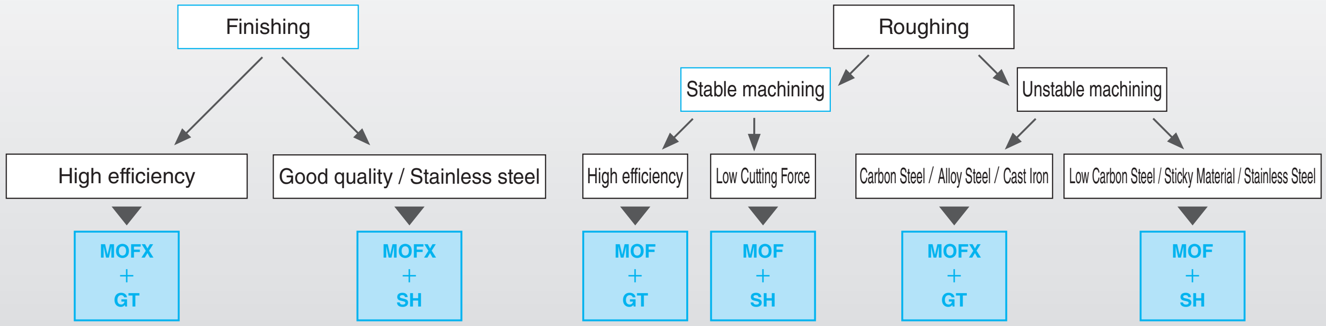


- Tighten the cartridge screw Recommended torque: 5N·m Tighten the wedge screw Recommended torque: 6N·m
- Measure the front edge fluctuation again.

Selection of MOFX / MOF Mill

【MOFX】
High durability of cutter body due to the cartridge design.
Best for finishing due to easy edge adjustment.

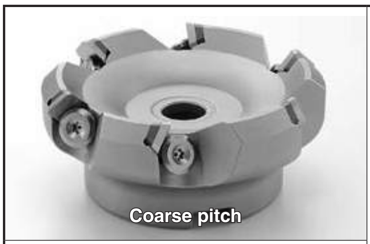
【MOF】(Ref. to page M34)
Excellent chips evacuation when roughing sticky materials such as low carbon steel and stainless steel.

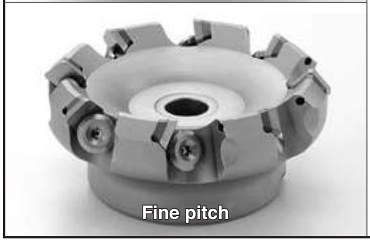


- Finishing
  - High efficiency → **MOFX + GT**
  - Good quality / Stainless steel → **MOFX + SH**
- Roughing
  - Stable machining
    - High efficiency → **MOF + GT**
    - Low Cutting Force → **MOF + SH**
  - Unstable machining
    - Carbon Steel / Alloy Steel / Cast Iron → **MOFX + GT**
    - Low Carbon Steel / Sticky Material / Stainless Steel → **MOF + SH**

MOFX is suitable for more precious machining and unstable machining.

MSE45 Face Mill (Coarse pitch / Fine pitch)





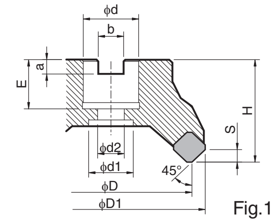


Fig.1

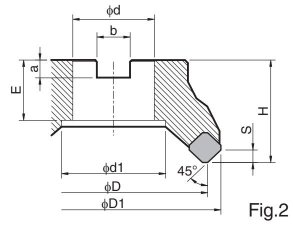


Fig.2

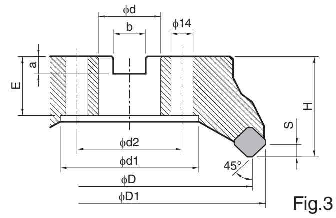


Fig.3

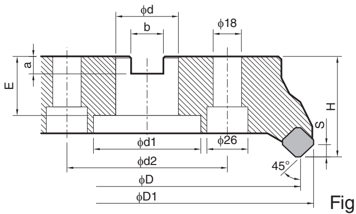
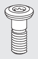
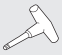
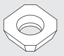
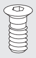
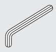


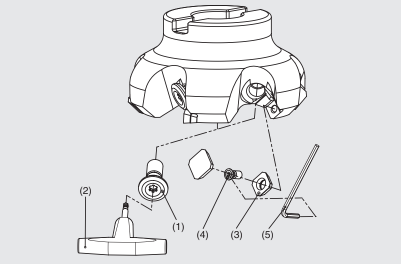
Fig.4

Toolholder Dimensions

Description			Std.	No. of Inserts	Dimension (mm)										Rake Angle		Drawing	Weight (kg)
					ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S	A.R.	R.R.		
Metric	Coarse pitch	**MSE 45040R-3T-M**	○	3	40	53	16	11.5	8.5	45	20	5.6	8.4	6	+20°	-5.0°	Fig.1	0.4
		45050R-4T-M	○	4	50	63	22	17	11	48	21	6.3	10.4			-5.0°		0.5
		45063R-5T-M	○	5	63	76				40						-10°		0.6
		45080R-6T-M	○	6	80	93	27	20	13	50	24	7	12.4			-8.5°		1.1
		45100R-6T-M	○	6	100	113	32	46	-		32	8	14.4			-7.5°	Fig.2	1.8
		45125R-7T-M	○	7	125	138	40	55		63	33	9	16.4			-6.5°		3.4
		45160R-8T-M	☐	8	160	173		88	66.7		30					-5.5°	Fig.3	5.2
		45200R-10T-M	☐	10	200	213	60	68	101.6		32	14	25.7			-5.0°	Fig.4	8.6
	Fine pitch	**MSE 45040R-4T-M**	○	4	40	53	16	11.5	8.5	45	20	5.6	8.4	6	+20°	-5.0°	Fig.1	0.4
		45050R-5T-M	○	5	50	63	22	17	11	48	21	6.3	10.4			-5.0°		0.5
		45063R-6T-M	○	6	63	76				40						-10°		0.6
		45080R-7T-M	○	7	80	93	27	20	13	50	24	7	12.4			-8.5°		1.1
		45100R-8T-M	○	8	100	113	32	46	-		32	8	14.4			-7.5°	Fig.2	1.7
		45125R-9T-M	○	9	125	138	40	55		63	33	9	16.4			-6.5°		3.3
		45160R-10T-M	☐	10	160	173		88	66.7		30					-5.5°	Fig.3	5.1
		45200R-13T-M	☐	13	200	213	60	68	101.6		32	14	25.7			-5.0°	Fig.4	7.4
Bore Dia. Inch spec	Coarse pitch	**MSE 45080R-6T**	○	6	80	93	25.4	20	13	50	26	6	9.5	6	+20°	-8.5°	Fig.1	1.1
		45100R-6T	○	6	100	113	31.75	46	-		32	8	12.7			-7.5°	Fig.2	1.8
		45125R-7T	○	7	125	138	38.1	55		63	38	10	15.9			-6.5°		3.4
		45160R-8T	○	8	160	173	50.8	88				11	19.1			-5.5°		5.2
		45200R-10T	☐	10	200	213	47.625	68	101.6			14	25.4			-5.0°	Fig.4	8.6
	Fine pitch	**MSE 45080R-7T**	○	7	80	93	25.4	20	13	50	26	6	9.5	6	+20°	-8.5°	Fig.1	1.1
		45100R-8T	○	8	100	113	31.75	46	-		32	8	12.7			-7.5°	Fig.2	1.7
		45125R-9T	○	9	125	138	38.1	55		63	38	10	15.9			-6.5°		3.3
		45160R-10T	○	10	160	173	50.8	88				11	19.1			-5.5°		5.1
		45200R-13T	☐	13	200	213	47.625	68	101.6			14	25.4			-5.0°	Fig.4	7.4

Spare Parts

Description	(1) Clamp Screw	(2) Wrench	(3) Shim	(4) Shim Clamp Screw	(5) Wrench
					
MSE 45040R-○T-M **45050R-○T-M**	CP8X15TL (Left-hand Thread)	TTC-25	MSE-4245S	SP4X9	LW-2 (for Shim Clamp Screw)
MSE 45063R-○T-M **~** **45200R-○○T-M** **MSE 45080R-○T** **~** **45200R-○○T**	CP8X23TL (Left-hand Thread)				

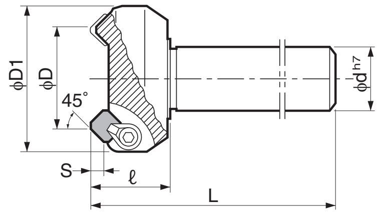


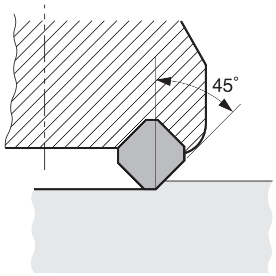
Clamp Screw (1) has Left-hand thread.
Therefore turn the wrench to the right to remove the insert.

- Mounting bolt (SP8X35) is included for MSE45040R-○T-M.
- Mounting bolt (HH10X30S) is included for MSE45050R-○T-M and MSE45063R-○T-M.
- Mounting bolt (HH12X35M) is included for MSE45080R-○T-M and MSE45080R-○T.

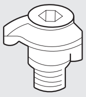
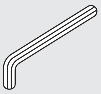
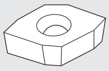
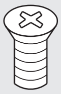
○ : Check Availability
☐ : Deleted from the next catalogue

MSE45 with Cylindrical shank (High Rake)





Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts				
												Clamp Set	Wrench	Shim	Shim Clamp Screw	
				ϕD	ϕD1	ϕd	L	ℓ	S	A.R.	R.R.					
MSE	**4550**	○	3	50	73	32	120	40	6	+20°	-3°	CPS-6M	LW-3	MSE-4245	SP3X8	
	4563	○	4	63	86											
	4580-32	○	4	80	103											

Applicable Inserts

Description	Applicable Inserts ➔ **M10**			Applicable Inserts ➔ **M25**
				
MSE45○○-○○ **MSE45○○○R-○T** **MSE45○○○R-○T-M**	SEMR 1203AFER-H	SEKR 1203AFEN-S	SEEN 1203AFTN SEKN 1203AFTN 1203AFFN	SEEN 1203AFFN-NE 1203AFFN (PCD)

◆ Recommended Cutting Conditions

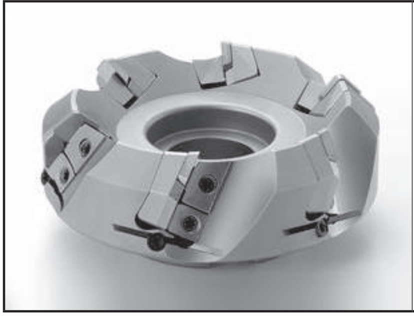
Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)					
		Cermet	MEGACOAT		PVD Coated Carbide	Carbide	PCD
		TN100M	PR1225	PR1210	PR830	KW10	KPD001 (KPD010)
Carbon Steel	~0.30	★ 120~200	★ 120~250	-	☆ 120~200	-	-
Alloy Steel	~0.30	★ 100~180	★ 100~220	-	☆ 100~180	-	-
Mold Steel	~0.25	★ 100~180	★ 80~180	-	☆ 80~150	-	-
Stainless Steel	~0.25	☆ 120~200	★ 120~220	-	☆ 120~200	-	-
Cast Iron	~0.30	-	-	★ 100~220	-	☆ 80~150	-
Non-ferrous Metals	~0.20	-	-	-	-	★ 100~300	★ 300~800

★:1st Recommended ☆:2nd Recommended

○ : Check Availability

Easy edge adjustment MSE45-SF

MSE45-SF Face Mill (Easy edge adjustment)



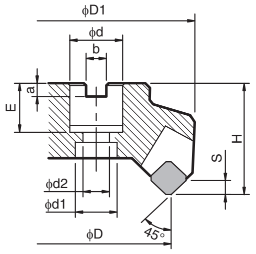


Fig.1

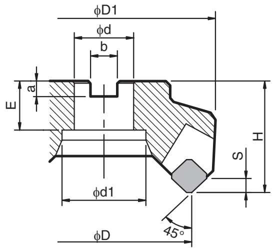
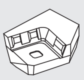
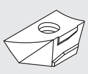
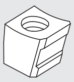
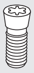
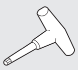


Fig.2

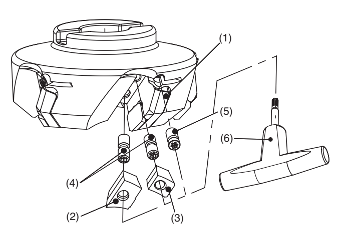
Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)										Rake Angle		Drawing	Weight (kg)
				φD	φD1	φd	φd1	φd2	H	E	a	b	S	A.R.	R.R.		
Metric	**MSE 45063R-4T-M-SF**	○	4	63	85	22	17	11	50	21	6.3	10.4	6	+20°	-10°	Fig.1	1.2
	45080R-5T-M-SF	○	5	80	101	27	40	13		24	7	12.4			-8.5°		1.5
	45100R-6T-M-SF	○	6	100	119	32	45	-		32	8	14.4			-7.5°	Fig.2	2.2
	45125R-7T-M-SF	○	7	125	143	40	55		63	30	9	16.4			-6.5°		4.0
Bore Dia. Inch spec	**MSE 45080R-5T-SF**	○	5	80	101	25.4	38	-	50	26	6	9.5	6	+20°	-8.5°	Fig.2	1.5
	45100R-6T-SF	○	6	100	119	31.75	45			32	8	12.7			-7.5°		2.2
	45125R-7T-SF	○	7	125	143	38.1	55		63	38	10	15.9			-6.5°		4.0

Spare Parts

Description	(1) Cartridge	(2) Clamp	(3)Clamp	(4) Clamp Screw	(5) Adjustment Screw	(6) Wrench
						
MSE 45○○R-○T-M -SF	LSE-445SR	C43R (for Insert)	C44R (for Cartridge)	W6X17	SV-60136TR	TTC-20
MSE 45○○R-○T-SF						

· Mounting bolt (HH10X30S) is included for MSE45063R-4T-M-SF.
· Mounting bolt (HH12X35M) is included for MSE45080R-5T-M-SF.



Applicable Inserts

Description	Applicable Inserts ➔ **M10**				Applicable Inserts ➔ **M25**	
				 With Wiper Edge	 With Wiper Edge	 With Wiper Edge
MSE45...-SF	SEMR 1203AFER-H	SEKR 1203AFEN-S	SEEN 1203AFTN SEKN 1203AFTN 1203AFFN	SEEN 1203AFTR-W 1203AFFR-W	SEEN 1203AFFN-NE 1203AFFN (PCD)	SEEN 1203AFFR-W (PCD)

◆ Recommended Cutting Conditions

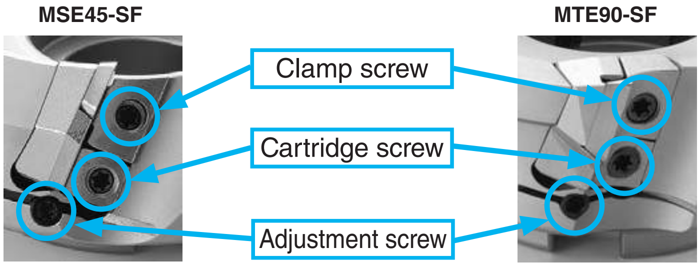
Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)					
		Cermet	MEGACOAT		PVD Coated Carbide	Carbide	PCD
		TN100M	PR1225	PR1210	PR830	KW10	KPD001 (KPD010)
Carbon Steel	~0.30	★ 120~200	★ 120~250	-	☆ 120~200	-	-
Alloy Steel	~0.30	★ 100~180	★ 100~220	-	☆ 100~180	-	-
Mold Steel	~0.25	★ 100~180	★ 80~180	-	☆ 80~150	-	-
Stainless Steel	~0.25	☆ 120~200	★ 120~220	-	☆ 120~200	-	-
Cast Iron	~0.30	-	-	★ 100~220	-	☆ 80~150	-
Non-ferrous Metals	~0.20	-	-	-	-	★ 100~300	★ 300~800

★:1st Recommended ☆:2nd Recommended

○ : Check Availability

How to Adjust Cutting Edge height

Screw names



Adjustable height for the cutting edge

- For model MSE45-SF: Approx. 20µm
- For model MTE90-SF: Approx. 50µm

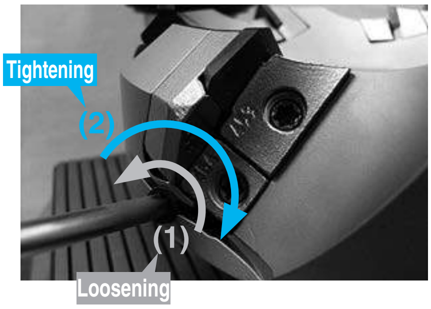
(The difference in adjustable heights varies because of the difference in lead angles.)

* For the explanations below, refer to the screw names indicated above. Milling Cutter shown here is model MSE45-SF.

1) Partial adjustment of the adjustment screw

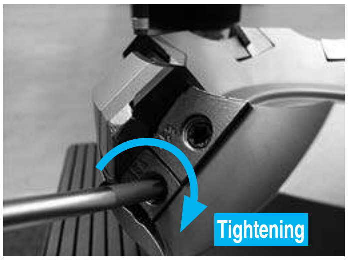
(1) Loosen the edge adjustment screw

(2) Tighten as much as the edge adjustment screw is tensioned

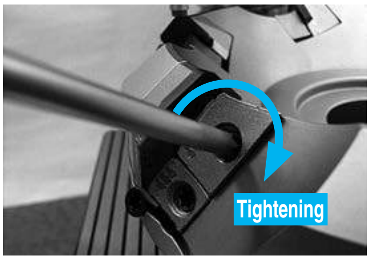


2) Partial tightening of the clamp screw and cartridge screw

(1) Partial tighten the cartridge screw.Notes)



(2) Partial tighten the clamp screw.Notes)

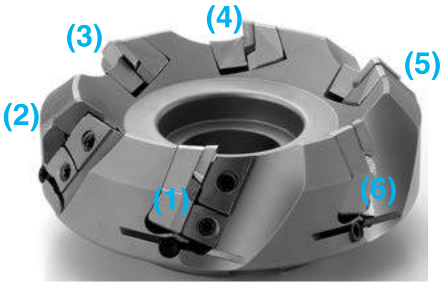


* Perform work with all inserts attached in their correct positions.

Notes) Partial tightening: Tighten the adjustment screw only partially, so that further adjustment is still possible.

3) Measuring the cutting edge fluctuation

Example: Measuring the front cutting edge fluctuation



No.	Measurement results	Results	Edge fluctuation
(1)	0.263mm		-6µm
(2)	0.258mm		-11µm
(3)	0.254mm		-15µm
(4)	0.269mm	Max.	0µm
(5)	0.261mm		-8µm
(6)	0.250mm	Min.	-19µm

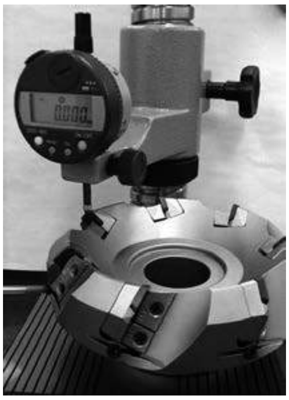
Current fluctuation:19µm

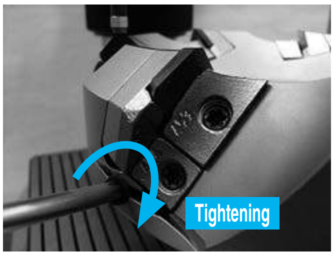
(Number (1)~(6) are not indicated on cutter body)

* With each of these screws partial tightened: cartridge screw, clamp screw, adjustment screw, measure the cutting edge fluctuation.

4) Adjusting the fluctuation

Based on the measurement results, adjust the fluctuation.

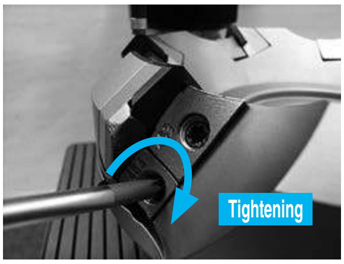




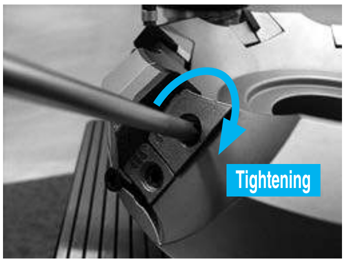
Using the measured amount of fluctuation, adjust so that the fluctuation is adjusted at the highest corner of the cutting edge, then fully tighten the adjusting screw.

5) Firm tightening of the cartridge and insert

(1) Fully tighten the cartridge screw



(2) Fully tighten the clamp screw



Easy edge adjustment MSE45-SF

The usage of SEEN wiper insert

Features of the wiper insert

By installing one wiper insert on the cutter that also has a standard insert attached, the surface roughness can be improved.
The edge geometry of wiper insert is arc style and overhang is slightly prominent to axis direction when cutter is installed.
Finishing with a wiper insert enables better surface quality.

Recommended Cutting Conditions

1) Vc, fz···within recommended cutting conditions
2) ap ≤ 0.5mm

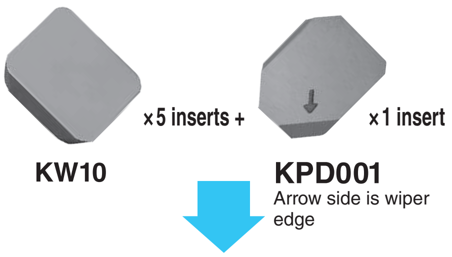
How to attach wiper insert

1) Install only one wiper insert against standard insert.
2) As only one edge of the wiper insert is used, please attach insert arrow " ↓ " that faces to workpiece cutting surface.
3) Check overhang amount for wiper insert using MSE45-SF type. So you canobtain much more stable surface roughness.

How to set up amount of overhang for wiper edge

1) Please adjust wiper insert overhang within 0.03 to 0.1mm from the largest overhang standard insert. If overhang is larger than this, life of insert should be lower.
2) It is recommended having wiper insert overhang about 0.05mm.

For example, when finishing Aluminum with ϕ125···

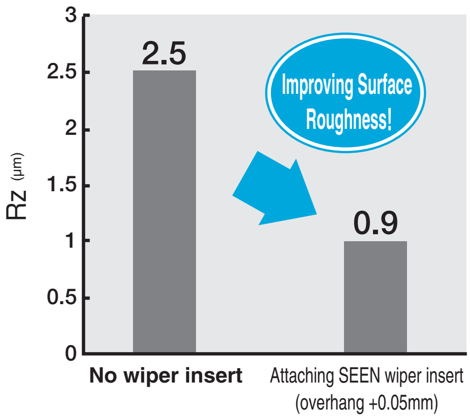


Arrow side is wiper edge

Low cost and good cutting surface

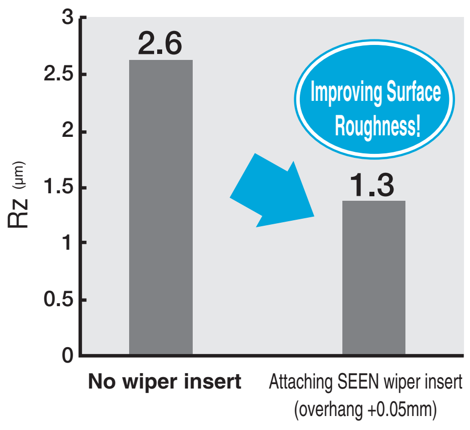
Case Studies

In case of Aluminum (A5052)



Cutting Conditions
- ·MSE45100R-6T-SF
- ·Vc=300m/min
- ·ap=0.2mm
- ·fz=0.2mm/t
- ·Wet
- ·No wiper insert
  SEKN1203AFFN (KW10)
  6 inserts
- ·With wiper insert
  SEKN1203AFFN (KW10)
  5 inserts
  SEEN1203AFFR-W (KPD001)
  1 insert

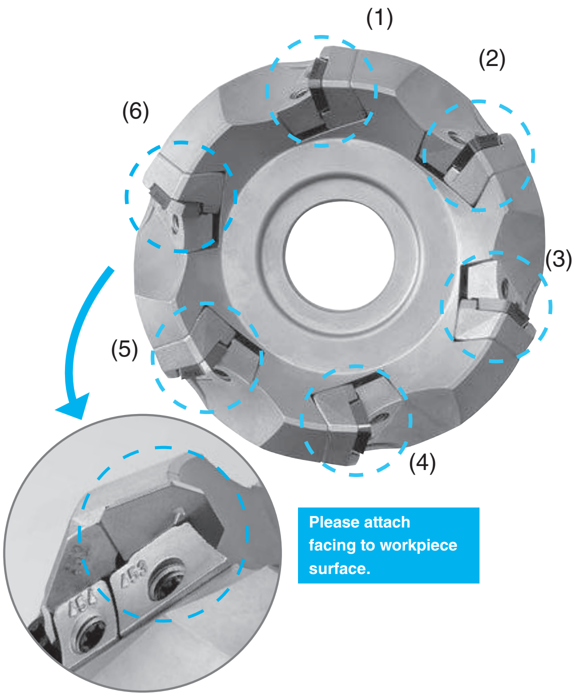
In case of S50C



Cutting Conditions
- ·MSE45100R-6T-SF
- ·Vc=200m/min
- ·ap=0.2mm
- ·fz=0.1mm/t
- ·Dry
- ·No wiper insert
  SEKN1203AFTN (TN100M)
  6 inserts
- ·With wiper insert
  SEKN1203AFTN (TN100M)
  5 inserts
  SEEN1203AFTR-W (TN100M)
  1 insert

Example of attaching wiper insert

No.	Insert	Edge fluctuation
(1)	Standard	-6μm
(2)	Standard	-11μm
(3)	Standard	-15μm
(4)	Standard	0μm
(5)	Standard	-8μm
(6)	With Wiper Edge	+0.03~+0.1mm

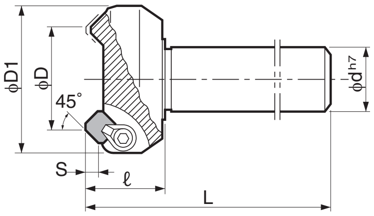


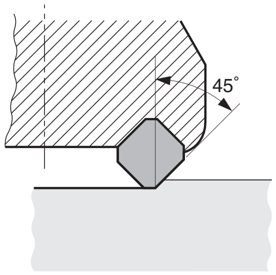
Please attach facing to workpiece surface.

MSD45

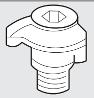
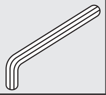
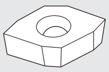
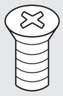
Facing Chamfering

MSD45 with cylindrical shank





Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts				
				φD	φD1	φd	L	ℓ	S	A.R.	R.R.	Clamp Set	Wrench	Shim	Shim Clamp Screw	
																
MSD	**4550**	○	3	50	73	32	120	40	6.5	+16°	-3°	CPS-6M	LW-3	MSD-42	SP3X8	
	4563	○	3	63	87											
	4580-32	○	4	80	104											

Applicable Inserts

Description	Applicable Inserts ➡ **M10**			Applicable Inserts ➡ **M25**
				
MSD 45...	SDMR 1203AUER-H	SDKR 1203AUEN-S	SDCN 1203AUTN SDKN 1203AUTN 1203AUFN	SDKN 1203AUFN-NE 1203AUFN (PCD)

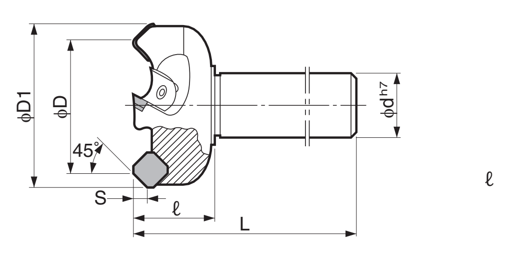
Recommended Cutting Conditions ➡ **M195**

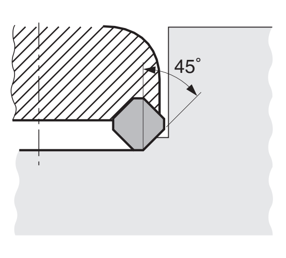
○ : Check Availability

MSO45

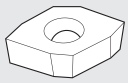
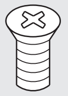
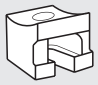
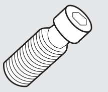
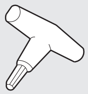
Facing
Chamfering

MSO45-S with cylindrical shank (High Rake)





Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts				
				ϕD	ϕD1	ϕd	L	ℓ	S	A.R.	R.R.	Shim	Shim Clamp Screw	Clamp	Clamp screw	Wrench
																
MSO	**4550-S**	○	4	50	66	32	120	40	7.1	+27°	-8°	MSO-4T245	SP3X6	CH-20R	TH8X15	TH-4
	4563-S	○	5	63	79											
	4580-S	○	5	80	96											

MSO45 Face Mill (High Rake)

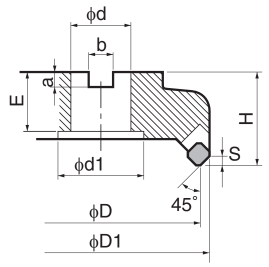


Fig.1

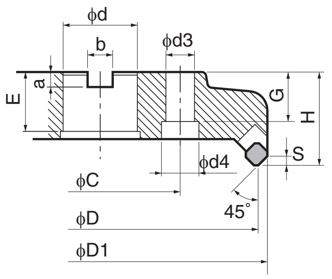
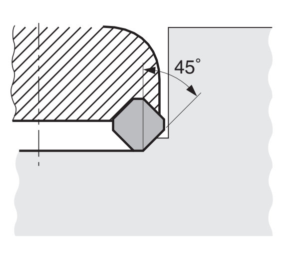


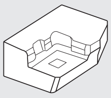
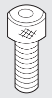
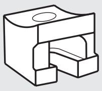
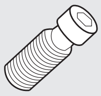
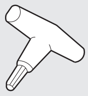
Fig.2

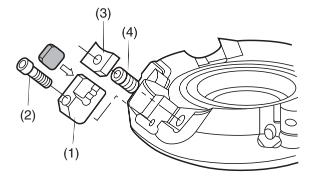


Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)														Rake Angle		Drawing	Weight (kg)
				ϕD	ϕD1	ϕd	ϕd1	ϕd2	ϕd3	ϕd4	ϕC	H	E	G	a	b	S	A.R.	R.R.		
MSO	**45100R**	○	5	100	114.8	31.75	48	-	-	-	-	60	32	-	8	12.7	7.1	+27°	-8°	Fig.1	2.5
	45125R	○	6	125	140.0	38.10	58						38		10	15.9					3.7
	45160R	○	8	160	174.5	50.80	68								11	19.0					5.4
	45200R	○	10	200	214.5	47.625	-		18	26	101.6			32	14	25.4				Fig.2	8.4

Spare Parts

Description	(1)Cartridge	(2)Cartridge Clamp screw	(3)Clamp	(4)Clamp screw	Wrench
					
MSO 45...R	LSO-445R	HH4X16	CH-20R	TH8X15	TH-4



Applicable Inserts

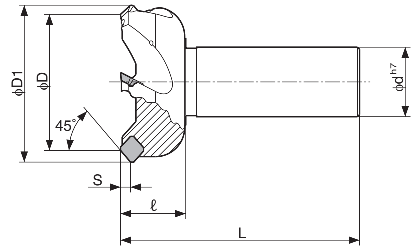
Description	Applicable Inserts ➡ **M10**		Applicable Inserts ➡ **M25**
			
MSO 45...	SOKR 13T3AXEN-J	SOKN 13T3AXTN 13T3AXFN	SOKN 13T3AXFN-NE (PCD)

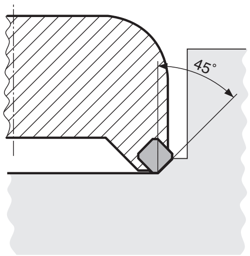
Recommended Cutting Conditions ➡ **M195**

○ : Check Availability

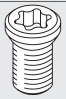
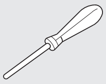
Facing Chamfering

MSO45-S-09 with cylindrical shank (High Rake)





Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts				
											Clamp Screw	Wrench			
			φD	φD1	φd	L	ℓ	S	A.R.	R.R.					
MSO 4550-S32-09	○	3	50	60	32	110	30	4.2	+27°	-8°	SB-3060TR	DT-10			
4563-S32-09	○	4	63	73											
4580-S32-09	○	4	80	90											

Applicable Inserts

Description	Applicable Inserts ➡ **M22**	
		
MSO45...-09	SOMT 0903AXEN-J	SOMW 0903AXTN 0903AXFN

Recommended Cutting Conditions ➡ **M195**

○ : Check Availability

Face Mill for Heavy Milling MSRS15

Square (4-edge) type MSRS15 Face Mill

Conventional tools

Chip evacuation per unit time is increased

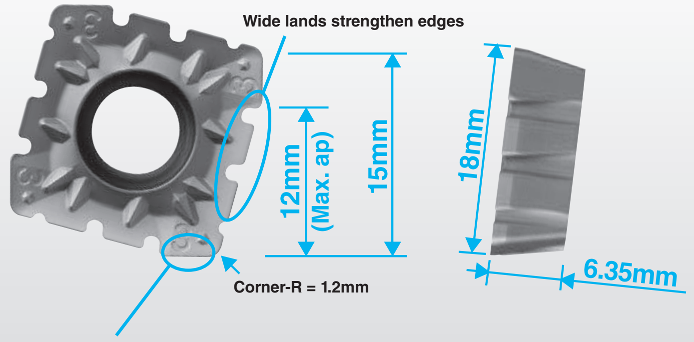
MSRS15

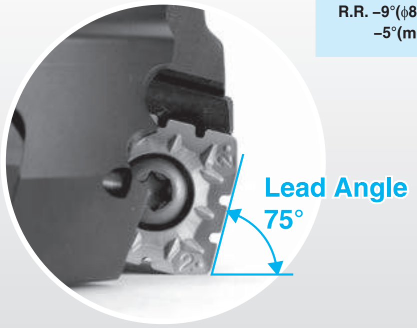
Roughing is processed in one pass.
MSRS15 changes heavy milling! (Max. ap 12 mm)

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

● Recommended ap: 5~10mm

A.R. +9°
R.R. –9°(ϕ80)
–5°(more than ϕ100)

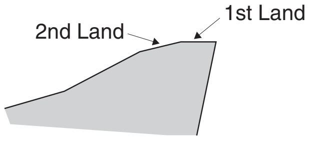
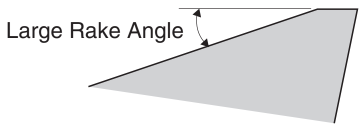
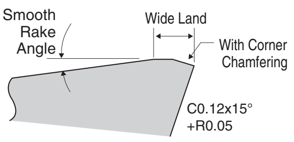




Large wiper edges achieve high feed rate.

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
	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
Edge preparation			

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

or

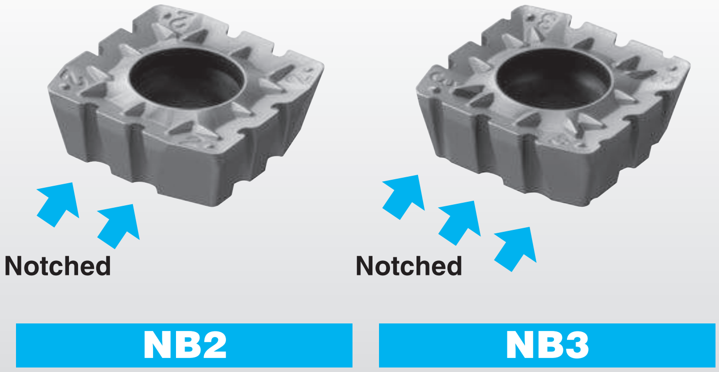
+

●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).

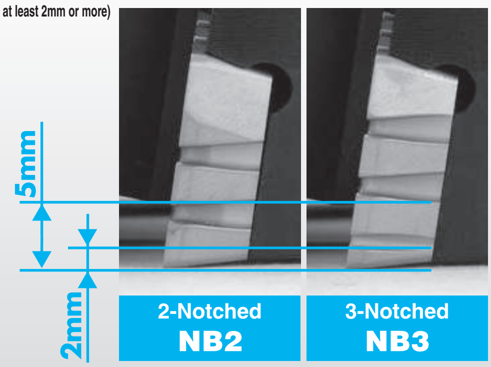
Notched insert reduces cutting force, and enables high feed rates by reducing chattering.

● Notched Insert



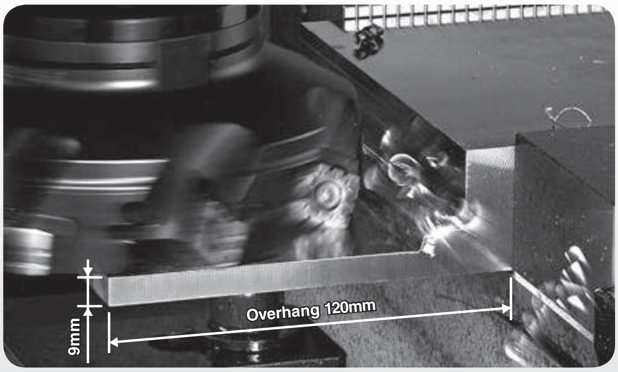
● Notch effect

The effects of the notch can be seen at more than 5mm of vertical ap (effects for NB3 appears from at least 2mm or more)



Design to suppress chattering with low cutting force

● Possible to cut thin-plate workpieces (low rigidity material such as can manufacturing equipment)

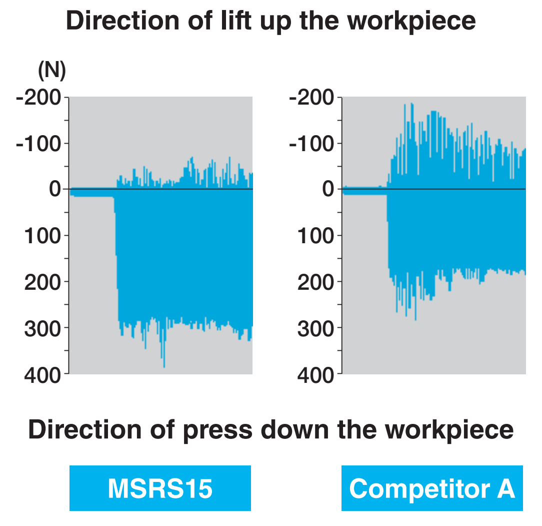


MSRS15160R-8T

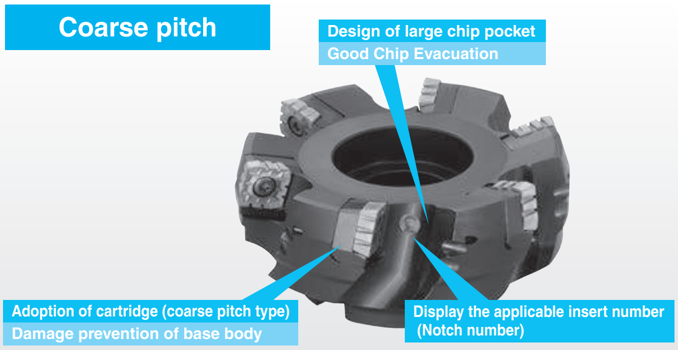
Workpiece Material : S50C
Vc=200m/min (n=398min^{-1})
fz=0.15mm/t (Vf=477mm/min), $ap_{\times}ae$=6×100mm
(Machining of overhang from 15mm to 9mm)

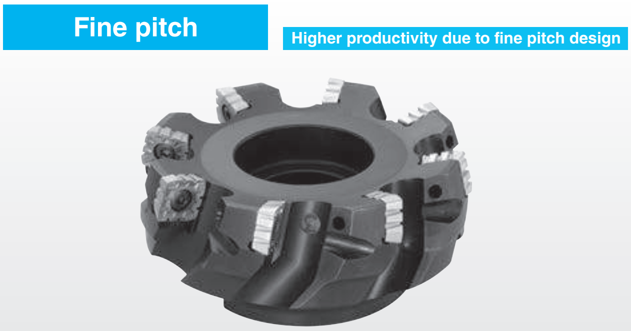
● Comparison of cutting force (thrust force)

MSRS15 suppresses chattering since less force to lift workpiece is needed during machining.

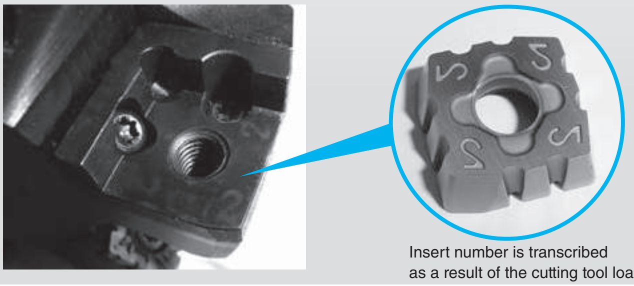


Features of Toolholder





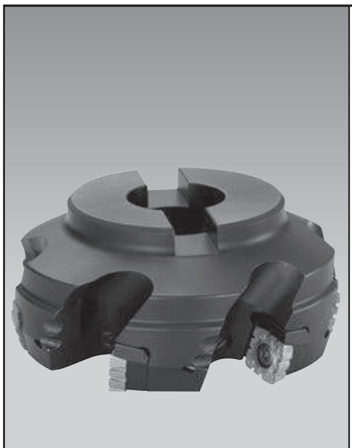
Insert Replacement Identification



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

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

MSRS15



(The photo shows the coarse pitch type)

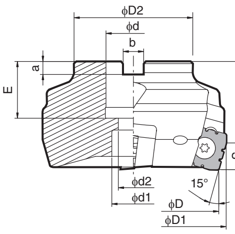


Fig.1

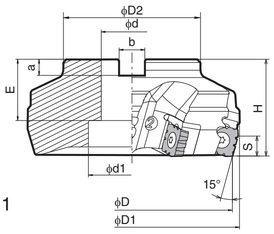


Fig.2

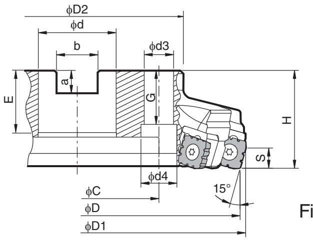


Fig.3

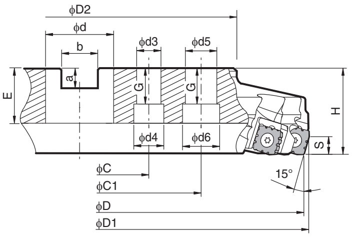


Fig.4

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

Toolholder Dimensions (Metric)

Description			Std.	No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)
					ϕD	ϕD1	ϕD2	ϕd	ϕd1	ϕd2	H	E	a	b	S	ϕd3	ϕd4	ϕd5	ϕd6	ϕC	ϕC1	G		
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.

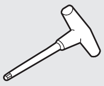
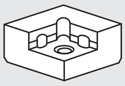
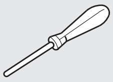
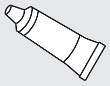
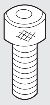
Toolholder Dimensions (Bore Dia. ϕd: Inch spec)

Description			Std.	No. of Inserts	Dimension (mm)																		Drawing	Weight (kg)
					ϕD	ϕD1	ϕD2	ϕd	ϕd1	ϕd2	H	E	a	b	S	ϕd3	ϕd4	ϕd5	ϕd6	ϕC	ϕC1	G		
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 (HH12×35) 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		Spare Parts						
		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	MP-1	HH12X35
	MSRS 15100R-○○(M) ≀ **15315R-○○(M)**	for Insert Clamp Recommended tightening torque 7.5N·m			for Cartridge Clamp Recommended tightening torque 3.5N·m			-
Fine pitch	**MSRS 15080R-○○(M)**	SB-60120TR	TT-25L	-	-	-	MP-1	HH12X35
	MSRS 15100R-○○(M) ≀ **15315R-○○(M)**	for Insert Clamp Recommended tightening torque 7.5N·m						-

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

Applicable Inserts

Description	Applicable Inserts ➡ **M23** [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
For custom-ordered cutter	-	-	SPMT 1806EDSL-NB2T	SPMT 1806EDSL-NB3T

Description	Applicable Inserts ➡ **M23**		
	 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 ➡ **M46**

Recommended Cutting Conditions

Workpiece Material	fz (mm/t)			Recommended Insert Grades（Cutting Speed Vc:m/min）			
				MEGACOAT			PVD Coated Carbide
	NB2P + NB3P	NB2 + NB3	NB2T + NB3T	**PR1225**	**PR1230**	**PR1210**	**PR830**
Carbon Steel	0.15	0.2	0.3	☆ 120～**180**～250	★ 120~**180**~220	-	☆ 120~**170**~220
Alloy Steel	0.15	0.2	0.3	☆ 120～**180**～250	★ 120~**180**~220	-	☆ 120~**170**~220
Mold Steel	0.1	0.15	0.2	☆ 100～**160**～220	★ 100~**160**~200	-	☆ 100~**150**~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

M

Milling

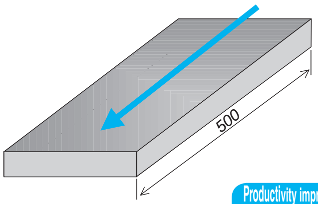
MSRS15

Case Studies -Improved productivity / Shortened Cutting Time-

SS400

Plate
- Vc=150m/min (n=382min^{-1})
- apxae=10×125mm
- fz=0.2mm/t (Vf=458mm/min)
- Dry ·6 inserts
- MSRS15125R-6T
- SPMT1806EDER-NB2
- SPMT1806EDER-NB3

(PR830)



Productivity improved by 4.4 times!

MSRS15	Chip Evacuation Rate 572cc/min
Competitor's Cutter A	129cc/min

[Competitor's Cutter A]
ϕ125, 6 inserts
Vc=150m/min (n=382min^{-1})
apxae=3×125mm
fz=0.15mm/t (Vf=344mm/min)

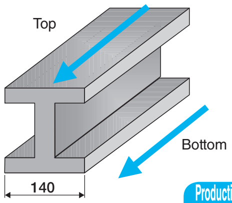
Because conditions can be raised drastically, very effective for time crunch.
Productivity improved by 4.4 times.

(Evaluation by the user)

S50C

Rail
- Vc=150m/min (n=300min^{-1})
- apxae=6×140mm
- fz=0.2mm/t (Vf=480mm/min)
- Dry ·8 inserts
- MSRS15160R-8T
- SPMT1806EDER-NB2
- SPMT1806EDER-NB3

(PR830)



Productivity improved by 4.7 times!

MSRS15	Chip Evacuation Rate 403cc/min
Competitor's Cutter B	84cc/min

[Competitor's Cutter B]
Machining with 2mm × 3 passes
Vc=150m/min (n=300min^{-1})
apxae=2×140mm
fz=0.125mm/t (Vf=300mm/min)

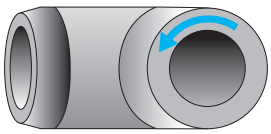
MSRS15 can complete machining with 1 pass for what needed to be cut with 3 passes usually. Still machining sound of MSRS was quiet. Productivity improved by 4.7 times.

(Evaluation by the user)

C12A(Cast Steel)

Industrial Machine Part
- Vc=100m/min (n=200min^{-1})
- apxae=10×114mm
- fz=0.4mm/t (Vf=635mm/min)
- Dry ·8 inserts
- MSRS15160R-8T
- SPMT1806EDER-NB2
- SPMT1806EDER-NB3

(PR830)



Productivity improved by 2.5 times!

MSRS15	Chip Evacuation Rate 724cc/min
Competitor's Cutter C	290cc/min

[Competitor's Cutter C]
6 inches, 8 inserts
Vc=250m/min (n=522min^{-1})
apxae=2.5×114mm
fz=0.25mm/t (Vf=1,016mm/min)

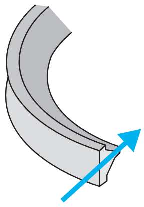
Before ap could not be increased due to high resistance, but MSRS15 can increase ap without increasing load on the main spindle. Productivity improved by 2.5 times.

(Evaluation by the user)

S45C

Gear
- Vc=200m/min (n=255min^{-1})
- apxae=10×200mm
- fz=0.17mm/t (Vf=600mm/min)
- Dry ·14 inserts
- MSRS15250R-14T
- SPMT1806EDER-NB2
- SPMT1806EDER-NB3

(PR830)



Productivity improved by 2.6 times!

MSRS15	Chip Evacuation Rate 1,200cc/min
Competitor's Cutter D	459cc/min

[Competitor's Cutter D]
ϕ250, 12 inserts
Vc=120m/min (n=153min^{-1})
apxae=5×200mm
fz=0.25mm/t (Vf=459mm/min)

Machining noise is quiet even when cutting width is less than 80% of cutter dia.
Productivity improved by 2.6 times.

(Evaluation by the user)

Q&A

Q-1 What amount of cutting width (ae) is necessary in a radial direction?

A-1 The estimated amount is 70 to 80% of diameter of the cutting tool.

Q-2 Why does the MSRS15 type have a cutting angle 75°?

A-2 45° cutting angle type can reduce an impact in biting a workpiece but increase a thrust force. On the other hand, 90° cutting angle type can reduce a thrust force but increase an impact in biting a workpiece.
75° cutting angle MSRS15 type can suppress both a thrust force and impact in biting keeping a good balance and enable smooth machining even in large machining.

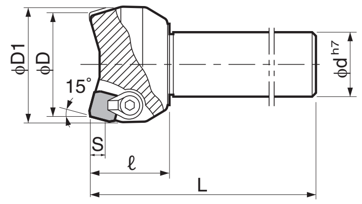
M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

MSP15 / MSE15

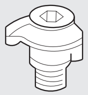
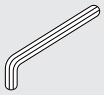
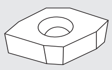
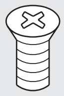
Facing

MSP15 with cylindrical shank

MSE15 with cylindrical shank (High Rake)



Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts				
				ϕD	ϕD1	ϕd	L	ℓ	S	A.R.	R.R.	Clamp Set 	Wrench 	Shim 	Shim Clamp Screw 	
MSP	**1550**	○	3	50	57	32	120	40	9	+10°	-2°	CPS-6M	LW-3	MSP-42	SP3X8	
	1563	☐	3	63	70											
MSE	**1550**	☐	3	50	57	32	120	40	8.5	+20°	+3°	CPS-6M	LW-3	MSE-4215	SP3X8	
	1563	☐	3	63	71						+6°					
	1580-32	☐	4	80	87											

Applicable Inserts

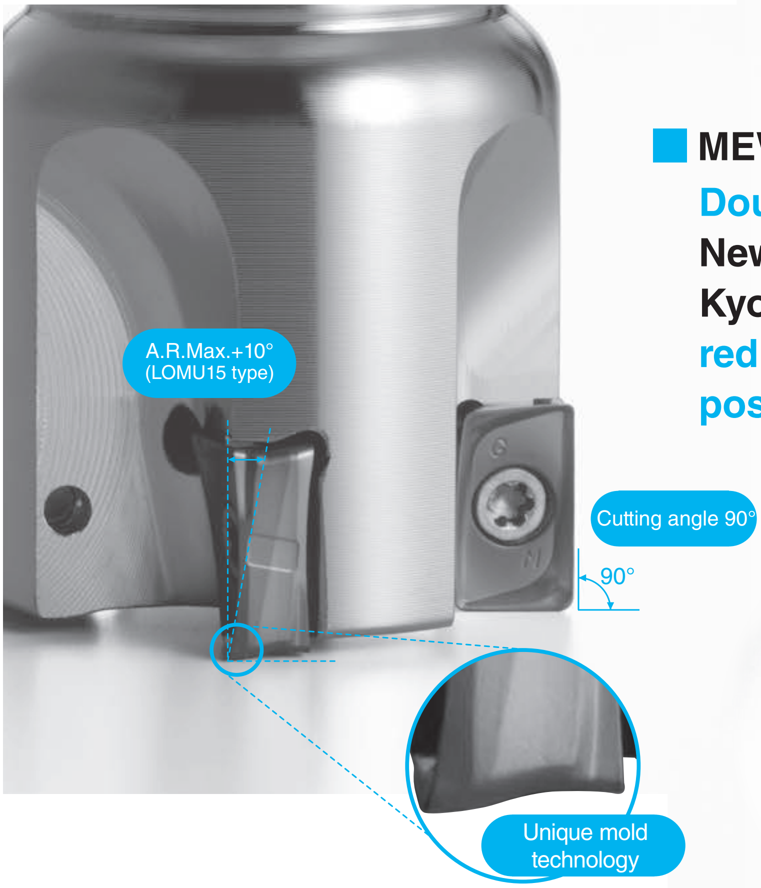
Description	Applicable Inserts ➔ **M11**			Applicable Inserts ➔ **M10**
				
MSP 15...	SPMR 1203EDER-H	SPKR 1203EDER-S	SPCN 1203EDTR SPKN 1203EDTR 1203EDER 1203EDFR	-
MSE 15...	-	-	-	SEKN 1203EFTR

Recommended Cutting Conditions ➔ **M195**

M

Milling

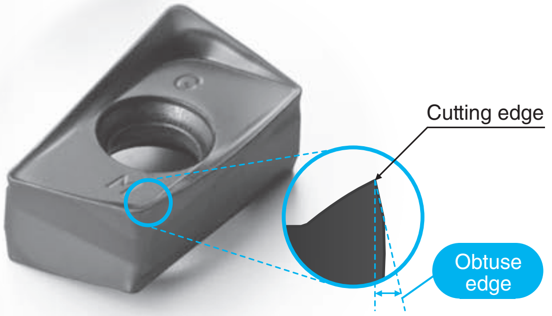
○ : Check Availability
☐ : Deleted from the next catalogue



MEW

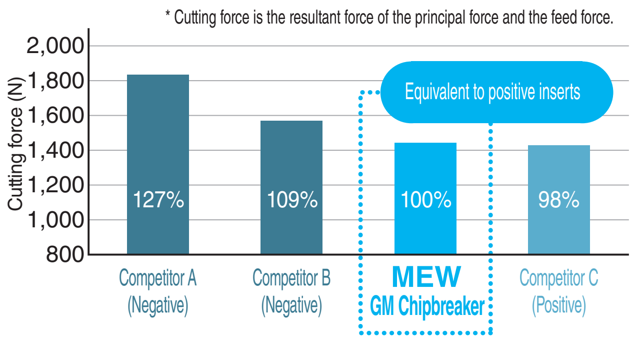
**Double-sided 4-edge insert,
Newly Developed End Mill
Kyocera's unique mold technology
reduces cutting force equivalent to positive inserts**

Obtuse edge increases cutting edge toughness



Low cutting force equivalent to positive inserts

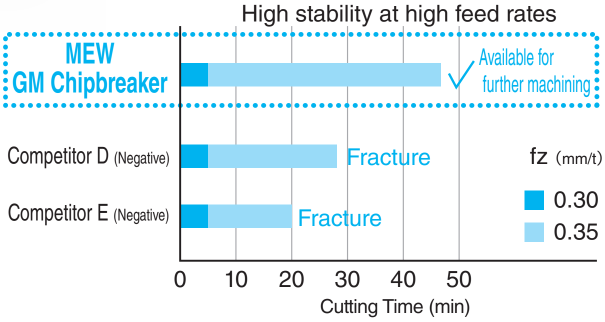
- Cutting Force Comparison



<Cutting Conditions>
Vc=150m/min apxae=3x15mm fz=0.15mm/t S50C Cutter dia. ϕ20

(Internal evaluation)

- Fracture Resistance Comparison



<Cutting Conditions>
Vc=120m/min apxae=3x10mm fz=0.3~0.35mm/t
SCM440H (37〜39HS) Cutter dia. ϕ20

(Internal evaluation)

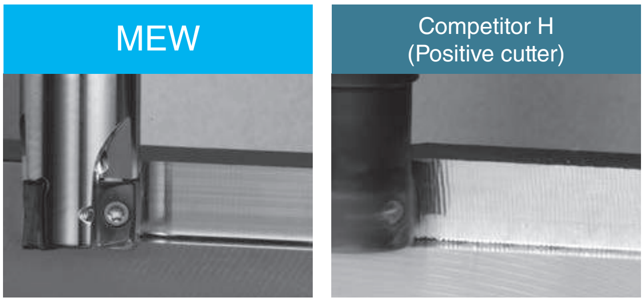
Improved surface finish, minimizing chattering

Sharp cutting and superior resistance to chattering and burrs,
due to 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

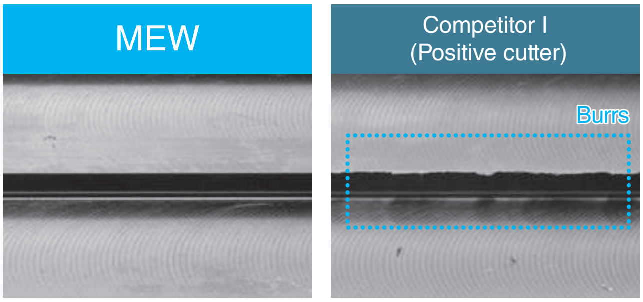

MEW

Competitor H (Positive cutter)

Smooth surface of MEW without chattering

<Cutting Conditions>
Vc=240m/min apxae=4(3 passes)x5mm fz=0.12mm/t Dry SS400 Cutter dia. ϕ20

Burr comparison with positive cutters


MEW

Competitor I (Positive cutter)

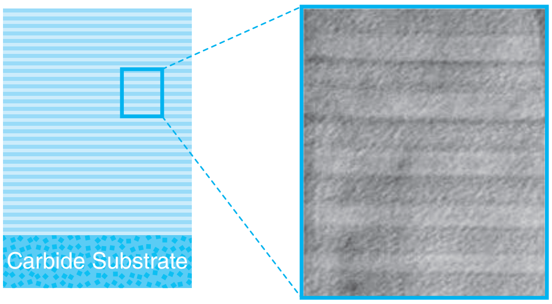
Less burrs than positive cutters due to sharp cutting

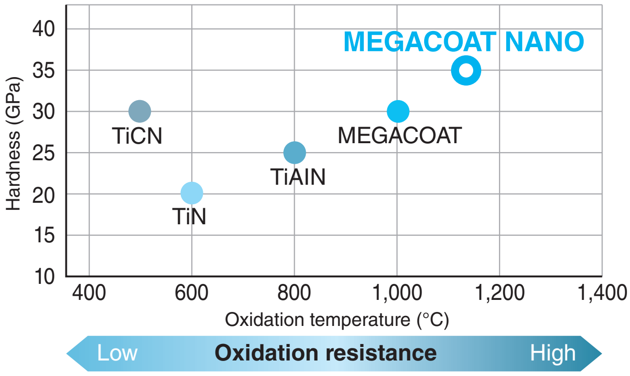
<Cutting Conditions>
Vc=250m/min apxae=4x5mm fz=0.1mm/t Dry S50C Cutter dia. ϕ20

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

MEGACOAT base multi-layer structure





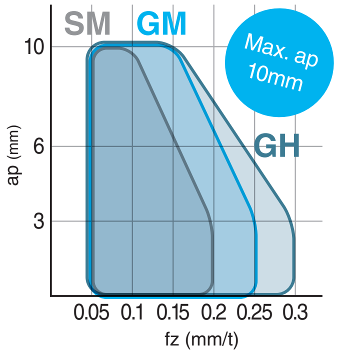
Prevents wear and fracture with high hardness (35GPa) and superior oxidation resistance (oxidation temperature: 1,150°C)

Various chipbreaker lineup

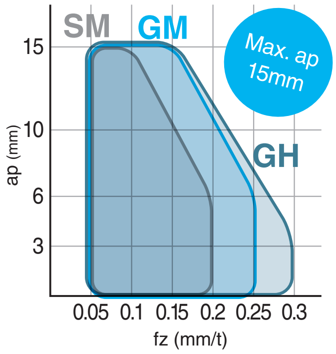
Newly developed 3 chipbreakers for various applications
Applicable to a wide range of application

Chipbreaker	Applications	Insert
GM	General purpose	
SM	Low cutting force	
GH	For Heavy Milling	

●LOMU10 type



●LOMU15 type



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

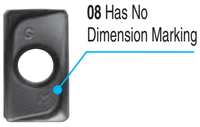
Chips (slotting)

Chips (shouldering)

Lineup of Corner-R(rε)

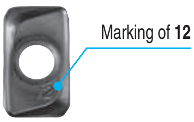
Corner-R(rε) 0.4,1.0,1.2,1.6 and 2.0 added to GM chipbreaker lineup

LOMU100404ER-GM
LOMU150504ER-GM

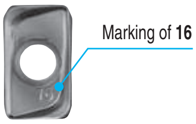


LOMU100408ER-GM
LOMU150508ER-GM

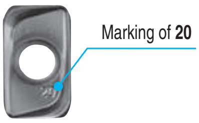
LOMU150510ER-GM



LOMU100412ER-GM
LOMU150512ER-GM



LOMU100416ER-GM
LOMU150516ER-GM



LOMU100420ER-GM
LOMU150520ER-GM

MEW

MEW End Mill

(Cylindrical)

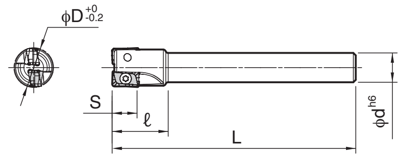


Fig.1

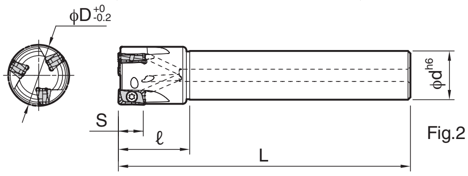


Fig.2

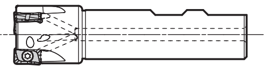


Fig.3

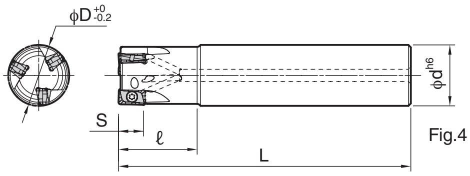


Fig.4

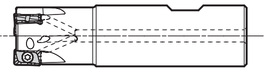


Fig.5

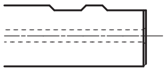


Fig.6

Toolholder Dimensions

Description				Std.	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Max. Revolution (min^{-1})
						φD	φd	L	ℓ	S	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	●	5	40	32	111	50	10	+7°	-19°	Yes	Fig.3	30,000
		MEW	40-W32-15-4T	●	4					15	+10°	-21°			25,000
	Same Shank	MEW	16-W16-10-2T	●	2	16	16	75	25	10	+7°	-22°	Yes	Fig.5	43,750
			20-W20-10-2T	●		20	20	77				-20°			41,000
			20-W20-10-3T	●	3										41,000
			25-W25-10-2T	●	2	25	25	90	32					Fig.6	37,500
			25-W25-10-3T	●	3										37,500
			32-W32-10-4T	●	4	32	32	102	40						33,900
		MEW	25-W25-15-2T	●	2	25	25	90	32	15	+10°	-22°	Yes	Fig.6	35,000
			32-W32-15-3T	●	3	32	32	102	40						30,000

Max. Revolution
When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

● : Std. Item
MTO : Made to order

MEW Face Mill

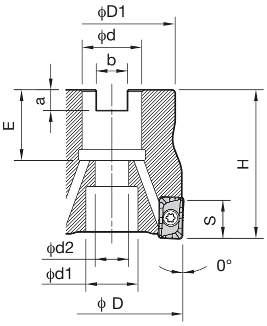


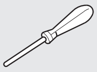
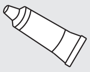
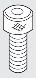
Fig.1

Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S	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	Fig.1	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	Fig.1	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
When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

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

Description		Spare Parts				Applicable Inserts ➡ **M13**		
		Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt	 General purpose	 Low Cutting Force	 Tough Edge (For Heavy Milling)
								
MEW	**…-10-_T**	SB-3065TRP for Insert Clamp Recommended tightening torque 1.2N·m	DTPM-8	MP-1	-	LOMU100404ER-GM LOMU100408ER-GM LOMU100412ER-GM LOMU100416ER-GM LOMU100420ER-GM	LOMU100408ER-SM	LOMU100408ER-GH
MEW	**032R-10_-M**				HH8X25			
	040R-10_-M							
	050R-10_-M				HH10X30			
	063R-10_-M							
MEW	**…-15-_T**	SB-4090TRP for Insert Clamp Recommended tightening torque 3.5N·m	DTPM-15	MP-1	-	LOMU150504ER-GM LOMU150508ER-GM LOMU150510ER-GM LOMU150512ER-GM LOMU150516ER-GM LOMU150520ER-GM	LOMU150508ER-SM	LOMU150508ER-GH
MEW	**040R-15_-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 ➡ **M60**

About wrench specifications

Wrenches and clamp screws are "Torx Plus".

1) Ref. to Fig. 2 for "Torx Plus" Wrench. (Purple grip)
2) Ref. to Fig. 3 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.

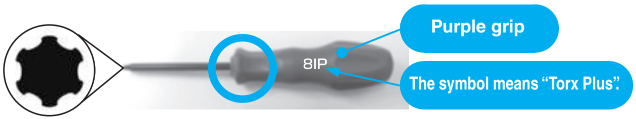


Fig. 2 "Torx Plus" Wrench (For MEW)

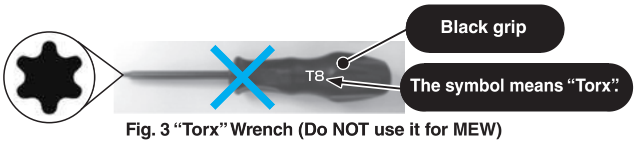
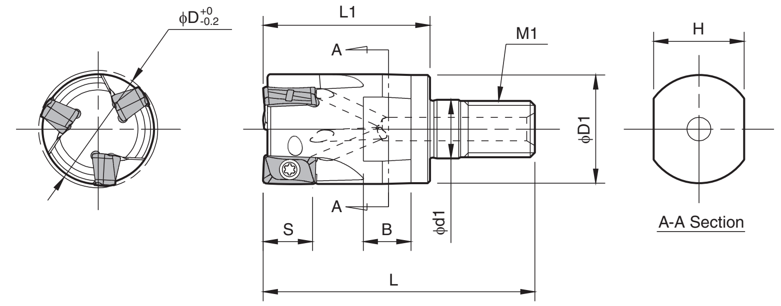


Fig. 3 "Torx" Wrench (Do NOT use it for MEW)

● : Std. Item

MEW Modular type

MEW type Head



Dimensions

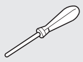
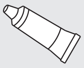
Description	Std.	No. of Inserts	Dimension (mm)									Rake Angle		Coolant Hole	Applicable Inserts ➡**M13**	Max. Revolution (min^{-1})
			ϕD	ϕD1	ϕd1	L	L1	M1	H	B	S	A.R. (MAX.)	R.R.			
MEW 16-M08-10-2T	●	2	16	14.7	8.5	43	25	M8×P1.25	12	8	10	+7°	-22°	Yes	LOMU1004	43,750
20-M10-10-2T	●		20	18.7	10.5	49	30	M10×P1.5	15	9			-20°			41,000
20-M10-10-3T	●	3														41,000
25-M12-10-3T	●		25	23	12.5	57	35	M12×P1.75	19	10						37,500
32-M16-10-4T	●	4	32	30	17	63	40	M16×P2.0	24	12						33,900
MEW 25-M12-15-2T	●	2	25	23	12.5	57	35	M12×P1.75	19	10	15	+10°	-22°	Yes	LOMU1505	35,000
32-M16-15-3T	●	3	32	30	17	63	40	M16×P2.0	24	12						30,000

■ **Max. Revolution**

When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

Ref. to page ➡**M58** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

Spare Parts and Applicable Inserts

Description	Spare Parts			Applicable Inserts ➡**M13**		
	Clamp Screw	Wrench	Anti-seize Compound	 General purpose	 Low Cutting Force	 Tough Edge (For Heavy Milling)
						
MEW 16-M08-10-2T **20-M10-10-2T** **20-M10-10-3T** **25-M12-10-3T** **32-M16-10-4T**	SB-3065TRP for Insert Clamp Recommended tightening torque 1.2N·m	DTPM-8	MP-1	LOMU100404ER-GM LOMU100408ER-GM LOMU100412ER-GM LOMU100416ER-GM LOMU100420ER-GM	LOMU100408ER-SM	LOMU100408ER-GH
MEW 25-M12-15-2T **32-M16-15-3T**	SB-4090TRP for Insert Clamp Recommended tightening torque 3.5N·m	DTPM-15	MP-1	LOMU150504ER-GM LOMU150508ER-GM LOMU150510ER-GM LOMU150512ER-GM LOMU150516ER-GM LOMU150520ER-GM	LOMU150508ER-SM	LOMU150508ER-GH

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

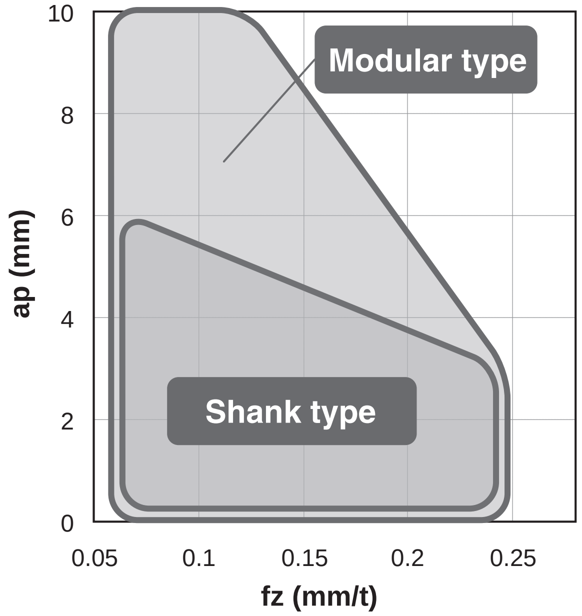
Modular End Mill Head Identification System

MEW	16	-	M08	-	10	-	2T
Series	Cutting Dia.		Thread Size for Clamping		Insert Size		No. of Inserts

● : Std. Item

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, Dry
- **Machine : BT30 M/C**

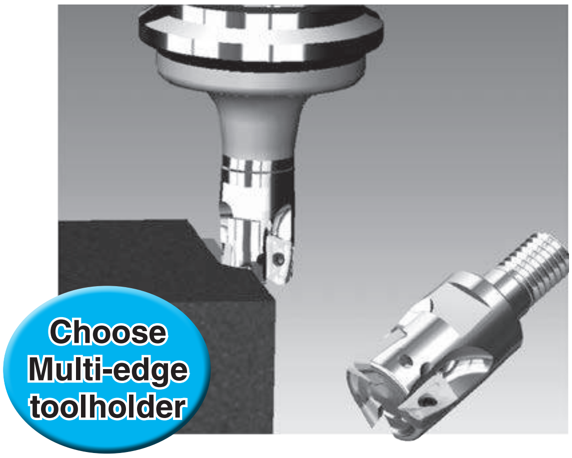
<Cutting Tool>

- 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）

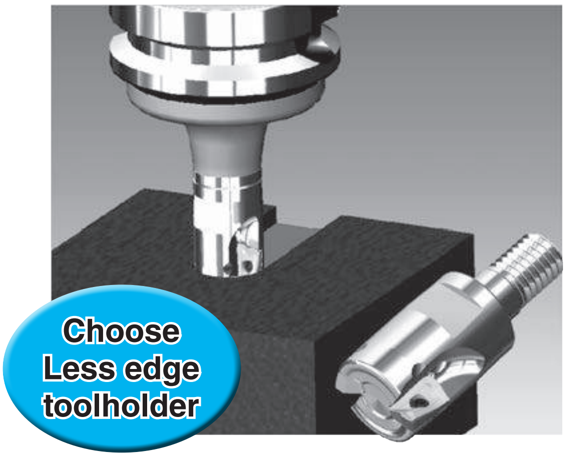
A wide range of applications even in BT30 M/C due to the superior anti-chattering performance.

How to select Multi-edge or Less edge toolholder

Shouldering（ae＝10mm）



Slotting



・Available Cutting Condition of Modular type

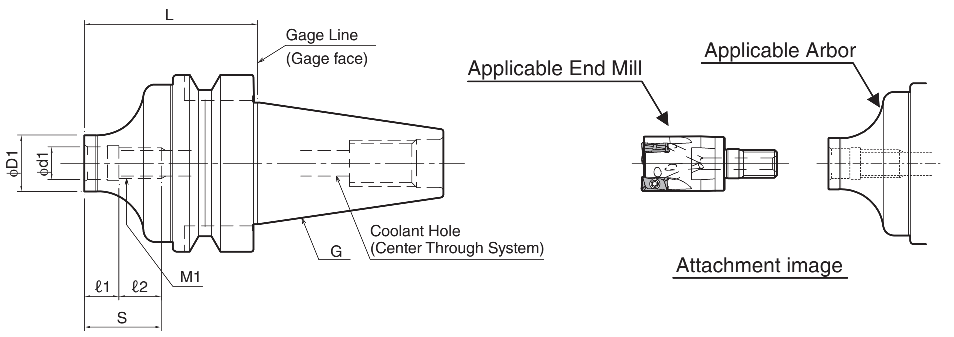
▨ Available Cutting Condition for 2 Inserts

☐ Available Cutting Condition for 3 Inserts

**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

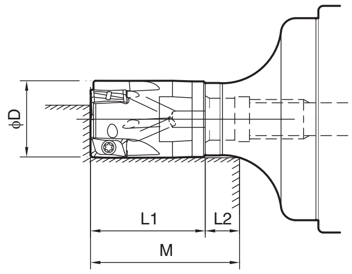
BT Arbor (for exchangeable head / double-face clamping spindle)



Dimensions

Description	Std.	Dimension (mm)							Coolant Hole	Arbor (Double-face clamping)	
		L	ϕD1	ϕd1	S	ℓ1	ℓ2	M1		G	
BT30K- M08-45	●	45	14.7	8.5	20	9	11	M8×P1.25	Yes	BT30	(MEW/MEC/MFH/MRX)..-M08-..
M10-45	●		18.7	10.5	21		12	M10×P1.5			(MEW/MEC/MFH/MRX)..-M10-..
M12-45	●		23	12.5	24		15	M12×P1.75			(MEW/MEC/MFH/MRX)..-M12-..
BT40K- M08-55	●	55	14.7	8.5	20	9	11	M8×P1.25	Yes	BT40	(MEW/MEC/MFH/MRX)..-M08-..
M10-60	●	60	18.7	10.5	21		12	M10×P1.5			(MEW/MEC/MFH/MRX)..-M10-..
M12-55	●	55	23	12.5	24		15	M12×P1.75			(MEW/MEC/MFH/MRX)..-M12-..
M16-65	●	65	30	17	25		16	M16×P2.0			(MEW/MEC/MFH/MRX)..-M16-..

Actual End Mill depth



Arbor Description	Applicable End Mill (Head)			Actual End Mill depth(mm)	
	Description	Cutting Dia.(mm)	Dimension (mm)	M	L2
		ϕD	L1		
BT30K- M08-45	...16-M08-...	ϕ16	25	31.8	6.8
	...17-M08-...	ϕ17		33.2	8.2
	...18-M08-...	ϕ18		34.2	9.2
M10-45	...20-M10-...	ϕ20	30	36.8	6.8
	...22-M10-...	ϕ22		39.2	9.2
M12-45	...25-M12-...	ϕ25	35	42.8	7.8
	...28-M12-...	ϕ28		45.5	10.5
BT40K- M08-55	...16-M08-...	ϕ16	25	31.7	6.7
	...17-M08-...	ϕ17		33.2	8.2
	...18-M08-...	ϕ18		34.3	9.3
M10-60	...20-M10-...	ϕ20	30	38.7	8.7
	...22-M10-...	ϕ22		44.5	14.5
M12-55	...25-M12-...	ϕ25	35	44.6	9.6
	...28-M12-...	ϕ28		47.6	12.6
M16-65	...32-M16-...	ϕ32	40	51.2	11.2
	...35-M16-...	ϕ35		60.2	20.2
	...40-M16-...	ϕ40		64	24

● : 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.

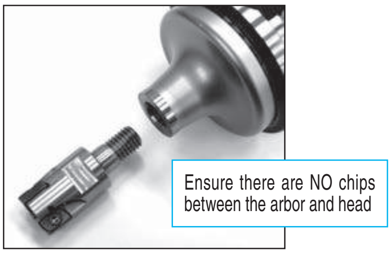

Ensure there are NO chips between the arbor and head

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
Note) The wrench is NOT included in the products.

Table1 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

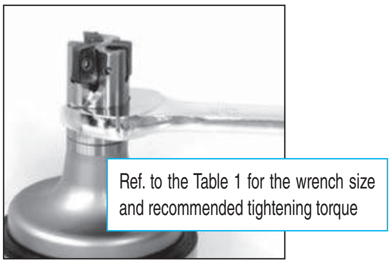

Ref. to the Table 1 for the wrench size and recommended tightening torque

Fig.2

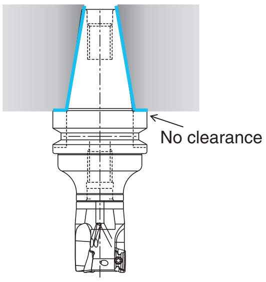
(3) Confirm that the head is fixed firmly on the arbor (Fig. 3).


No clearance In between

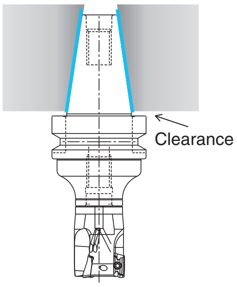
Fig.3

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 Ref. to page ➡ **M55,M56**
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.

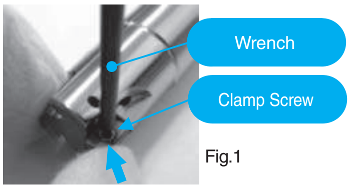


Fig.1

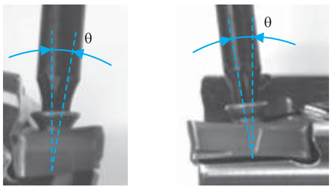


Fig.2

◆ Recommended Cutting Conditions

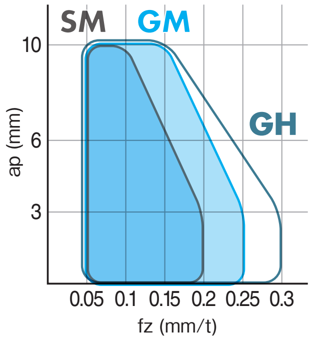
Chipbreaker	Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting SpeedVc:m/min)			
		Toolholder Description		MEGACOAT NANO			CVD Coated Carbide
		MEW16~MEW18	MEW20~MEW40 MEW040R~MEW080R	PR1535	PR1525	PR1510	CA6535
GM	Carbon Steel	0.06~**0.1**~0.2	0.08~**0.15**~0.25	☆ 120~**180**~250	★ 120~**180**~250	-	-
	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 *(GL)	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	-

★ :1st Recommendation ☆ :2nd Recommendation

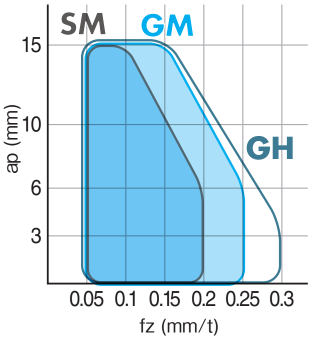
* **The bold-faced number** indicates a center value of recommended cutting condition.
Adjust the cutting speed and the feed rate within the above conditions according to the actual machining situation.
* Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.
* GL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

Applicable Chipbreaker Range (Shouldering)

● LOMU10 type



● LOMU15 type

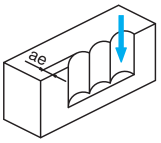


<Cutting Conditions>
Vc=150m/min ae=ϕD/2mm Workpiece Material : S50C

Ramping, Helical milling and Vertical milling (Plunging)

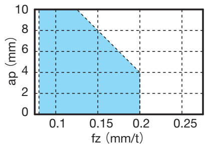
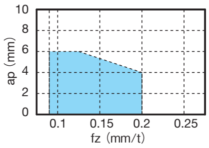
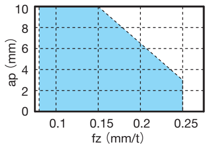
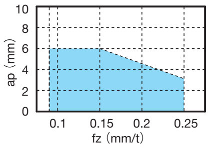
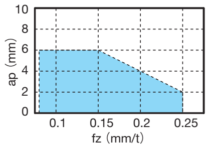
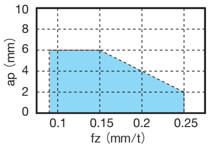
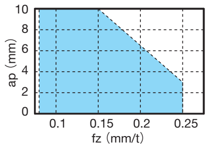
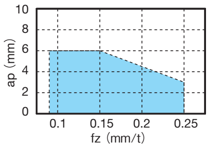
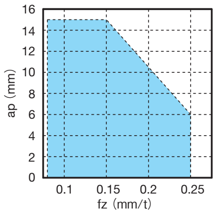
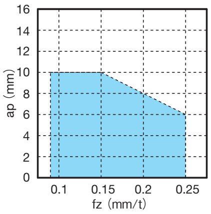
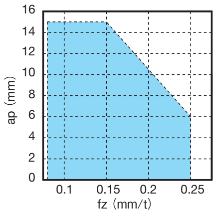
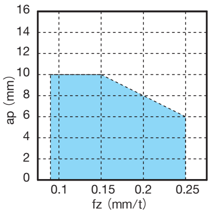
1. Available for vertical milling (plunging).
2. NOT available for ramping and helical milling, because interference between workpiece and insert may occur.

Vertical Milling (Plunging)



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

Cutting Performance

Description	Shouldering (Cutting width ae = φD/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**		
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 ℓ of the dimension
  2. Face mill: H of the dimension + minimum overhang length of the arbor

Case Studies

SS400

- Construction machine part
- Vc=250m/min
- ap×ae=4×20mm
- fz=0.14mm/t（Vf=1,350mm/min）
- Wet
- MEW32-S32-10-4T (4 inserts)
- LOMU100408ER-GM（PR1525）

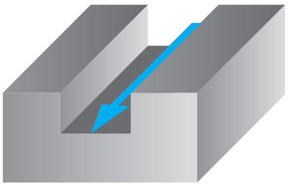
PR1525	Chip Evacuation Rate =108cc/min
Competitor A (Positive Cutter)	Chip Evacuation Rate =72cc/min

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

(Evaluation by the user)

SS400

- Machine Part
- Vc=250m/min
- ap×ae=3×20mm (Slotting)
- fz=0.2mm/t（Vf=2,390mm/min）
- Dry
- MEW20-S20-10-3T (3 inserts)
- LOMU100408ER-GM（PR1525）



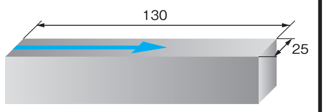
PR1525	Chip Evacuation Rate = 144cc/min (Stable milling)
Competitor B (Positive Cutter)	Chip Evacuation Rate = 114cc/min (Unstable)

No chattering with MEW, while Competitor B chattered at the same cutting conditions.
No burrs with MEW and excellent surface finish is gained.

(Evaluation by the user)

15-5PH（42HRC）

- Aircraft Part
- Vc=180m/min
- ap×ae=2×25mm
- fz=0.1mm/t（Vf=716mm/min）
- Wet
- MEW32-S32-10-4T (4 inserts)
- LOMU100408ER-GM（PR1525）



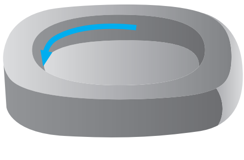
PR1525	Chip Evacuation Rate = 35.8cc/min (Further Machining Possible)
Competitor C (Positive Cutter)	Chip Evacuation Rate = 26.8cc/min (Unable to continue machining)

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

(Evaluation by the user)

SKD61（45HRC）

- Mold Part
- Vc=100m/min
- ap×ae=3.5×30mm
- fz=0.1mm/t（Vf=400mm/min）
- Dry
- MEW32-S32-10-4T (4 inserts)
- LOMU100408ER-GH（PR1525）



PR1525	Chip Evacuation Rate = 42cc/min (Further Machining Possible)
Competitor D (Positive Cutter)	Chip Evacuation Rate = 21cc/min (Unable to continue machining)

MEW doubled machining efficiency. Furthermore, MEW inserts have double number of edges (4-edge), which enables a drastic cost reduction.

(Evaluation by the user)

MEC End Mill

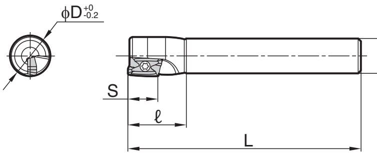


Fig.1

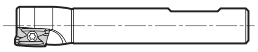


Fig.2

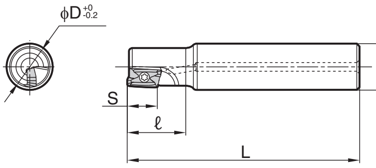


Fig.3

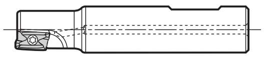


Fig.4

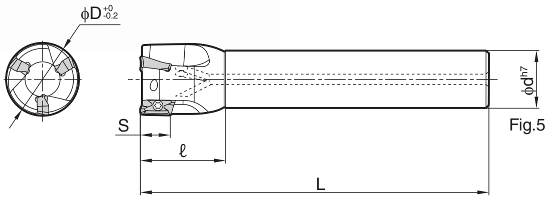


Fig.5

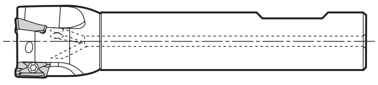


Fig.6

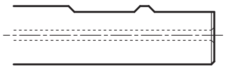


Fig.7

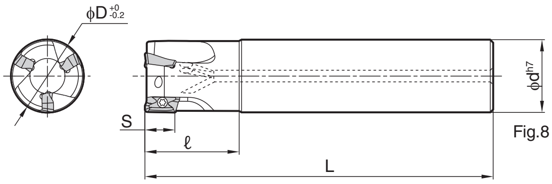


Fig.8

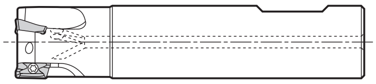


Fig.9

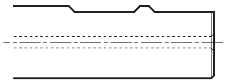


Fig.10

Toolholder Dimensions

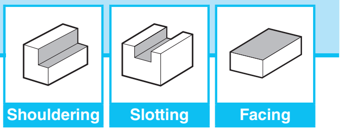
Description				Std.	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts		Max. Revolution (min^{-1})
						ϕD	ϕd	L	ℓ	S	A.R. (MAX.)	R.R.			Clamp Screw	Wrench	
Cylindrical	Standard Shank	MEC	10-S10-11	●	1	10	10	80	17	10	+10°	-24°	No	Fig.1	SB-2545TR	DTM-8	54,800
			10-S16-11	●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

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

Max. Revolution

When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force. For more details, see "Warning" on page **M67**.

● : Std. Item



Toolholder Dimensions

Description				Std.	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts		Max. Revolution (min^{-1})
						ϕD	ϕd	L	ℓ	S	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.8	SB-2555TRG	DTM-8	41,000
			25-S25-170-11T-3	●		25	25	170	60		+21°						37,500
			30-S25-180-11T-3	●		30	25	180	32		+23°	-9°		Fig.5			34,800
			32-S32-200-11T-3	●		32	32	200	65					Fig.8			33,900
			32-S32-200-11T-4	●	4												
	Standard	**MEC**	**25-S20-17**	●	2	25	20	120	36	15.7	+16°	-11°	Yes	Fig.5	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.8	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.8	SB-4070TRN	DTM-15	35,000
			25-S25-210-17	●				210									
			28-S25-210-17	●		28			36					Fig.5			32,500
			32-S32-200-17	●		32	32	200	65		+17°	-7°		Fig.8			30,000
			32-S32-250-17	●				250									
			35-S32-250-17	●		35			40					Fig.5			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.8	SB-4070TRN	DTM-15	30,000
			40-S32-250-17-3	●		40					+19°			Fig.5			25,000
			40-S32-250-17-4	●	4												
			50-S42-250-17-4	●		50	42		64			-6°					17,000
Weldon	Standard Shank	**MEC**	**10-W10-1103**	●	1	10	10	60	17	10	+10°	-24°	No	Fig.2	SB-2545TR	DTM-8	54,800
			10-W16-1103-H	●			16	68					Yes	Fig.4			
			12-W10-1103	●		12	10	60	20		+12°	-21°	No	Fig.2			50,800
			12-W16-1103-H	●			16	68					Yes	Fig.4			
			14-W12-1103	●		14	12				+12°	-19°	No	Fig.2			47,700
			14-W16-1103-H	●			16						Yes	Fig.4			
		MEC	**16-W12-11T3**	●	2	16	12	68	23	10	+18°	-14°	No	Fig.2	SB-2555TRG	DTM-8	43,750
			18-W16-11T3-H	●		18	16				+19°	-13°	Yes	Fig.6			43,000
			20-W16-11T3-H	●	3	20			25		+20°	-10°					41,000
			22-W20-11T3-H	●		22	20	81	26		+21°						39,600
			25-W20-11T3-H	●		25			29								37,500
			28-W25-11T3-H	●		28	25	88			+22°	-9°		Fig.7			35,800
			30-W25-11T3-H	●	4	30			32		+23°						34,800
			32-W25-11T3-H	●		32											33,900
			40-W32-11T3-H	●	5	40	32	110	50			-8°					30,000
	Same Shank	**MEC**	**16-W16-11T3-H**	●	2	16	16	68	25	10	+18°	-14°	Yes	Fig.9	SB-2555TRG	DTM-8	43,750
			20-W20-11T3-H	●	3	20	20	81	30		+20°	-10°					41,000
			25-W25-11T3-H	●		25	25	88	32		+21°			Fig.10			37,500
			32-W32-11T3-H	●	4	32	32	100	40		+23°	-9°					33,900
	Standard	**MEC**	**25-W20-1704-H**	●	2	25	20	86	36	15.7	+16°	-11°	Yes	Fig.6	SB-4070TRN	DTM-15	35,000
			32-W25-1704-H	●	3	32	25	92			+17°	-7°		Fig.7			30,000
			40-W32-1704-H	●	4	40	32	110	50		+19°						25,000
	Same Shank	**MEC**	**25-W25-1704-H**	●	2	25	25	92	36	15.7	+16°	-11°	Yes	Fig.10	SB-4070TRN	DTM-15	35,000
			32-W32-1704-H	●	3	32	32	100	40		+17°	-7°					30,000

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

Applicable Inserts

Description	Applicable Inserts ➔ **M18, M19**			Applicable Inserts ➔ **M25**
				
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	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 ➔ **M66, M67**

● : Std. Item
MTO : Made to order

MEC

Shouldering Slotting Facing

MEC Face Mill

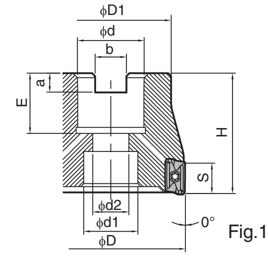


Fig.1

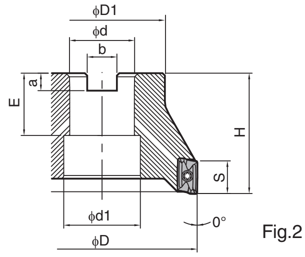
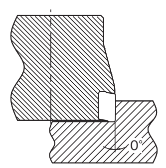


Fig.2

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



Toolholder Dimensions

Description				Std.	No. of Inserts	Dimension (mm)									Coolant Hole	Drawing	Weight (kg)	Spare Parts		Max. Revolution (min^{-1})
						ϕD	ϕd	ϕd1	ϕd2	H	E	a	b	S				Clamp screw	Wrench	
Metric	Coarse pitch	MEC	040R-11-5T-M	●	5	40	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	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	27	20	14	50	26	7	12.4				1.0			18,500
			100R-11-9T-MN	●	9	100	32	26	17.6	55		8	14.4				1.6			17,000
			125R-11-11T-M	●	11	125	40	45	32	63	33	9.5	16.4				3.1			15,000
			160R-11-14T-M	●	14	160		68	-						No	Fig.2	4.5			13,900
	Coarse pitch	MEC	040R-17-4T-M	●	4	40	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	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	27	20	14	50	26	7	12.4				1.0			12,000
			100R-17-7T-MN	●	7	100	32	26	17.6	55		8	14.4				1.8			10,500
			125R-17-9T-M	●	9	125	40	45	32	63	33	9.5	16.4				3.1			8,900
			160R-17-12T-M	●	12	160		68	-						No	Fig.2	4.5			7,400
Bore Dia. Inch spec	Coarse pitch	MEC	063R-11-6T	○	6	63	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											1.0			18,500
			100R-11-9TN	○	9	100	31.75	26	17.6	63	32	8	12.7				1.8			17,000
			125R-11-11T	○	11	125	38.1	45	32		38	10	15.9				3.4			15,000
			160R-11-14T	○	14	160	50.8	70	-		47	10	19.1			Fig.2	4.4			13,900
	Fine pitch	MEC	063R-11-8T	○	8	63	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											1.0			18,500
	Coarse pitch	MEC	063R-17-5T	○	5	63	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											1.0			12,000
			100R-17-7TN	○	7	100	31.75	26	17.6	63	32	8	12.7				1.8			10,500
			125R-17-9T	○	9	125	38.1	45	32		38	10	15.9				3.4			8,900
			160R-17-12T	○	12	160	50.8	70	-		47	10	19.1			Fig.2	4.5			7,400
	Fine pitch	MEC	063R-17-6T	○	6	63	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											1.0			12,000
			100R-17-9TN	○	9	100	31.75	26	17.6	63	32	8	12.7				1.8			10,500

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

Recommended Cutting Conditions ➡ **M66, M67**

■ Max. Revolution

When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force. For more details, see "Warning" on page **M67**.

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)

For good shoulder finishes by MEC multistage ap.

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

Table1

Description	Mounting bolt (Attachment)	Wrench
MEC040R·····-M	HH8X25H	LW-5 (Double width 5mm)
MEC050R·····-M **MEC063R·····-M**	HH10X30H	LW-6 (Double width 6mm)
MEC063R···· **MEC080R····**	HH12X35H	LW-8 (Double width 8mm)
MEC100R·····-N	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.

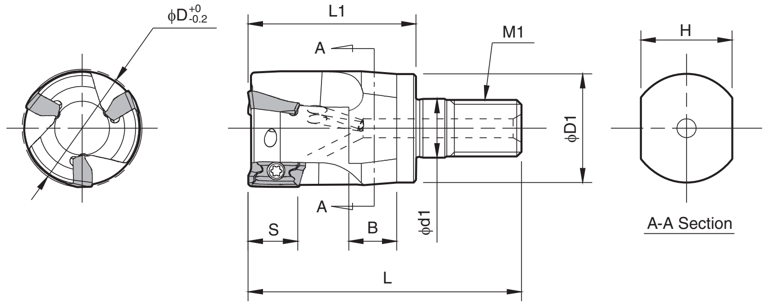
Applicable Inserts

Description	Applicable Inserts ➡ **M18, M19**			Applicable Inserts ➡ **M25**
				
MEC··R-11	BDMT11T3 ○○ ER-JT	BDMT11T3 ○○ ER-JS	BDGT11T3 ○○ FR-JA	BDMT11T3 ○○ FR
MEC··R-17	BDMT1704 ○○ ER-JT	BDMT1704 ○○ ER-JS	BDGT1704 ○○ FR-JA	BDMT1704 ○○ FR

● : Std. Item

MEC Modular type

MEC type Head



Dimensions

Description	Std.	No. of Inserts	Dimension (mm)									Rake Angle		Coolant Hole	Applicable Inserts ➡ M18,M19 M25	Max. Revolution (min^{-1})
			ϕD	ϕD1	ϕd1	L	L1	M1	H	B	S	A.R. (MAX.)	R.R.			
MEC 16-M08-11T-2T	●	2	16	14.7	8.5	43	25	M8×P1.25	12	8	10	+18°	-14°	Yes	BDMT11T3 BDGT11T3	43,750
20-M10-11T-2T	●	2	20	18.7	10.5	49	30	M10×P1.5	15	9		+20°	-10°			41,000
20-M10-11T-3T	●	3	20	18.7	10.5	49	30	M10×P1.5	15	9		+20°	-10°			41,000
25-M12-11T-3T	●	3	25	23	12.5	57	35	M12×P1.75	19	10		+21°	-10°			37,500
32-M16-11T-4T	●	4	32	30	17	63	40	M16×P2.0	24	12		+23°	-9°			33,900
MEC 25-M12-17-2T	●	2	25	23	12.5	57	35	M12×P1.75	19	10	15.7	+16°	-11°	Yes	BDMT1704 BDGT1704	35,000
32-M16-17-3T	●	3	32	30	17	63	40	M16×P2.0	24	12		+17°	-7°			30,000

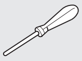
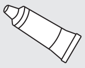
■ **Max. Revolution**

When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

Recommended Cutting Conditions ➡ **M66, M67**

Ref. to page ➡**M58** 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 for Insert Clamp Recommended tightening torque 1.2N·m	DTM-8	MP-1
20-M10-11T-2T			
20-M10-11T-3T			
25-M12-11T-3T			
32-M16-11T-4T			
MEC 25-M12-17-2T	SB-4070TRN for Insert Clamp Recommended tightening torque 3.5N·m	DTM-15	MP-1
32-M16-17-3T			

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

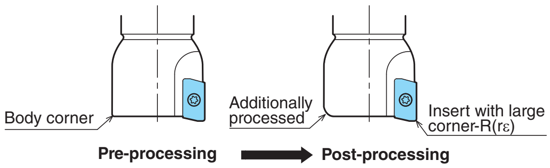
● : Std. Item

MEC

■ **When using inserts with corner-R(rε)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(rε) is 1.2mm or less.)**

Insert Corner-R(rε) (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		PVD Coated Carbide	CVD Coated Carbide
	MEC10~MEC19	**MEC20~MEC40 MEC040R~MEC160R**	**TN100M**	**PR1535**	**PR1225**	**PR1210**	**PR830**	**CA6535**
Carbon Steel	0.06~**0.1**~0.15	0.08~**0.15**~0.25	☆ 120~**160**~200	☆ 120~**180**~250	★ 120~**180**~250	-	☆ 120~**160**~200	-
Alloy Steel	0.06~**0.1**~0.12	0.08~**0.15**~0.2	☆ 100~**140**~180	☆ 100~**160**~220	★ 100~**160**~220	-	☆ 100~**140**~180	-
Mold Steel	0.06~**0.08**~0.1	0.08~**0.12**~0.2	☆ 80~**120**~150	☆ 80~**140**~180	★ 80~**140**~180	-	☆ 80~**120**~150	-
Stainless Steel (Austenitic related)	0.06~**0.08**~0.1	0.08~**0.12**~0.15	-	☆ 100~**160**~200	☆ 100~**160**~200	-	☆ 100~**140**~180	-
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		PVD Coated Carbide	CVD Coated Carbide
	MEC10~MEC19	**MEC20~MEC40 MEC040R~MEC160R**	**PR1535**	**PR1225**	**PR1210**	**PR830**	**CA6535**
Carbon Steel	0.06~**0.1**~0.12	0.08~**0.15**~0.18	☆ 120~**180**~250	★ 120~**180**~250	-	☆ 120~**160**~200	-
Alloy Steel	0.06~**0.08**~0.1	0.08~**0.12**~0.15	☆ 100~**160**~220	★ 100~**160**~220	-	☆ 100~**140**~180	-
Mold Steel	0.06~**0.08**~0.1	0.08~**0.1**~0.12	☆ 80~**140**~180	★ 80~**140**~180	-	☆ 80~**120**~150	-
Stainless Steel (Austenitic related)	0.06~**0.08**~0.1	0.08~**0.1**~0.12	★ 100~**160**~200	☆ 100~**160**~200	-	☆ 100~**140**~180	-
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.

★:1st Recommendation ☆:2nd Recommendation

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

·JA Chipbreaker

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)	
		DLC Coated Carbide	Carbide
		PDL025	**GW25**
Aluminum Alloy (Si13% or less)	0.05~0.3	200~1,000	200~800
Aluminum Alloy (Si13% 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 Alloy (Si 13% or less)	0.05~0.2	500~1,500
Aluminum Alloy (Si13% 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

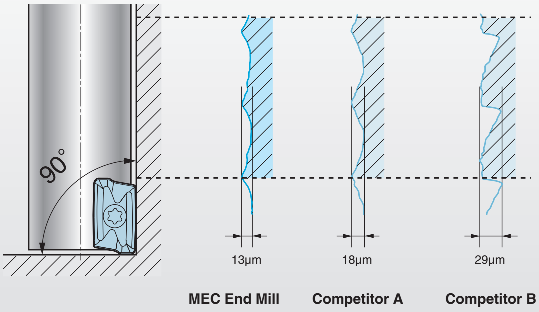
1. When running the end mill and the face mill at revolutions exceeding the maximum revolution limit, the inserts or toolholder may be damaged due to the centrifugal force.
2. For actual practical revolution, please set within recommended cutting condition.
3. When using at a higher revolution (over 10,000min^{-1}), refer to the table to adjust the balance of MEC and suitable arbor.

Revolution (min^{-1})	Balance quality grade G ISO1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

Features of MEC

Good squareness

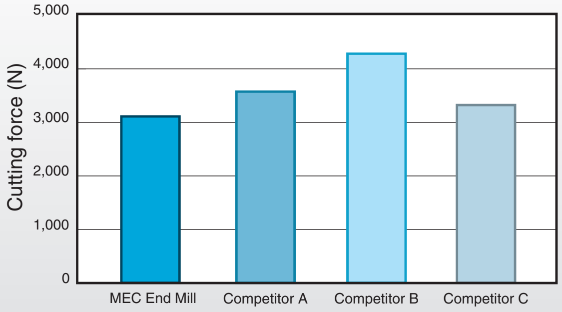
<Cutting Surface Comparison>



(Internal evaluation)

Low cutting force

<Cutting Force Comparison>

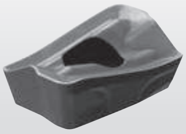


Tool Dia. ϕ20 S50C
Vc=100m/min Shouldering apxae=9x10mm
fz=0.2mm/t Dry

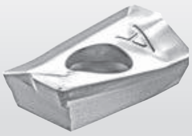
(Internal evaluation)

Chipbreaker

JT Chipbreaker (General Purpose)

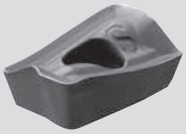


JA Chipbreaker (For Aluminum)



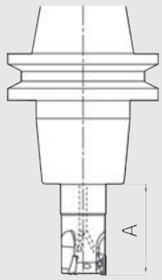
JS chipbreaker (Low cutting force)

Cutting force 20% lower

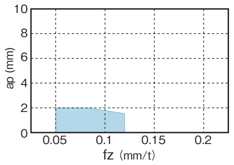
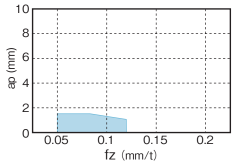
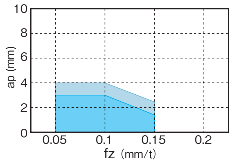
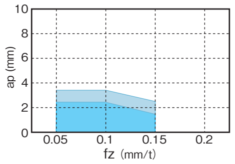
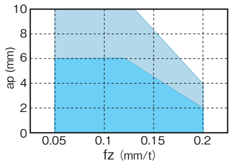
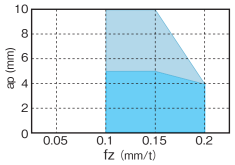
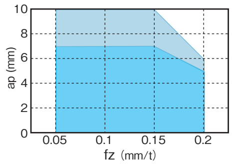
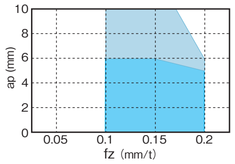
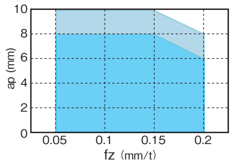
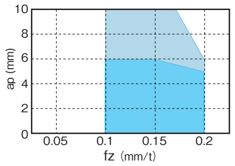
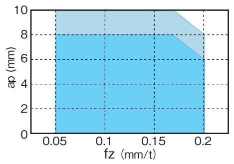
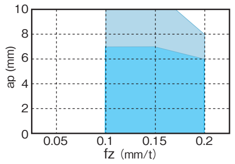


Cutting Performance of MEC End Mill

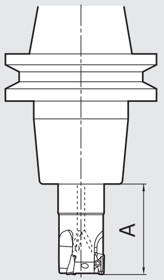
(1) Cutting edge length 10mm type (Standard / Same Shank)

Cutting Dia.	Description	Overhang Length A (mm)		Shape
ϕ10	**MEC10-S10-11**	17	-	
ϕ12	**MEC12-S16-11**	20	30	
ϕ16	**MEC16-S16-11T**	30	45	
ϕ20	**MEC20-S20-11T**	30	45	
ϕ25	**MEC25-S25-11T**	32	48	
ϕ32	**MEC32-S32-11T**	40	60	

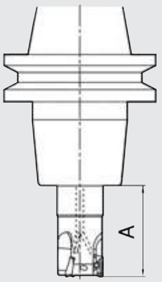
〔JT Chipbreaker Vc=120m/min Workpiece Material：S50C〕

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

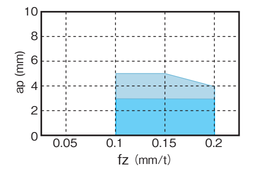
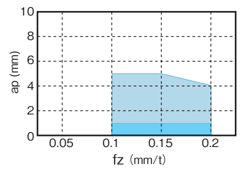
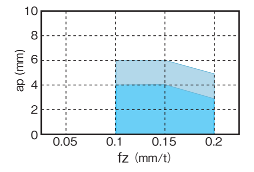
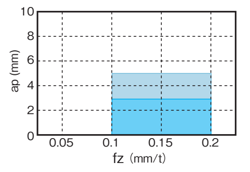
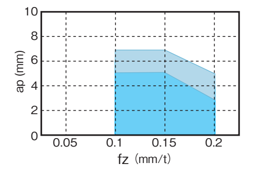
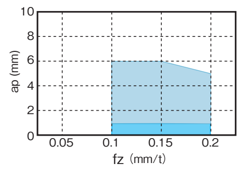
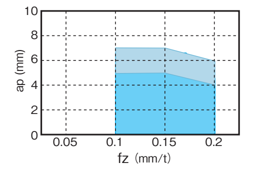
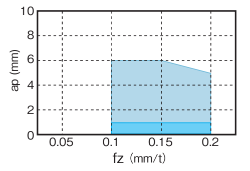
(2) Cutting edge length 10mm type (Long Shank)

Cutting Dia.	Description	Overhang Length A (mm)		Shape
ϕ20 Long Shank	**MEC20-S20-140-11T**	60	90	
ϕ25 Long Shank	**MEC25-S25-160-11T**	60	100	
ϕ32 Long Shank	**MEC32-S32-200-11T**	100	130	
ϕ40 Long Shank	**MEC40-S32-240-11T**	100	130	

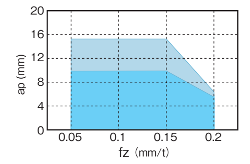
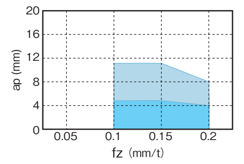
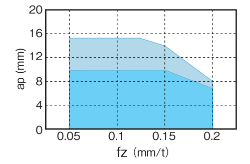
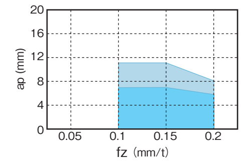
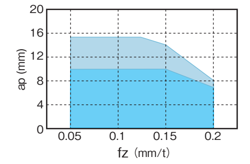
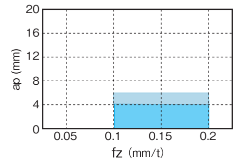
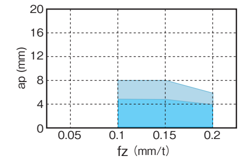
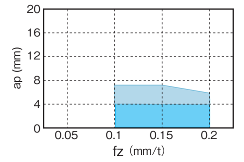
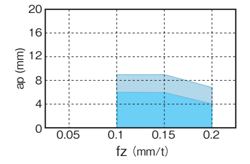
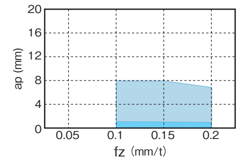
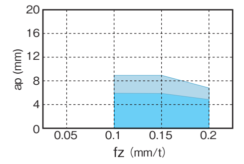
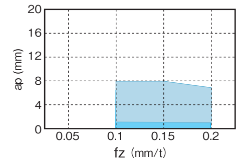
(3) Cutting edge length 15.7mm type

Cutting Dia.	Description	Overhang Length A (mm)		Shape
ϕ25	**MEC25-S25-17**	36	54	
ϕ32	**MEC32-S32-17**	40	60	
ϕ40	**MEC40-S32-17**	50	75	
ϕ25 Long Shank	**MEC25-S25-160-17**	60	100	
ϕ32 Long Shank	**MEC32-S32-200-17**	100	130	
ϕ40 Long Shank	**MEC40-S32-240-17**	100	130	

〔JT Chipbreaker Vc=120m/min Workpiece Material：S50C〕

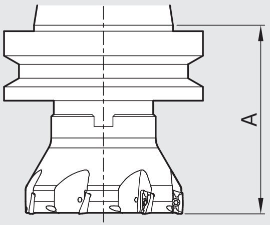
Description	■Shouldering (Cutting width ae = ϕD/2)	■Slotting ■Ramping and Helical Milling
MEC20 -S20-140-11T Long Shank		
MEC25 -S25-160-11T Long Shank		
MEC32 -S32-200-11T Long Shank		
MEC40 -S32-240-11T Long Shank		

〔JT Chipbreaker Vc=120m/min Workpiece Material：S50C〕

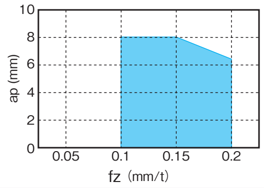
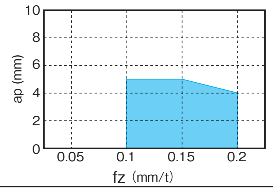
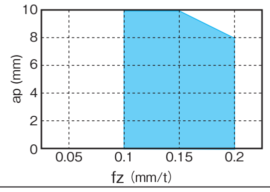
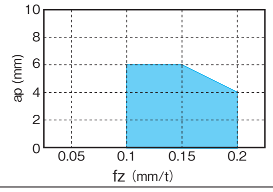
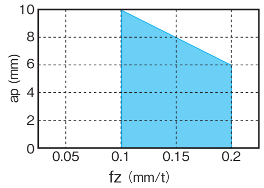
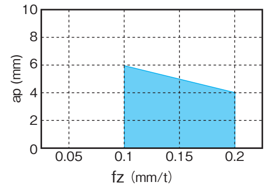
Description	■Shouldering (Cutting width ae = ϕD/2)	■Slotting ■Ramping and Helical Milling
MEC25-S25-17		
MEC32-S32-17		
MEC40-S32-17		
MEC25 -S25-160-17 Long Shank		
MEC32 -S32-200-17 Long Shank		
MEC40 -S32-240-17 Long Shank		

Cutting Performance of MEC Face Mill

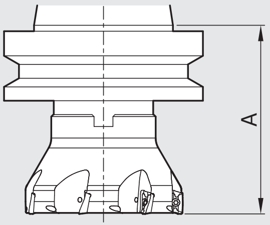
Cutting edge length 10 mm type

Cutting Dia.	Description	Overhang Length A (mm)
ϕ40	**MEC040R-11-5T-M**	115
ϕ50	**MEC050R-11-○T-M**	100
ϕ63	**MEC063R-11-○T**	95
	MEC063R-11-○T-M	
ϕ80	**MEC080R-11-○T**	95
ϕ100	**MEC100R-11-9TN**	108
ϕ125	**MEC125R-11-11T**	
ϕ160	**MEC160R-11-14T**	
Shape		

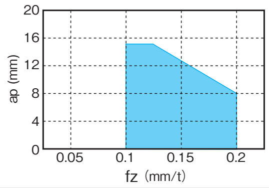
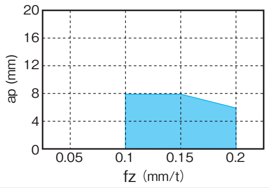
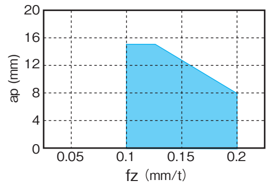
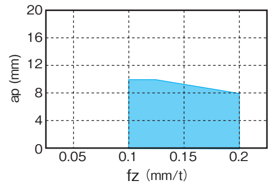
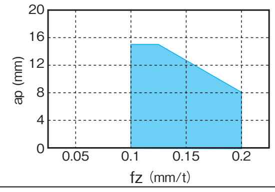
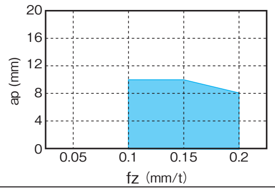
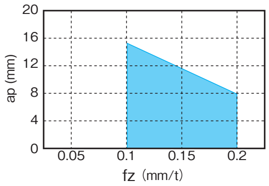
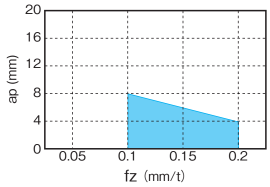
〔JT Chipbreaker Vc=120m/min Workpiece Material：S50C〕

Description	■Shouldering (Cutting width ae = ϕD/2)	■Slotting
MEC040R -11-5T-M		
MEC050R -11-○T-M ~ MEC100R -11-9TN		
MEC125R -11-11T MEC160R -11-14T		

Cutting edge length 15.7mm type

Cutting Dia.	Description	Overhang Length A (mm)
ϕ40	**MEC040R-17-4T-M**	115
ϕ50	**MEC050R-17-○T-M**	100
ϕ63	**MEC063R-17-○T**	95
	MEC063R-17-○T-M	
ϕ80	**MEC080R-17-○T**	95
ϕ100	**MEC100R-17-○TN**	108
ϕ125	**MEC125R-17-9T**	
ϕ160	**MEC160R-17-12T**	
Shape		

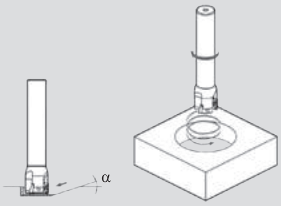
〔JT Chipbreaker Vc=120m/min Workpiece Material：S50C〕

Description	■Shouldering (Cutting width ae = ϕD/2)	■Slotting
MEC040R -17-4T-M		
MEC050R -17-○T-M		
MEC063R -17-○T(-M) ~ MEC100R -17-○TN		
MEC125R -17-9T MEC160R -17-12T		

Ramping, Helical milling and Vertical milling (Plunging)

Ramping / Helical Milling

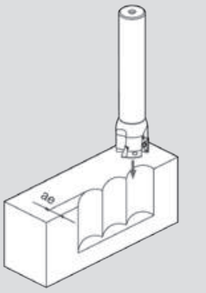
- Ramping angle is recommended under α°.
- Refer to each tool's cutting performance list for depth of helical milling per one revolution.
  Use compressed air during machining.



Cutting Dia.	Applicable Inserts	Max. ramping angle (α°)
ϕ16~ϕ18	BDMT11T3 type BDGT11T3 type	3°
ϕ19~ϕ21		5°
ϕ22~ϕ25		2.5°
ϕ28~ϕ32		1.5°
ϕ40		0.7°
ϕ50 and over		Not recommended
ϕ25	BDMT1704 type BDGT1704 type	8°
ϕ32		5°
ϕ40		2.5°
ϕ50 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)
ϕ16 ~ ϕ19	BDMT11T3 type BDGT11T3 type	1.5mm
ϕ20 ~ ϕ160	BDMT11T3 type BDGT11T3 type	5mm
ϕ25 ~ ϕ160	BDMT1704 type BDGT1704 type	8mm

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

Guidance of minimum cutting dia. by helical milling

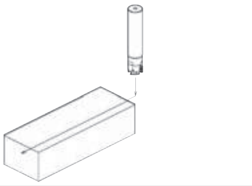
MEC	Cutting Dia.	ϕ16	ϕ18	ϕ20	ϕ22	ϕ25	ϕ28	ϕ30	ϕ32	ϕ40	ϕ50
BD_T11T3 type	Guidance of minimum cutting dia. by helical milling	ϕ21	ϕ25	ϕ29	ϕ33	ϕ39	ϕ45	ϕ49	ϕ53	ϕ69	Helical milling is not recommended.
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling.	ϕ28	ϕ32	ϕ36	ϕ40	ϕ46	ϕ52	ϕ56	ϕ60	ϕ76	

MEC	Cutting Dia.	ϕ25	ϕ32	ϕ40	ϕ50
BD_T1704 type	Guidance of minimum cutting dia. by helical milling	ϕ34	ϕ48	ϕ64	Helical milling is not recommended.
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling.	ϕ46	ϕ60	ϕ76	

Case Studies

RC55 (Pre-hardened Tool Steel)

·Test piece (54~56HRC)
·Vc=50m/min (n=800min^{-1})
·apxae=2x14mm
·fz=0.125mm/t (Vf=300mm/min)
·Dry
·MEC20-S20-11T
·3 inserts
·BDMT11T308ER-JT (PR830)

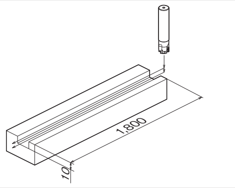


MEC	**Chip Removal Amount = 71.3cm³ (Further Machining Possible)**
Competitor's End Mill A	Chip Removal Amount = 2.9cm³ (Chipping occurred)

Competitor's End Mill A [ϕ25 (2 inserts) 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. (Evaluation by the user)

SS400

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

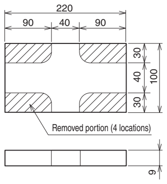


MEC	**23pcs/edge**
Competitor's End Mill B	10~11pcs/edge

MEC extended the tool life for more than twice.
(Evaluation by the user)

SUS304

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

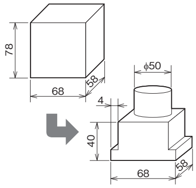


MEC	**4pcs/edge or more**
Competitor's End Mill C	1pcs/edge or less

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)
(Evaluation by the user)

DAC10 (Hot Work Tool Steel)

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

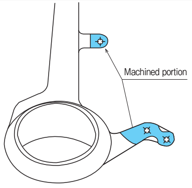


MEC	**2 hours (Small Wear: Extendible)**
Competitor's End Mill D	2 hours (halted due to insert breakage)

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 inserts type) was used with Vf=936mm/min (fz=0.15mm/t). (Evaluation by the user)

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 inserts
·BDMT170408ER-JT (PR830)

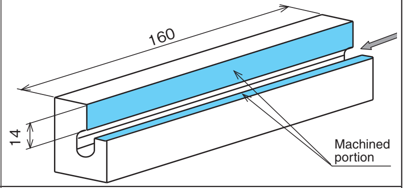


MEC	**150pcs/edge**
Competitor's End Mill E	40pcs/edge

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

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 inserts
·BDMT170408ER-JS (PR1025)



MEC	**9pcs/edge**
Competitor's End Mill F	1pcs/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.
(Evaluation by the user)

Shouldering Slotting Facing

MECX End Mill

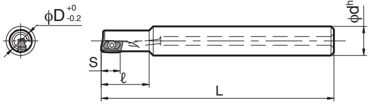


Fig.1

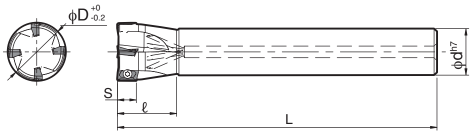


Fig.3

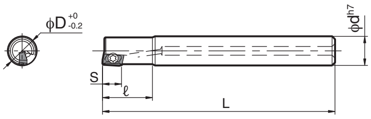


Fig.2

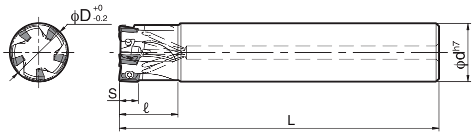


Fig.4

Toolholder Dimensions

Description			Std.	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Drawing	Spare Parts		Max. Revolution (min^{-1})
					φD	φd	L	ℓ	S	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
		32-S32-07-6T	●	6	32	32	130	30			-8.9°					33,600
	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
		33-S32-200-07-6T	●	6	33	32	200	30			-8.8°					33,100
Weldon	Standard	**MECX 16-W16-07-3T**	●	3	16	16	68	20	6	16.3°	-11.3°	Yes		SB-2042TRG	DTM-6	43,200
		20-W20-07-4T	●	4	20	20	81				-10.4°					40,200
		25-W25-07-5T	●	5	25	25	88	25			-9.7°					37,000
	Fine pitch	**MECX 16-W16-07-4T**	●	6	16	16	68	20	6	16.3°	-11.3°	Yes		SB-2042TRG	DTM-6	43,200
		20-W20-07-5T	●	5	20	20	81				-10.4°					40,200
		25-W25-07-7T	●	7	25	25	88	25			-9.7°					37,000

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

Recommended Cutting Conditions ➡ M74

■ **Max. Revolution**

When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.
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

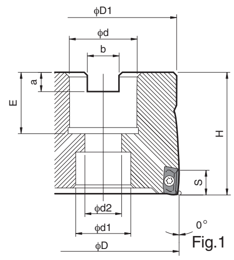


Fig.1

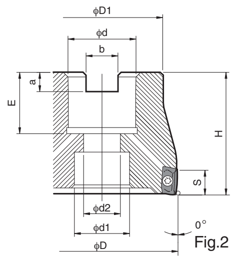
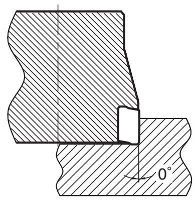


Fig.2



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Drawing	Weight (kg)	Spare Parts		Max. Revolution (min⁻¹)
			ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S	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	Fig.1	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
050R-07-12T-M	●	12	50	40										-8.3°		Fig.2	0.35			27,700
063R-07-14T-M	●	14	63											-7.9°			0.50			24,900

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

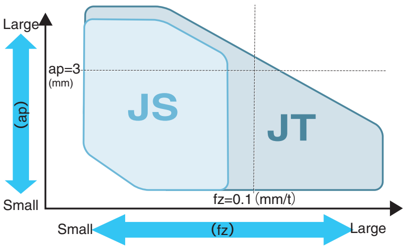
Recommended Cutting Conditions ➡ **M74**

- **Max. Revolution**
  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force. 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).**

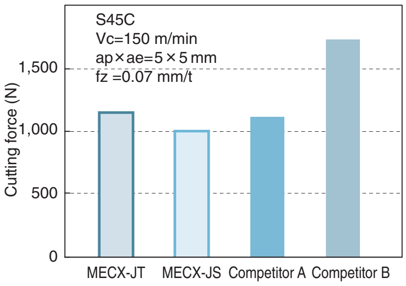
Applicable Inserts

Description	Applicable Inserts ➡ **M18**	
		
MECX...-07..	BDMT 0703 ○○ ER-JT	BDMT 0703 ○○ ER-JS

Chipbreaker selection



Cutting Force Comparison



⚠ 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. When running the end mill and the face mill at revolutions exceeding the maximum revolution limit, the inserts or toolholder may be damaged due to the centrifugal force.
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 ISO1940-1/8821 (JIS B0905)
~20,000	G16
~30,000	G6.3
30,000~	G2.5

● : Std. Item

MECX

Recommended Cutting Conditions

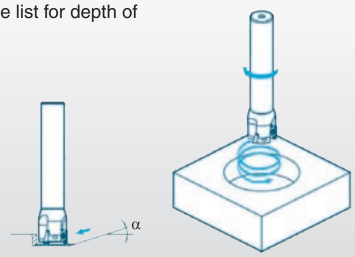
Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc : m/min)				
	JS Chipbreaker	JT Chipbreaker	MEGACOAT NANO	MEGACOAT		PVD Coated Carbide	CVD Coated Carbide
			PR1535	**PR1225**	**PR1210**	**PR830**	**CA6535**
Carbon Steel	0.04~0.08~0.1	0.06~0.1~0.12	☆ 120~180~250	★ 120~180~250	-	☆ 120~150~180	-
Alloy Steel	0.04~0.06~0.08	0.06~0.08~0.1	☆ 100~160~220	★ 100~160~220	-	☆ 100~140~180	-
Mold Steel	0.04~0.06~0.08	0.06~0.08~0.1	☆ 80~140~180	★ 80~140~180	-	☆ 80~120~150	-
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 α°.
- Refer to each tool's cutting performance list for depth of helical milling per one revolution.
  Use compressed air during machining.



Cutting Dia.	Applicable Inserts	Max. ramping angle (α°)
ϕ8	**BDMT0703** type	Not recommended
ϕ10		1.5°
ϕ12, ϕ14		2°
ϕ16		3°
ϕ17, ϕ18		1.5°
ϕ20		2°
ϕ21		1.8°
ϕ25		1.3°
ϕ26		1.2°
ϕ32		0.8°
ϕ33		0.5°

Guidance of minimum cutting dia. by helical milling

MECX	Cutting Dia.	ϕ8	ϕ10	ϕ12	ϕ14	ϕ16	ϕ17	ϕ18	ϕ20
BDMT0703 type	Guidance of minimum cutting dia. by helical milling	Helical milling is not recommended.	ϕ14	ϕ18	ϕ22	ϕ26	ϕ28	ϕ30	ϕ34
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling.		ϕ17	ϕ21	ϕ25	ϕ29	ϕ31	ϕ33	ϕ37

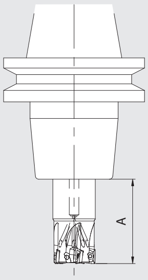
MECX	Cutting Dia.	ϕ21	ϕ25	ϕ26	ϕ32	ϕ33
BDMT0703 type	Guidance of minimum cutting dia. by helical milling	ϕ36	ϕ44	ϕ46	ϕ58	ϕ60
	Guidance of minimum cutting dia. in case of flatting bottom after helical milling.	ϕ39	ϕ47	ϕ49	ϕ61	ϕ63

Cutting Performance of MECX End Mill

〔JT Chipbreaker Vc=150m/min Workpiece Material：S50C〕

Cutting Dia.	Description	Overhang Length A (mm)	
		▨	■
φ8	**MECX08-S10-07-1T**	16	-
φ10	**MECX10-S10-07-1T**	17	-
φ12	**MECX12-S12-07-2T**	18	30
φ16	**MECX16-S16-07-3T**	20	40
φ20	**MECX20-S20-07-4T**	20	40
φ25	**MECX25-S25-07-5T**	25	50
φ32	**MECX32-S32-07-6T**	30	50

Shape



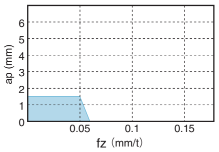
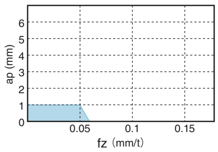
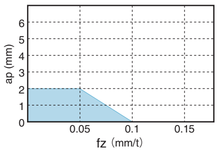
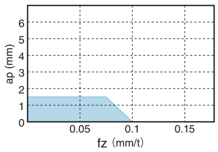
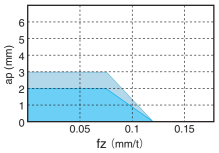
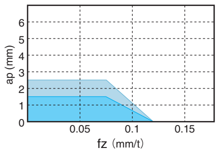
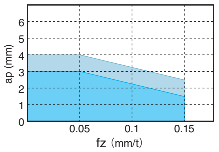
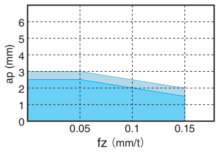
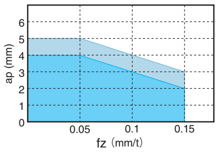
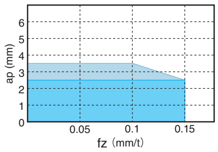
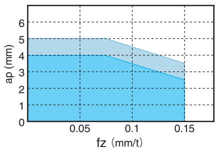
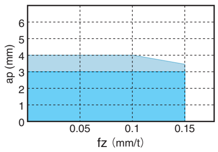
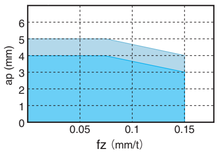
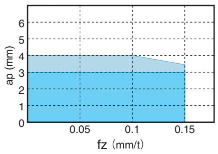
* Machining with extended overhang length is not recommended for φ8 and φ10.

* The cutting performance list shows applicable range of JT Chipbreaker (PR830) 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.

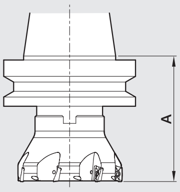
Description	■Shouldering (Cutting width ae = φD/2)	■Slotting ■Ramping and Helical Milling
MECX08-S10-07-1T		
MECX10-S10-07-1T		
MECX12-S12-07-2T		
MECX16-S16-07-3T		
MECX20-S20-07-4T		
MECX25-S25-07-5T		
MECX32-S32-07-6T		

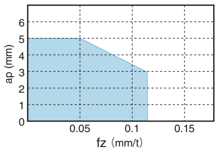
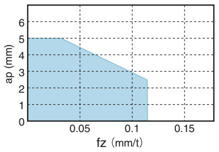
Cutting Performance of MECX Face Mill

〔JT Chipbreaker Vc=150m/min Workpiece Material：S50C〕

Cutting Dia.	Description	Overhang Length A (mm)
		▨
φ32	**MECX032R-07-8T-M**	100
φ40	**MECX040R-07-10T-M**	
φ50	**MECX050R-07-12T-M**	
φ63	**MECX063R-07-14T-M**	

Shape



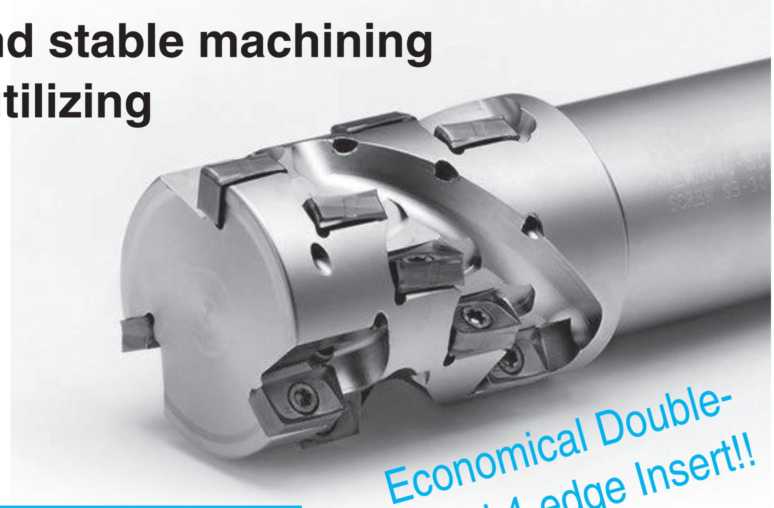
Description	■Shouldering (Cutting width ae = φD/2)
MECX032R-07-8T-M **MECX040R-07-10T-M**	
MECX050R-07-12T-M **MECX063R-07-14T-M**	

* Slotting is not recommended.

High quality and stable machining with heavy milling

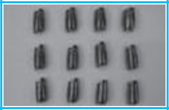
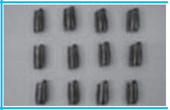
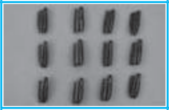
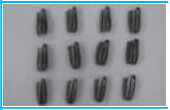
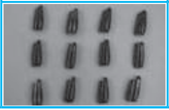
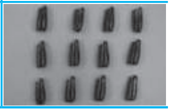
Helical End Mill MEWH

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



Economical Double-sided 4-edge Insert!!

Chip Evacuation

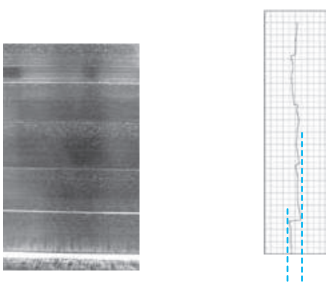
	Chipbreaker	Workpiece Material	fz=0.15mm/t	fz=0.2mm/t
	**GM**	SCM435		
	GM	SS400		
	SM			

Vc=120m/min
ap×ae=20×15mm
Dry

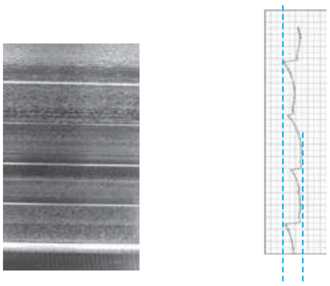
Chips are evacuated constantly to the opposite direction of cutter feed without causing clogging

Surface Finish Comparison

MEWH



Competitor A



Better surface quality than competitor A

SCM435
Vc=120m/min
ap×ae=45×5mm
fz=0.1mm/t
Dry

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

LOMU100404ER-GM
LOMU150504ER-GM

LOMU100408ER-GM
LOMU150508ER-GM

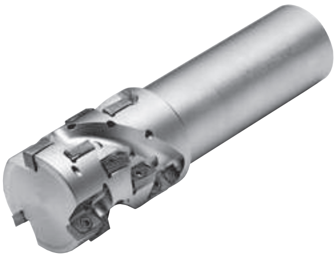
LOMU150510ER-GM

LOMU100412ER-GM
LOMU150512ER-GM

LOMU100416ER-GM
LOMU150516ER-GM

LOMU100420ER-GM
LOMU150520ER-GM

MEWH End Mill (with coolant hole for bottom insert)



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

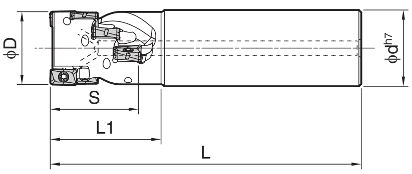


Fig.1

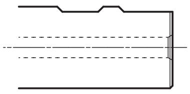


Fig.3

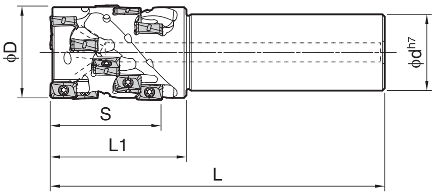


Fig.2

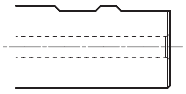
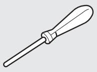
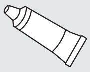


Fig.4

Toolholder Dimensions

Description	Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Coolant Hole	Drawing	Spare Parts			Applicable Inserts ➡ **M13**
					ϕD	ϕd	L	L1	S			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 for Insert Clamp Recommended tightening torque 1.2N·m	DTPM-8	MP-1	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 for Insert Clamp Recommended tightening torque 3.5N·m	DTPM-15	MP-1	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 for Insert Clamp Recommended tightening torque 1.2N·m	DTPM-8	MP-1	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 for Insert Clamp Recommended tightening torque 3.5N·m	DTPM-15	MP-1	LOMU1505••
050-W40-15-4-2T	●				50	40	135								
050-W40-15-4-3T	●	3		12											

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

Recommended Cutting Conditions ➡ **M79**

● : Std. Item

MEWH Shell Mill (without coolant hole)

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

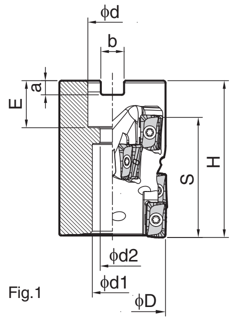


Fig.1

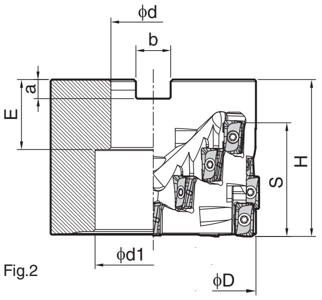
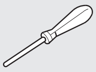
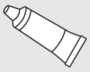
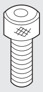


Fig.2

Toolholder Dimensions

Description	Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)									Drawing	Spare Parts				Applicable Inserts ➡ M13
					ϕD	ϕd	ϕd1	ϕd2	H	E	a	b	S		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	MP-1	HH8X25	LOMU1004··
050R-10-5-3T-M	●		5	15	50	22	18	11	64	21	6.3	10.4	46		for Insert Clamp Recommended tightening torque 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	MP-1	HH10X30	LOMU1505··
063R-15-3-3T-M	●		3	9	63	27	20	13	58	24	7	12.4	41		for Insert Clamp Recommended tightening torque 3.5N·m			HH12X35	
080R-15-4-4T-M	●	4	4	16	80	32	26	18	70	28	8	14.4	53					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 ➡ **M79**

Applicable Inserts

Description	Applicable Inserts ➡ **M13**		
	 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)
MEWH...-10-...	LOMU1004..ER-GM	LOMU100408ER-SM	LOMU100408ER-GH
MEWH...-15-...	LOMU1505..ER-GM	LOMU150508ER-SM	LOMU150508ER-GH

Recommended Cutting Conditions ➡ **M79**

Guidance of applicable inserts for MEWH

Insert Location Indication	Toolholder Description										
	MEWH···10···					MEWH···15···					
	Corner-R(rε)(mm)					Corner-R(rε)(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(rε) 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
		MEWH025~MEWH050 (Helical End Mill)	PR1535	PR1525	PR1510	CA6535
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	-

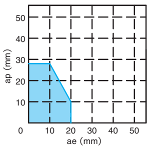
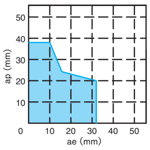
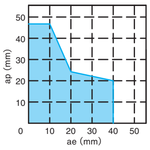
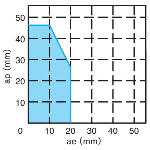
★:1st Recommendation ☆:2nd Recommendation

* **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.

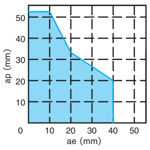
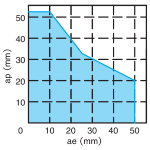
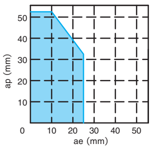
* Machining with coolant is recommended for Stainless Steel, Ni-base heat-resistant alloys and titanium alloys with MEWH.

Cutting Performance

● LOMU1004 type

Cutting Dia.	Description	2 Flute ap×ae	Description	3 Flute ap×ae
ϕ25	MEWH025 -S25-10-3-2T		–	–
ϕ32	MEWH032 -S32-10-4-2T		–	–
ϕ40	MEWH040 -S32-10-5-2T		MEWH040 -S32-10-5-3T	

● LOMU1505 type

Cutting Dia.	Description	2 Flute ap×ae	Description	3 Flute ap×ae
ϕ40	MEWH040 -S32-15-4-2T		–	–
ϕ50	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 "L1" of the dimension list

Shouldering
*Slotting
Facing
* Only for 2 flute type

MECH End Mill (with coolant hole for bottom insert)

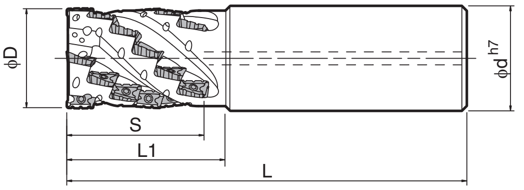


Fig.1

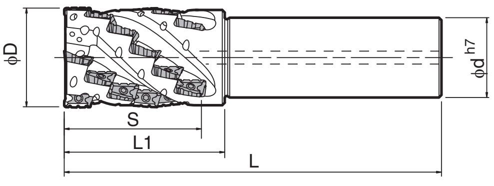
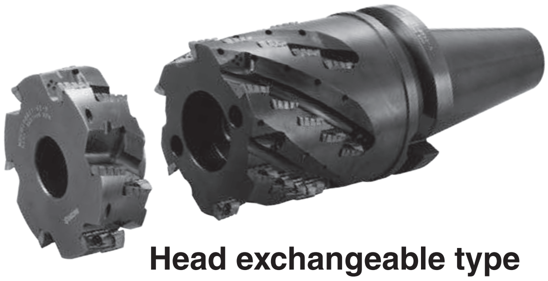


Fig.2

Toolholder Dimensions

	Description	Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)					Rake Angle		Drawing	Spare Parts			Applicable Inserts ➔ M19
						ϕD	ϕd	L	L1	S	A.R. (MAX.)	R.R.		Clamp Screw	Wrench	Anti-seize Compound	
Cylindrical	**MECH 025-S25-11-4-2T**	●	2	4	8	25	25	120	46	37	+21°	-10°	Fig.1	SB-2555TRG	DTM-8	MP-1	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	MP-1	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				
Weldon	**MECH 025-W25-11-4-2T**	●	2	4	8	25	25	104	46	37	+21°	-10°		SB-2555TRG	DTM-8	MP-1	BDMT11T308ER-N2 BDMT11T308ER-N3
	032-W32-11-5-2T	●		5	10	32	32	117	55	46	+23°	-9°					
	032-W32-11-5-4T	●	4		20												
	040-W32-11-6-4T	●		6	24	40		126	64	55		-8°					
	050-W40-11-7-4T	●		7	28	50	40	147	75	64		-7°					
	050-W40-11-7-6T	●	6		42												
	MECH 040-W32-17-4-2T	●	2	4	8	40	32	136	73	59	+19°	-7°		SB-4070TRN	DTM-15	MP-1	BDMT170408ER-N3 BDMT170408ER-N4
	050-W40-17-5-4T	●	4	5	20	50	40	161	88	74							

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

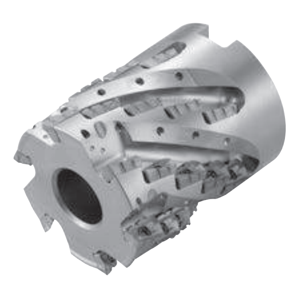


Head exchangeable type MECH

MECH

● : Std. Item

MECH Shell Mill (without coolant hole)



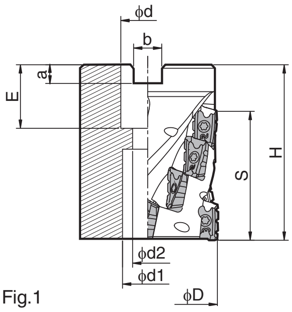


Fig.1

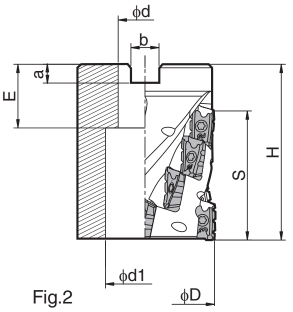


Fig.2

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

Dimensions

Description	Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)									Drawing	Spare Parts				Applicable Inserts ➡ M19
					ϕD	ϕd	ϕd1	ϕd2	H	E	a	b	S		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	MP-1	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	MP-1	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	MP-1	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)

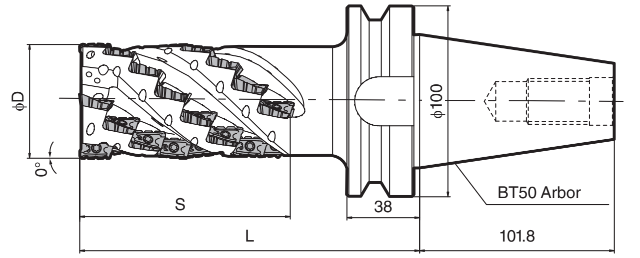


Fig.1

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

Dimensions

Description	Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)			Drawing	Weight (kg)	Spare Parts			Applicable Inserts ➡ M19
					ϕD	L	S			Clamp Screw	Wrench	Anti-seize Compound	
MECH 050R11-8-4T-BT50	●	4	8	32	50	143	73	Fig.1	4.8	SB-2555TRG	DTM-8	MP-1	BDMT11T308ER-N2 BDMT11T308ER-N3
MECH 050R17-7-4T-BT50	●	4	7	28	50	173	104		4.9	SB-4070TRN	DTM-15	MP-1	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.

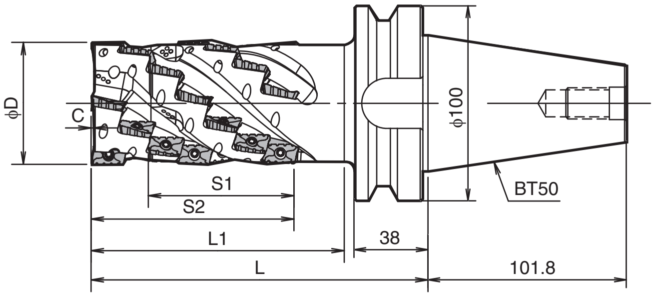
Applicable Inserts

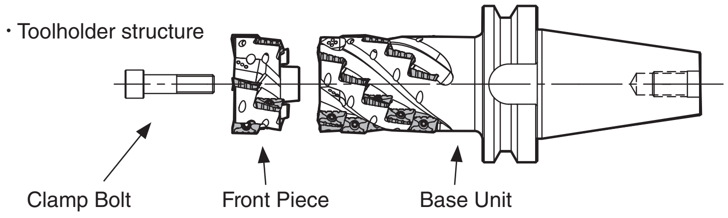
Description	Applicable Inserts ➡ M19			
	 2-Notched	 3-Notched	 3-Notched	 4-Notched
MECH•••-11-	**BDMT 11T308ER-N2**	**BDMT 11T308ER-N3**	–	–
MECH•••-17-	–	–	**BDMT 170408ER-N3**	**BDMT 170408ER-N4**

● : Std. Item

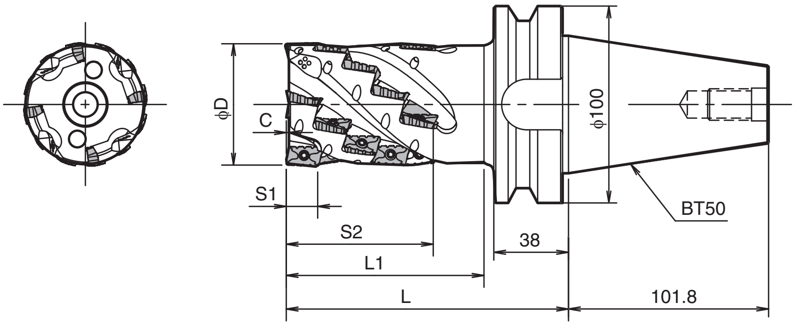
Recommended Cutting Conditions ➡ **M85**

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			Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)						Rake Angle		Weight (kg)
							ϕD	L	L1	C	S1	S2	A.R.	R.R.	
Arbor Integral Type	**MECH**	**050R11-4T-BT50SA**	MTO	4	8	32	50	143	99	0.7	55	73	+23°	-7°	4.8
		063R17-4T-BT50SA	MTO		7	28	63	173	130	1.3	75	104	+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	0.7	10	55	+23°	-7°	4.6
		063R17-4T-BT50-A	MTO		5	20	63	143	100	1.3	16	75	+19°	-7°	5.4
		080R17-4T-BT50-A	MTO				80								6.8
		100R17-6T-BT50-A	MTO	6	5	30	100								8.5

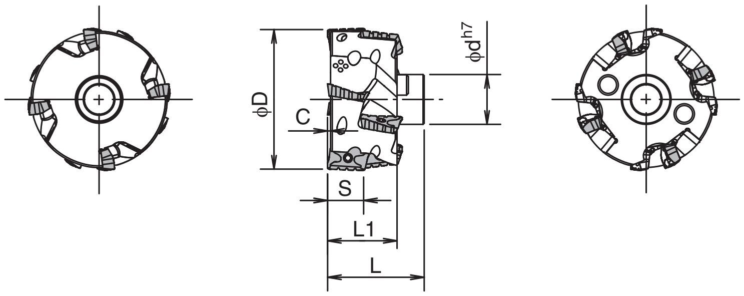
Recommended Cutting Conditions ➡ **M85**

Toolholder structure

End Mill			Base Unit ➡ **M82**		Front Piece (1pcs) ➡ **M83**		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

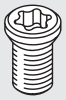
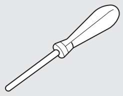
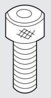
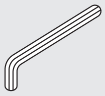
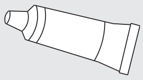
Description		Std.	No. of Flutes	No. of Stages	No. of Inserts	Dimension (mm)						Rake Angle		Weight (kg)
						ϕD	ϕd	L	L1	C	S	A.R.	R.R.	
MECH	**050R11-4T-F**	●	4	2	8	50	22	32	18	0.7	10	+23°	-7°	0.2
	063R17-4T-F	●				63	22	44	30	1.3	16	+19°	-7°	0.4
	080R17-4T-F	●				80	32							0.8
	100R17-6T-F	●	6	2	12	100	45							1.3

Applicable Inserts

End Mill		Base Unit ➔ **M82**	Front Piece ➔ **M83**	Applicable Inserts ➔ **M19**
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, ref. to page ➔ **M85**.

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	MP-1
		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

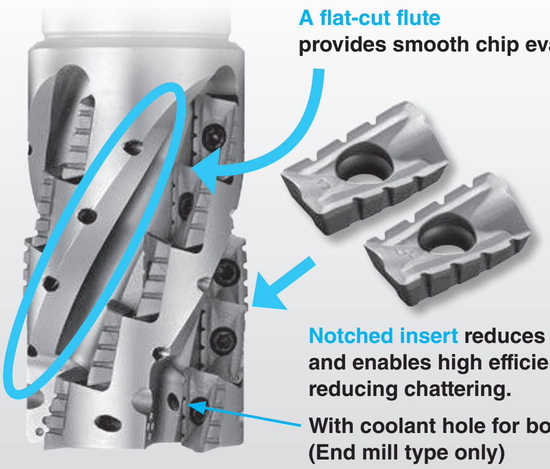
MECH

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



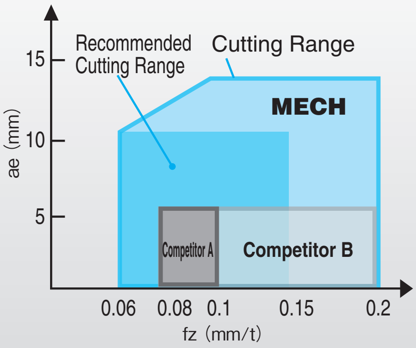
A flat-cut flute provides smooth chip evacuation

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

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

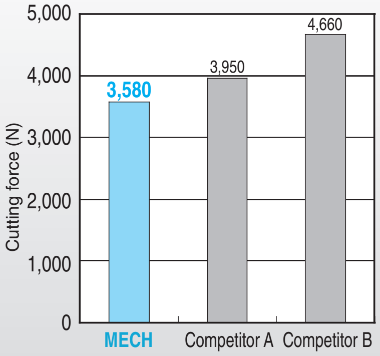
Low Cutting Force

Low Cutting Force due to Notched Inserts



Workpiece Material:S50C
Vc=120m/min
apxae=40mmx5~13mm
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

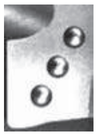
Description	No. of Flutes	No. of Inserts	No. of Inserts			
			BDMT11T308ER-		BDMT170408ER-	
			N2	N3	N3	N4
MECH 025-S25-11-4-2T	2	8	4	4	-	-
032-S32-11-5-2T		10	5	5		
032-S32-11-5-4T	4	20	10	10		
040-S32-11-6-4T		24	12	12		
040-S42-11-6-4T						
050-S42-11-7-4T		28	14	14		
050-S42-11-7-6T	6	42	21	21		
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.)

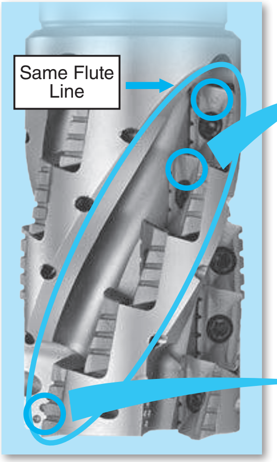


Fig.1 Same Flute Line

Fig.2 Insert No.

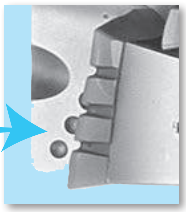


Fig.3 Marks

Recommended Cutting Conditions (When using a notched insert)

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)				
		MEGACOAT NANO	MEGACOAT			PVD Coated Carbide
		PR1535	**PR1225**	**PR1230**	**PR1210**	**PR830**
Carbon Steel	0.08~0.1~0.15	☆ 120~180~250	☆ 120~180~250	★ 120~180~220	-	☆ 100~140~180
Alloy Steel	0.08~0.1~0.15	☆ 100~160~220	☆ 100~160~220	★ 100~160~200	-	☆ 100~140~180
Mold Steel	0.08~0.1~0.15	☆ 80~140~180	☆ 80~140~180	★ 80~140~160	-	☆ 100~120~150
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	-

* Machining with coolant is recommended for titanium alloys.

★:1st Recommendation ☆:2nd Recommendation

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 less than 60% of those of a notched insert.

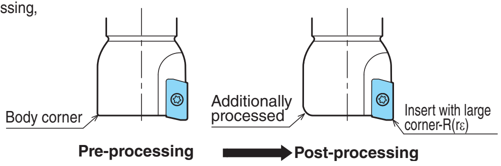
·JA Chipbreaker

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

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

Insert Corner-R(rε) (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.

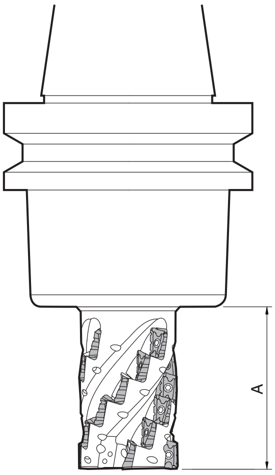


Cutting Performance (Used Machine: Machining center equivalent to AC15 / 18.5kW)

MECH End Mill

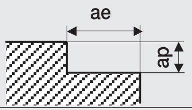
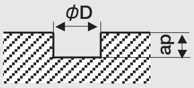
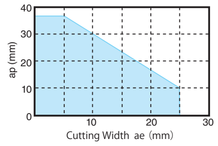
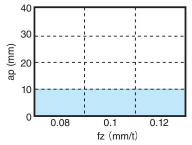
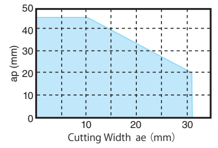
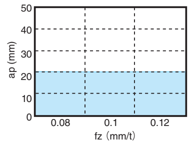
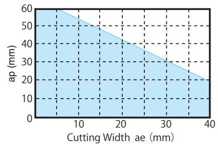
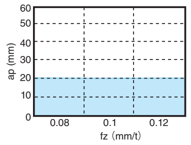
Cutting Dia.	Description	Overhang Length A (mm)
ϕ25	**MECH025-S25-11-4-2T**	48
ϕ32	**MECH032-S32-11-5-2T** **MECH032-S32-11-5-4T**	57
ϕ40	**MECH040-S32-11-6-4T** **MECH040-S42-11-6-4T**	65
ϕ50	**MECH050-S42-11-7-4T** **MECH050-S42-11-7-6T**	76
ϕ40	**MECH040-S32-17-4-2T** **MECH040-S42-17-4-2T**	74
ϕ50	**MECH050-S42-17-5-4T**	89

Shape

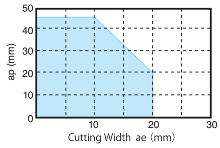
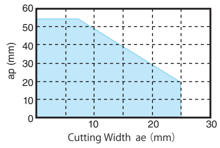
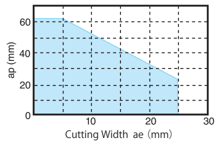
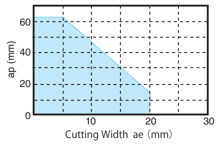
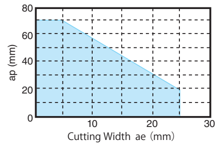


2 Flute Type

(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.

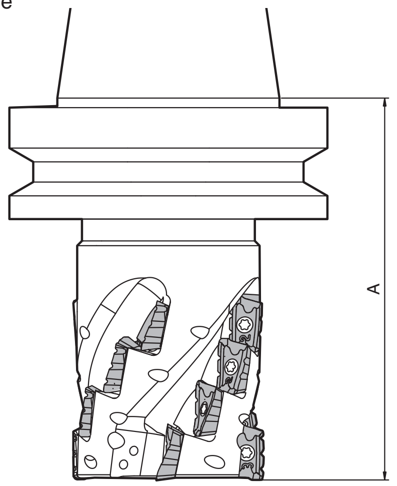
M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

MECH Shell Mill

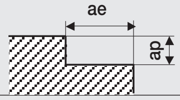
(Workpiece Material:S50C)

Cutting Dia.	Description	Overhang Length A (mm)
ϕ40	MECH040R-11-4-4T-M	125
ϕ50	MECH050R-11-5-6T-M	123
	MECH050R-17-2-4T-M	112
	MECH050R-17-4-4T-M	138
ϕ63	MECH063R-17-3-4T-☐	115
ϕ80	MECH080R-17-4-6T-☐	130
ϕ100	MECH100R-17-4-6T-☐	130

Shape

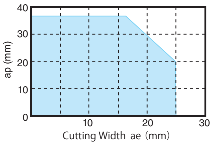


■ Shouldering

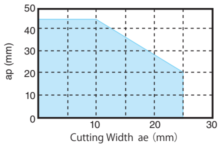


Cutting Speed: Vc=100~180m/min
Feed : fz=0.08~0.15mm/t

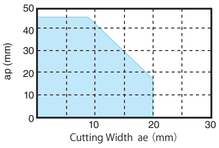
MECH040R
-11-4-4T-M



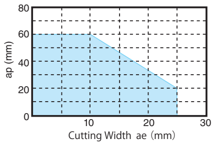
MECH063R
-17-3-4T-☐



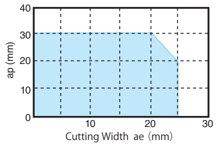
MECH050R
-11-5-6T-M



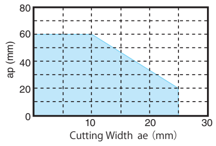
MECH080R
-17-4-6T-☐



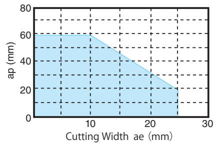
MECH050R
-17-2-4T-M



MECH100R
-17-4-6T-☐



MECH050R
-17-4-4T-M



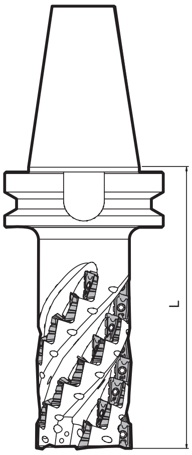
Slotting is not recommended.

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

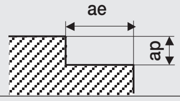
(Workpiece Material:S50C)

Cutting Dia.	Description	Overhang Length L (mm)
ϕ50	MECH050R11-8-4T-BT50 MECH050R11-4T-BT50SA	143
	MECH050R17-7-4T-BT50	173
ϕ63	MECH063R17-7-4T-BT50 MECH063R17-4T-BT50SA	
ϕ80	MECH080R17-7-4T-BT50 MECH080R17-4T-BT50SA	
ϕ100	MECH100R17-7-6T-BT50 MECH100R17-6T-BT50SA	

Shape

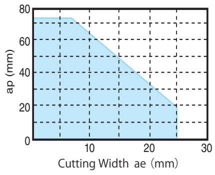


■ Shouldering

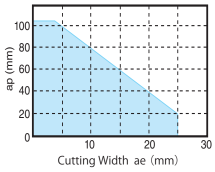


Cutting Speed: Vc=100~180m/min
Feed : fz=0.08~0.15mm/t

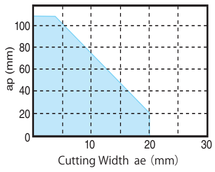
MECH050R11
-8-4T-BT50
MECH050R11
-4T-BT50SA



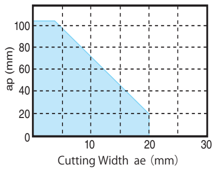
MECH080R17
-7-4T-BT50
MECH080R17
-4T-BT50SA



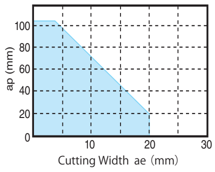
MECH050R17
-7-4T-BT50



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



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

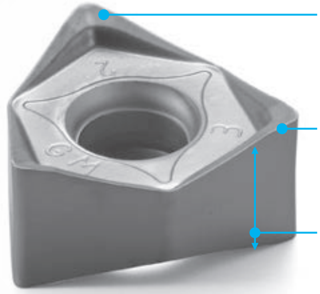


Slotting is not recommended.

MFWN

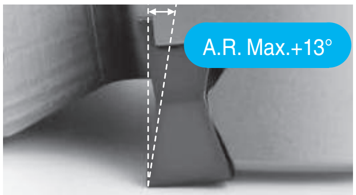
6 Advantages

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

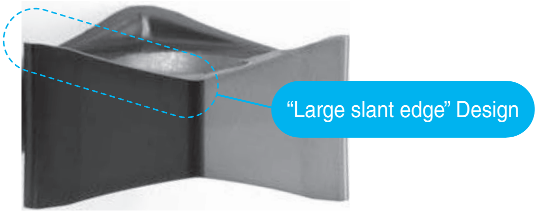


Advantage 1 Sharp cutting due to low cutting force

- **Sharp cutting by large rake angle**



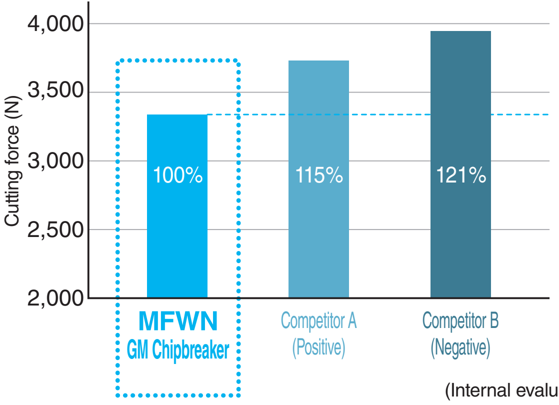
- **"Large slant edge" Design reduces shock when cutting edge enters the workpiece**



- **Cutting Force Comparison**

<Cutting Conditions>
Vc = 180m/min
ap×ae = 7×110mm
fz = 0.2mm/t
Workpiece Material : S50C
ϕ125mm Cutter

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

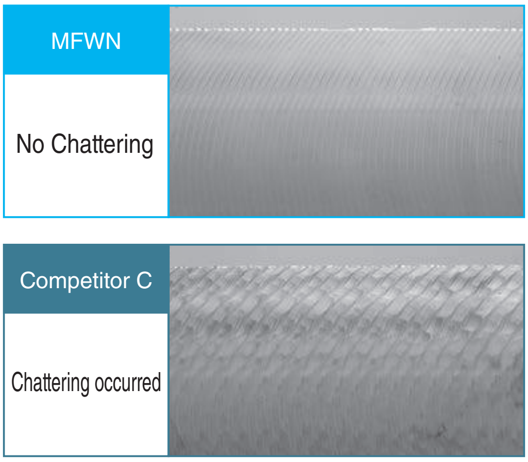


(Internal evaluation)

Advantage 2 Reduced chattering

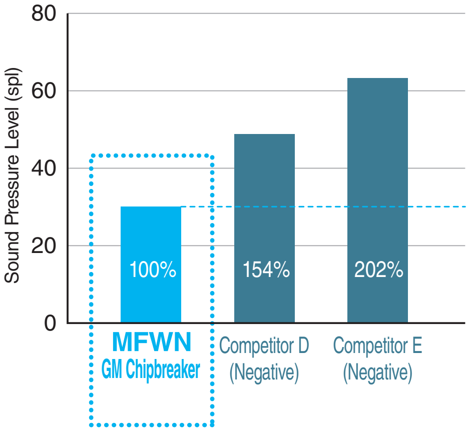
Applicable to long overhang

- **Surface Finish Comparison**



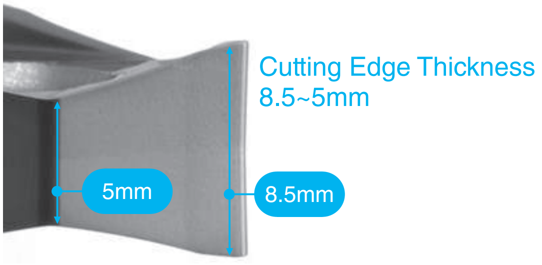
- **Machining Noise Comparison**

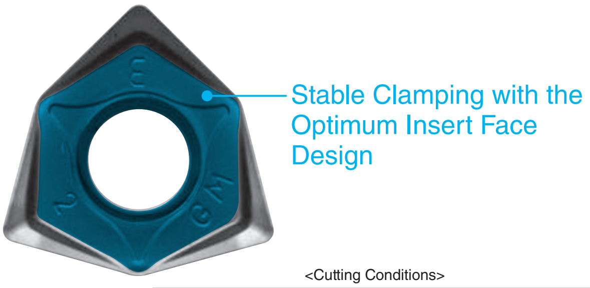
<Cutting Conditions>
Vc = 200m/min
ap×ae = 3×15mm
fz = 0.1mm/t
Workpiece Material : S50C
ϕ80mm Cutter (7 inserts)



(Internal evaluation)

Advantage 3 Superior Fracture Resistance due to Thick Edge Design

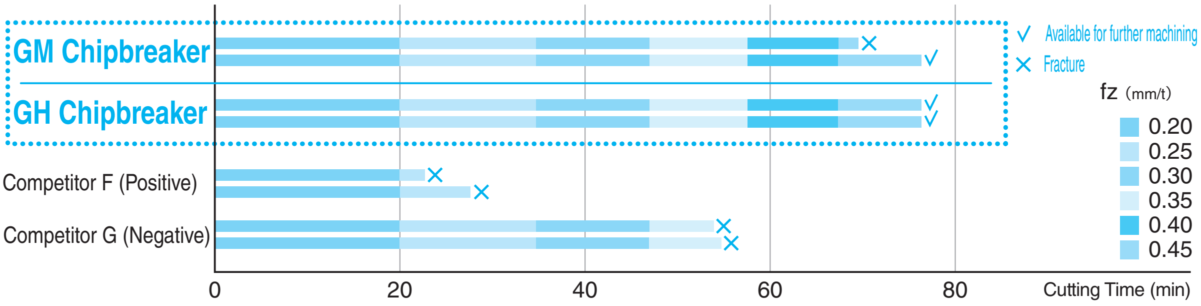




<Cutting Conditions>

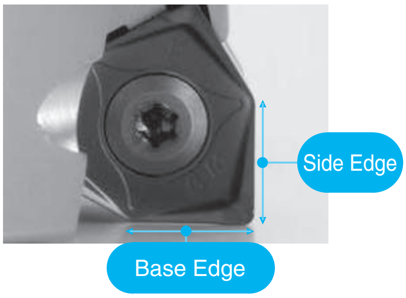
Workpiece Material:SCM440H(38~42HS)   Interruption with a slot on the workpiece
Vc = 100m/min   apxae = 2x100mm   fz = 0.2~0.45 mm/t   Dry

● Fracture Resistance Comparison



Advantage 4 Neutral

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

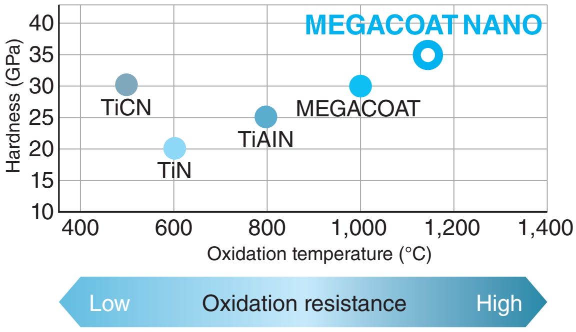


Applicable to a wide range of application

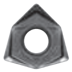
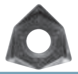
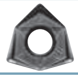
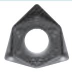
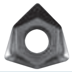
Advantage 5

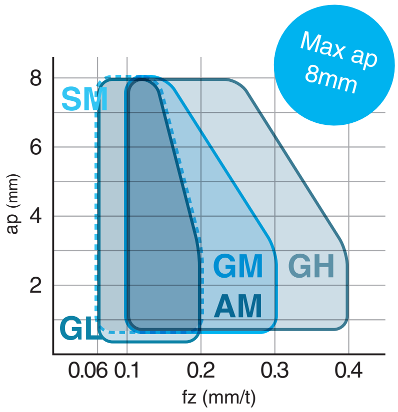
Extended Tool Life by New MEGACOAT NANO Technology

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

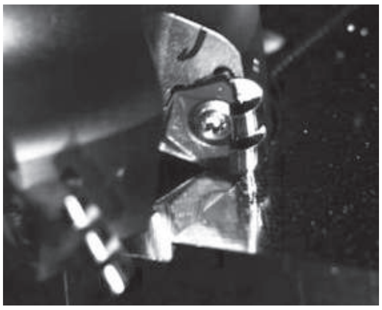


Advantage 6 5 chipbreakers for various applications

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

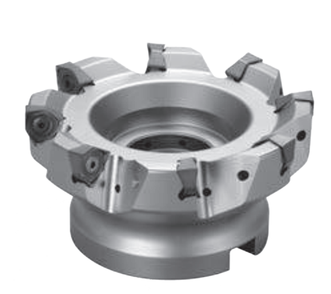


Smooth chip evacuation



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

MFWN Face Mill



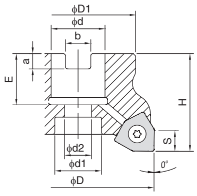


Fig.1

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

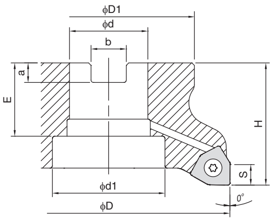


Fig.2

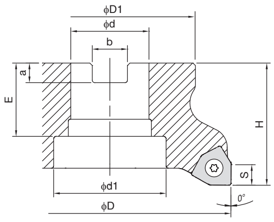


Fig.3

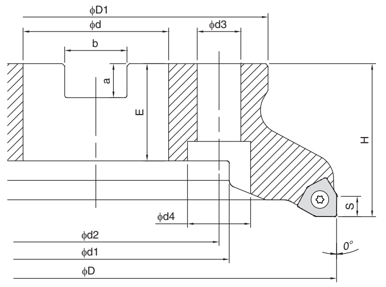


Fig.4

Toolholder Dimensions

Description			Std.	No. of Inserts	Dimension (mm)											Drawing	Weight (kg)	Shim	Coolant Hole
					ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	ϕd3	ϕd4				
Metric	Coarse pitch	**MFWN 90063R-3T-M**	●	3	63	47	22	19	11	40	21	6.3	10.4	-		Fig.1	0.5	Yes	Yes
		90080R-4T-M	●	4	80	60	27	20	13	50	24	7	12.4				1.0		
		90100R-5T-M	●	5	100	70	32	46	-		30	8	14.4			Fig.2	1.3		
		90125R-6T-M	●	6	125	87	40	55		63	33	9	16.4				2.5		
		90160R-8T-M	●	8	160	102		68	66.7		32			14	20	Fig.4	3.8		No
		90200R-10T-M	●	10	200	142	60	110	101.6		40	14	25.7	18	26		6.0		
		90250R-12T-M	●	12	250												8.4		
	Fine pitch	**MFWN 90063R-4T-M**	●	4	63	47	22	19	11	40	21	6.3	10.4	-	-	Fig.1	0.5	No	Yes
		90080R-5T-M	●	5	80	60	27	20	13	50	24	7	12.4				1.0		
		90100R-7T-M	●	7	100	70	32	46	-		30	8	14.4			Fig.2	1.3		
		90125R-8T-M	●	8	125	87	40	55		63	33	9	16.4				2.6		
		90160R-10T-M	●	10	160	102		68	66.7		32			14	20	Fig.4	3.9		No
		90200R-12T-M	●	12	200	142	60	110	101.6		40	14	25.7	18	26		6.3		
		90250R-14T-M	●	14	250												8.7		
	Extra fine pitch	**MFWN 90063R-5T-M**	●	5	63	47	22	19	11	40	21	6.3	10.4	-	-	Fig.1	0.5	No	Yes
		90080R-7T-M	●	7	80	60	27	20	13	50	24	7	12.4				1.1		
		90100R-9T-M	●	9	100	70	32	46	-		30	8	14.4			Fig.2	1.3		
		90125R-12T-M	●	12	125	87	40	55		63	33	9	16.4				2.6		
		90160R-14T-M	●	14	160	102		68	66.7		32			14	20	Fig.4	3.9		No
		90200R-16T-M	●	16	200	142	60	110	101.6		40	14	25.7	18	26		6.4		
		90250R-18T-M	●	18	250												8.8		
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	Yes
		90100R-5T	○	5	100	70	31.75	46	-		34	8	12.7			Fig.2	1.3		
		90125R-6T	○	6	125	87	38.1	55		63	38	10	15.9				2.6		
		90160R-8T	○	8	160	102	50.8	72				11	19.1			Fig.3	3.9		No
		90200R-10T	○	10	200	142	47.625	110	101.6		40	14	25.4	18	26	Fig.4	6.3		
		90250R-12T	○	12	250												8.7		
	Fine pitch	**MFWN 90080R-5T**	○	5	80	60	25.4	20	13	50	27	6	9.5	-	-	Fig.1	1.0	No	Yes
		90100R-7T	○	7	100	70	31.75	46	-		34	8	12.7			Fig.2	1.4		
		90125R-8T	○	8	125	87	38.1	55		63	38	10	15.9				2.7		
		90160R-10T	○	10	160	102	50.8	72				11	19.1			Fig.3	4.0		No
		90200R-12T	○	12	200	142	47.625	110	101.6		40	14	25.4	18	26	Fig.4	6.6		
		90250R-14T	○	14	250												8.9		
	Extra fine pitch	**MFWN 90080R-7T**	○	7	80	60	25.4	20	13	50	27	6	9.5	-	-	Fig.1	1.1	No	Yes
		90100R-9T	○	9	100	70	31.75	46	-		34	8	12.7			Fig.2	1.3		
		90125R-12T	○	12	125	87	38.1	55		63	38	10	15.9				2.7		
		90160R-14T	○	14	160	102	50.8	72				11	19.1			Fig.3	4.1		No
		90200R-16T	○	16	200	142	47.625	110	101.6		40	14	25.4	18	26	Fig.4	6.7		
		90250R-18T	○	18	250												9.1		

*Dimension S：8mm

Applicable Inserts ➡ **M17**

● : Std. Item

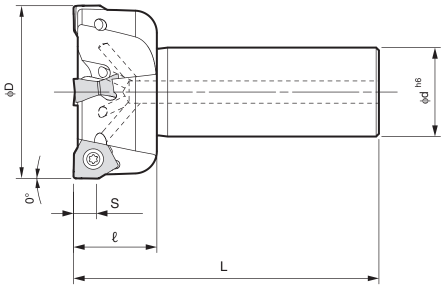
Spare Parts

Description		Spare Parts							
		Clamp Screw	Wrench TT	Wrench DTM	Shim	Shim Screw	Wrench	Anti-seize Compound	Mounting bolt
Coarse pitch	**MFWN 90063R-3T-M**	SB-50140TR	TT-15	-	MFWN-90	SPW-7050	LW-5	MP-1	HH10X30
	MFWN 90080R-4T(-M)								HH12X35
	MFWN 90100R-5T(-M) ~ **90250R-12T(-M)**	for Insert Clamp Recommended tightening torque 4.2N·m			for Shim Clamp Recommended tightening torque 6.0N·m				-
Fine pitch	**MFWN 90063R-4T-M**	SB-50140TR	TT-15	-	-	-	-	MP-1	HH10X30
	MFWN 90080R-5T(-M)								HH12X35
	MFWN 90100R-7T(-M) ~ **90250R-14T(-M)**	for Insert Clamp Recommended tightening torque 4.2N・m							-
Extra fine pitch	**MFWN 90063R-5T-M**	SB-50140TR	TT-15	-	-	-	-	MP-1	HH10X30
	MFWN 90080R-7T(-M)	SB-40140TRN	-	DTM-15					HH12X35
	MFWN 90100R-9T(-M) ~ **90250R-18T(-M)**	for Insert Clamp Recommended tightening torque 3.5N・m							-

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

Recommended Cutting Conditions ➡ **M92**

MFWN with cylindrical shank (with coolant hole)



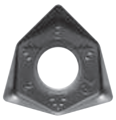
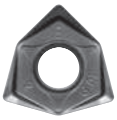
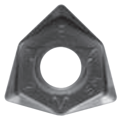
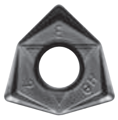
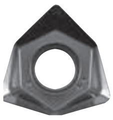
Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)					Rake Angle		Coolant Hole	Spare Parts		
			ϕD	ϕd	L	ℓ	S	A.R. (MAX.)	R.R.		Clamp Screw	Wrench	Anti-seize Compound
MFWN 90050R-S32-3T	●	3	50	32	110	30	8	+13°	-12°	Yes	SB-50140TR	TT-15	MP-1
90063R-S32-4T	●	4	63						-10°		Recommended tightening torque 4.2N・m		
90080R-S32-5T	●	5	80						-9°				

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

Applicable Inserts ➡ **M17**

Applicable Inserts

Description	Applicable Inserts ➡ **M17**				
	 Surface-Finish Oriented (Precision Class)	 General purpose	 Low Cutting Force	 Tough Edge (For Heavy Milling)	 Non-ferrous Metals
MFWN90…	**WNEU 080608EN-GL**	**WNMU 080608EN-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

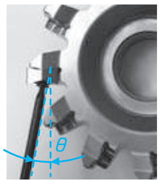


Fig.2

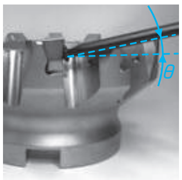


Fig.3

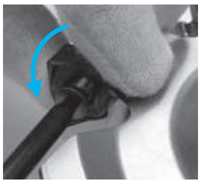


Fig.4

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.

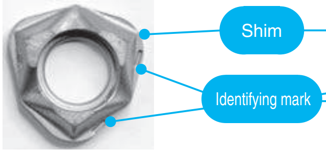


Fig.1

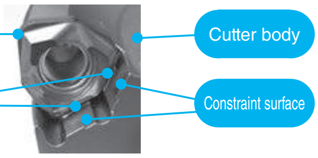


Fig.2

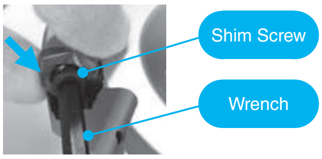


Fig.3

Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)					
			MEGACOAT NANO			CVD Coated Carbide	DLC Coated Carbide	Carbide
			PR1535	PR1525	PR1510	CA6535	PDL025	GW25
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~**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 *1 (GL)	Carbon Steel	0.06~**0.12**~0.2	☆ 120~**180**~250	☆ 120~**180**~250	-	-	-	-
	Alloy Steel	0.06~**0.12**~0.2	☆ 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)	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	-	-
AM	Non-ferrous metals	0.1~**0.2**~0.3	-	-	-	-	★ 200~**600**~900	☆ 200~**500**~800

★ :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.

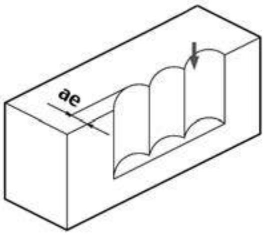
· Machining with coolant is recommended for Ni-base heat-resistant alloys and titanium alloys.

*1. GL Chipbreaker is recommended for Surface finish oriented milling.
2. GH Chipbreaker : Fine pitch ⇒ fz≤0.3 (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 under fz=0.3mm/t)
Extra fine pitch (without shim)	✓	✓	N/A

Vertical milling (Plunging)



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

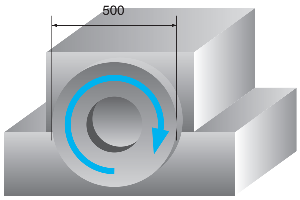
● Cutter type and chipbreaker selection

Milling Purpose	Cutter Type			Chipbreaker			
	Coarse pitch	Fine pitch	Extra fine pitch	GM	SM	GH	GL
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)	●					●	

Case Studies

FC300

- Machine Part
- Vc=170m/min
- apxae=2.5×130mm
- fz=0.183mm/t (Vf=500mm/min)
- Wet
- MFWN90160R-8T (8 inserts)
- WNMU080608EN-GM (PR1510)



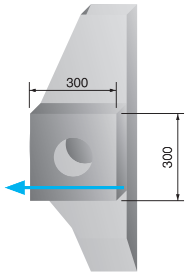
PR1510	Chip Evacuation Rate = 163cc/min
Competitor A (Positive Cutter)	Chip Evacuation Rate = 68cc/min

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.

(Evaluation by the user)

Manganese Steel

- Construction machine part
- Vc=150m/min
- apxae=1×100mm
- fz=0.2mm/t (Vf=668mm/min)
- Dry
- MFWN90100R-7T (7 inserts)
- WNMU080608EN-GM (PR1525)



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

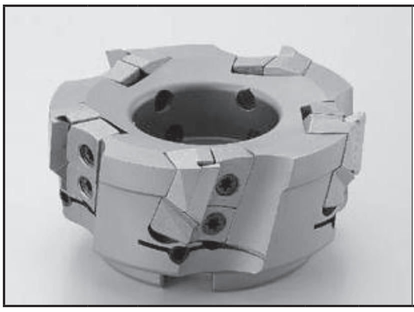
Despite instability with the long overhang of the workpiece, MFWN doubled tool life, improving the efficiency by 150%.

(Evaluation by the user)

Easy edge adjustment MTE90

Shouldering Slotting Facing

MTE90-SF Face Mill (Easy edge adjustment)



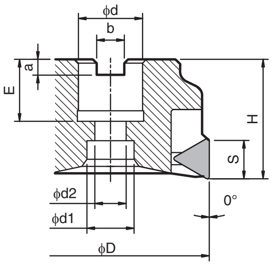


Fig.1

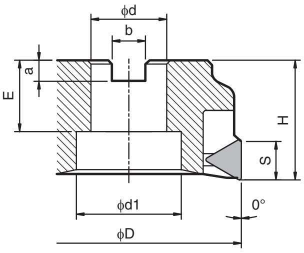
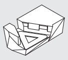
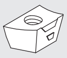
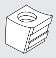
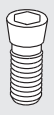
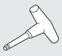
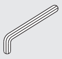


Fig.2

Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)									Rake Angle		Drawing	Weight (kg)
				ϕD	ϕd	ϕd1	ϕd2	H	E	a	b	S	A.R.	R.R.		
Bore Dia. Inch spec	**MTE 90080R-4T-SF**	○	4	80	25.4	20	13	50	26	6	9.5	17	+17°	+3°	Fig.1	1.0
	90100R-5T-SF	○	5	100	31.75	45	-		32	8	12.7			+4°	Fig.2	1.5
	90125R-6T-SF	○	6	125	38.1	55		63	38	10	15.9			+5°		3.0

Spare Parts

Description	Cartridge	Clamp	Clamp	Clamp Screw	Adjustment Screw	Wrench	Wrench
							
MTE 90○○○R-○T-SF	LTE-490SR	C91R (for Insert)	C92R (for Cartridge)	W8X16	SV-60136R	TTC-25	LW-4 (for adjustment screw)

· Mounting bolt (HH12X35M) is included for MTE90080R-4T-SF.

Recommended Cutting Conditions

Workpiece Material	Feed Rate fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)					
		Cermet	MEGACOAT		PVD Coated Carbide	Carbide	PCD
		TN100M	**PR1225**	**PR1210**	**PR830**	**KW10**	**KPD001 (KPD010)**
Carbon Steel	~0.25	★ 120~200	★ 120~250	-	☆ 120~200	-	-
Alloy Steel	~0.25	★ 100~180	★ 100~220	-	☆ 100~180	-	-
Mold Steel	~0.20	★ 100~180	★ 80~180	-	☆ 80~150	-	-
Stainless Steel	~0.20	☆ 120~200	★ 120~220	-	☆ 120~200	-	-
Cast Iron	~0.25	-	-	★ 100~220	-	☆ 80~150	-
Non-ferrous Metals	~0.20	-	-	-	-	★ 100~300	★ 300~800

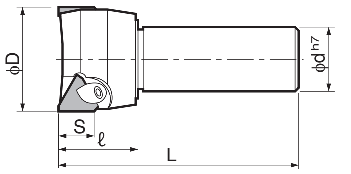
★:1st Recommendation ☆:2nd Recommendation

How to Adjust Cutting Edge height

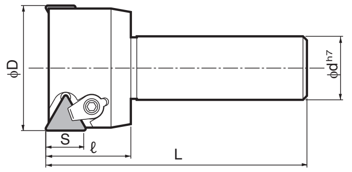
For adjustment method of edge height, ref. to page ➡ **M41**

○ : Check Availability

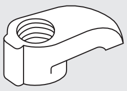
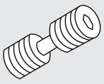
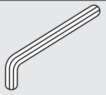
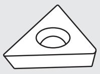
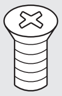
MTE90 with cylindrical shank (High Rake)



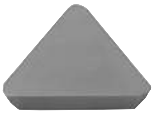
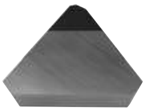
MTP90 with cylindrical shank



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)					Rake Angle		Spare Parts					
										Clamp	Clamp	Clamp screw	Wrench	Shim	Shim Clamp Screw
			φD	φd	L	ℓ	S	A.R.	R.R.						
MTE 9050	○	3	50	32	120	40	17	+13°	+3°	-	CP-8TE	W8X18	LW-4	MTE-42	SP3X8
9063	○	3	63						+5°						
9080-32	○	4	80					+16°	+6°						
MTP 9050	●	3	50	32	130	43	18	+8°	0°	CP-8W	-			KPT-42	
9063	●	3	63												

Applicable Inserts

Description	Applicable Inserts ➔ **M12**			Applicable Inserts ➔ **M25**
				
MTE 90...	TEMR 2204PTER-H	TEKR 2204PTER-S	TEEN 2204PTTR TEKN 2204PTTR 2204PTFR	TEKN 2204PTFR-NE 2204PTFR (PCD)
MTP 90...	TPMR 2204PDER-H	TPKR 2204PDER-S	TPKN 2204PDTR 2204PDFR	-

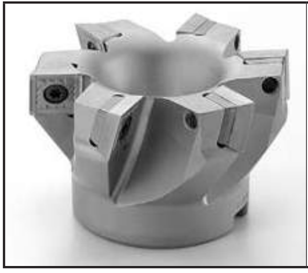
Recommended Cutting Conditions ➔ **M94**

● : Std. Item
○ : Check Availability

MSO90

Shouldering　Slotting　Facing

MSO90 Face Mill (Coarse pitch / Fine pitch)



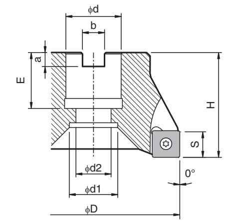


Fig.1

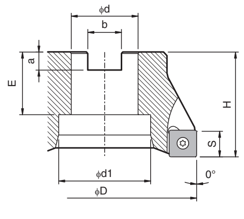


Fig.2

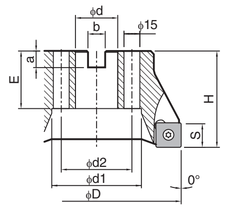


Fig.3

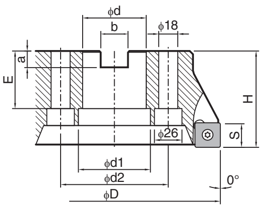
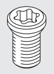
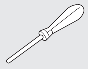
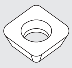
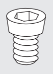
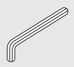


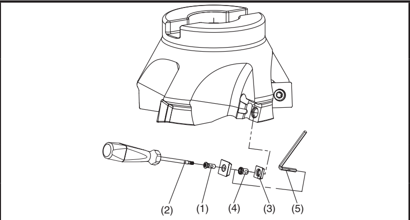
Fig.4

Toolholder Dimensions

Description			Std.	No. of Inserts	Dimension (mm) φD	φd	φd1	φd2	H	E	a	b	S	Rake Angle A.R.	R.R.	Drawing	Weight (kg)
Metric	Coarse pitch	**MSO 90063R-15-4T-M**	○	4	63	22	17	11	50	21	6.3	10.4	13	+15°	-9.5°	Fig.1	0.6
		90080R-15-4T-M	○	4	80	27	20	14		24	7	12.4			-9°		0.8
		90100R-15-5T-M	○	5	100	32	48	-	60	32	8	14.4			-8.5°	Fig.2	1.3
		90125R-15-6T-M	○	6	125	40	59			33	9	16.4			-8°		2.3
		90160R-15-7T-M	○	7	160		81	66.7	63	30					-7.5°	Fig.3	4.1
		90200R-15-9T-M	○	9	200	60	68	101.6		32	14	25.7			-7.5°	Fig.4	7.1
	Fine pitch	**MSO 90063R-15-5T-M**	○	5	63	22	17	11	50	21	6.3	10.4	13	+15°	-9.5°	Fig.1	0.6
		90080R-15-6T-M	○	6	80	27	20	14		24	7	12.4			-9°		0.8
		90100R-15-6T-M	○	6	100	32	48	-	60	32	8	14.4			-8.5°	Fig.2	1.3
		90125R-15-7T-M	○	7	125	40	59			33	9	16.4			-8°		2.3
		90160R-15-9T-M	○	9	160		81	66.7	63	30					-7.5°	Fig.3	4.1
		90200R-15-11T-M	○	11	200	60	68	101.6		32	14	25.7			-7.5°	Fig.4	7.1
Bore Dia. Inch spec	Coarse pitch	**MSO 90080R-15-4T**	○	4	80	25.4	20	13	50	26	6	9.5	13	+15°	-9°	Fig.1	0.8
		90100R-15-5T	○	5	100	31.75	48	-	60	32	8	12.7			-8.5°	Fig.2	1.3
		90125R-15-6T	○	6	125	38.1	59			38	10	15.9			-8°		2.3
		90160R-15-7T	○	7	160	50.8	68		63		11	19.1			-7.5°		4.1
		90200R-15-9T	○	9	200	47.625		101.6			14	25.4			-7.5°	Fig.4	7.1
	Fine pitch	**MSO 90080R-15-6T**	○	6	80	25.4	20	13	50	26	6	9.5	13	+15°	-9°	Fig.1	0.8
		90100R-15-6T	○	6	100	31.75	48	-	60	32	8	12.7			-8.5°	Fig.2	1.3
		90125R-15-7T	○	7	125	38.1	59			38	10	15.9			-8°		2.3
		90160R-15-9T	○	9	160	50.8	68		63		11	19.1			-7.5°		4.1
		90200R-15-11T	○	11	200	47.625		101.6			14	25.4			-7.5°	Fig.4	7.1

Spare Parts

Description	(1)Clamp Screw	(2)Wrench	(3)Shim	(4)Shim Clamp Screw	(5)Wrench
					
MSO 90○○○R-15-○T-M **MSO 90○○○R-15-○T**	SB-45130TR	DTP-20	MSO-5200	SPW-6045	LW-4.5 (for Shim Clamp Screw)



- Mounting bolt (HH12X35M) is included for MSO90080R-15-○T-M and MSO90080R-15-○T
- Mounting bolt (HH10X30S) is included for MSO90063R-15-○T-M

Applicable Inserts

Description	Applicable Inserts ➔ M22
	
MSO90○○○R-15...	SEMM150408PESR

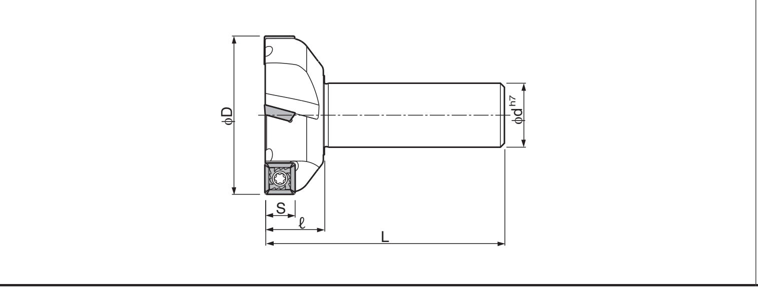
◆ Recommended Cutting Conditions

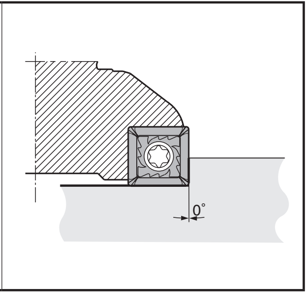
Workpiece Material	Feed Rate fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)				
		Cermet	MEGACOAT		PVD Coated Carbide	Carbide
		TN100M	PR1225	PR1210	PR830	KW10
Carbon Steel	~0.20	★ 120~200	★ 120~250	-	☆ 120~200	-
Alloy Steel	~0.20	★ 100~180	★ 100~220	-	☆ 100~180	-
Mold Steel	~0.20	★ 100~180	★ 80~180	-	☆ 80~150	-
Stainless Steel	~0.20	☆ 120~200	★ 120~220	-	☆ 120~200	-
Cast Iron	~0.20	-	-	★ 100~220	-	☆ 80~150
Non-ferrous Metals	~0.20	-	-	-	-	★ 100~300

★:1st Recommendation　☆:2nd Recommendation

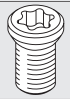
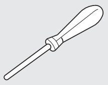
○ : Check Availability

MSO90-S with cylindrical shank



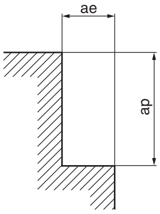
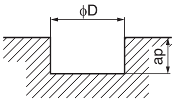
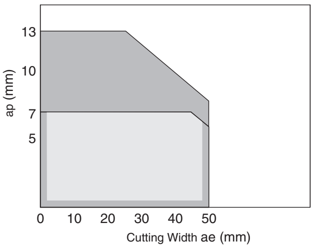
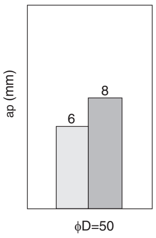


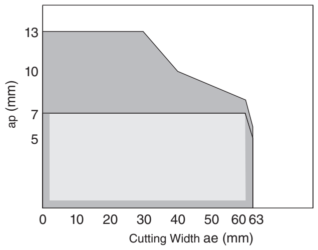
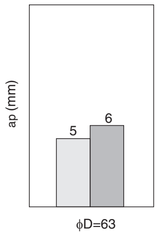
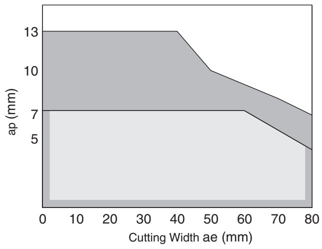
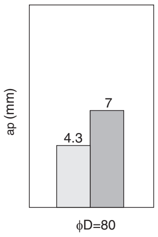
Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Rake Angle		Spare Parts		Applicable Inserts ➡ M22
				φD	φd	L	ℓ	S		A.R.	R.R.	Clamp Screw 	Wrench 	
MSO	**9050-S32-09**	○	3	50	32	120	30	7		+12°	-9°	SB-3080TR	DT-10	SEMM 09T308PESR
	9063-S32-09	○	4	63										
	9080-S32-09	○		80							-7°			
MSO	**9050-S32-15**	○	3	50	32	120	30	13		+15°	-10°	SB-5085TR	DT-20	SEMM 150408PESR
	9063-S32-15	○	4	63							-9°			
	9080-S32-15	○		80							-8°			

● Cutting Performance

[Cutting Conditions] Vc=100m/min, fz=0.15mm/t, Dry

Workpiece Material	Shouldering	Slotting
S50C		
Description		
MSO-9050-S32-○○ Insert Size ▭ 09 type ▨ 15 type		

Description	Shouldering	Slotting
MSO-9063-S32-○○ Insert Size ▭ 09 type ▨ 15 type		
MSO-9080-S32-○○ Insert Size ▭ 09 type ▨ 15 type		

○ : Check Availability

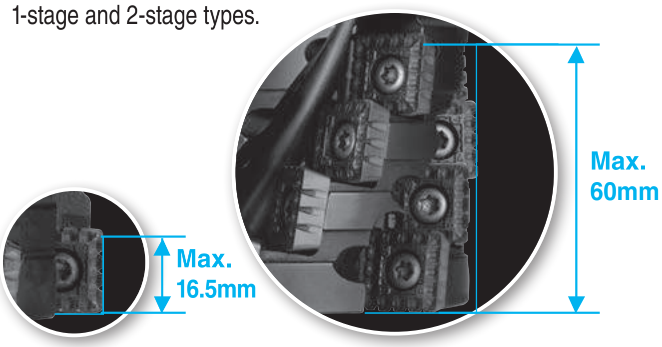
Heavy Milling Cutter MSRS90

- High efficiency, low cutting force and stable machining without chatter
- Neutral and corner-R insert

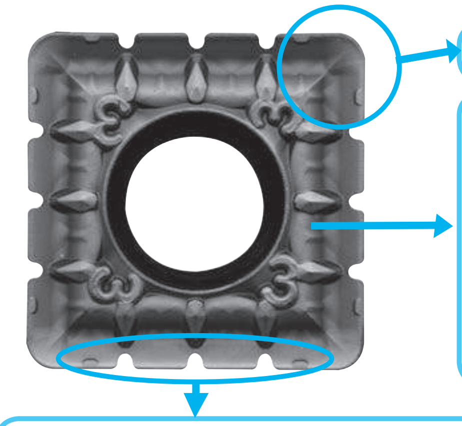
Applicable to shouldering (cutting angle: 90°),
high feed milling (cutting angle: 30°), plunging, and side cutter.

- Wide selection of cutting edge length according to cutting conditions

4-stage type (ϕ80, ϕ100) is added to the standard lineup as well as 1-stage and 2-stage types.

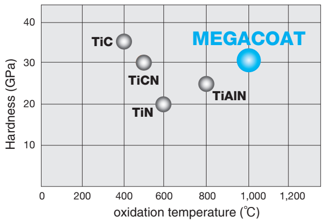


Custom-ordered milling cutter with high performance notched neutral inserts provides various applications



Neutral insert with corner-R is available to various applications

Long tool life: MEGACOAT

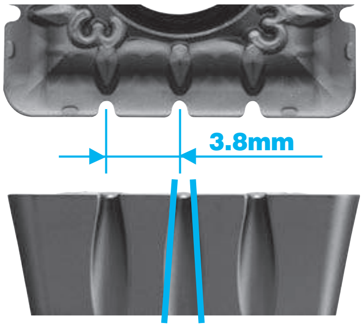


High hardness and
high oxidation resistance
Long tool life: MEGACOAT

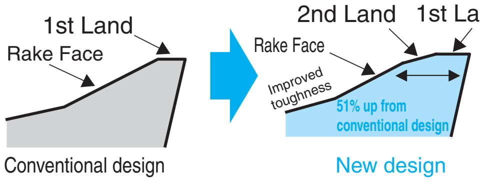
Notched insert SPMT180616EN type

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

The second land near the cutting edge improves edge strength.



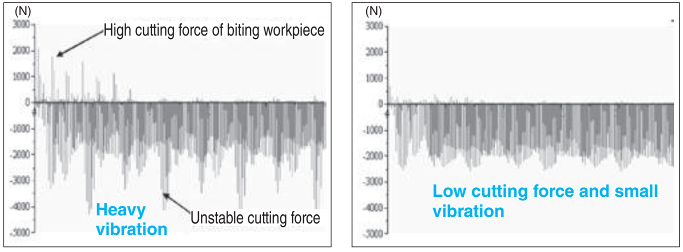
For neutral (Right / Left) hand
Applicable for various cutting angles.
Cutting edge length: 18mm



Edge preparation

- Low cutting force (Notched insert benefit)

Cutting Force Comparison



Competitor A

MSRS90

Notched insert realizes lower cutting force and smaller vibration

Tapered cutter

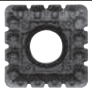
Vertical Milling
(Plunging) cutter

45° Face Mill

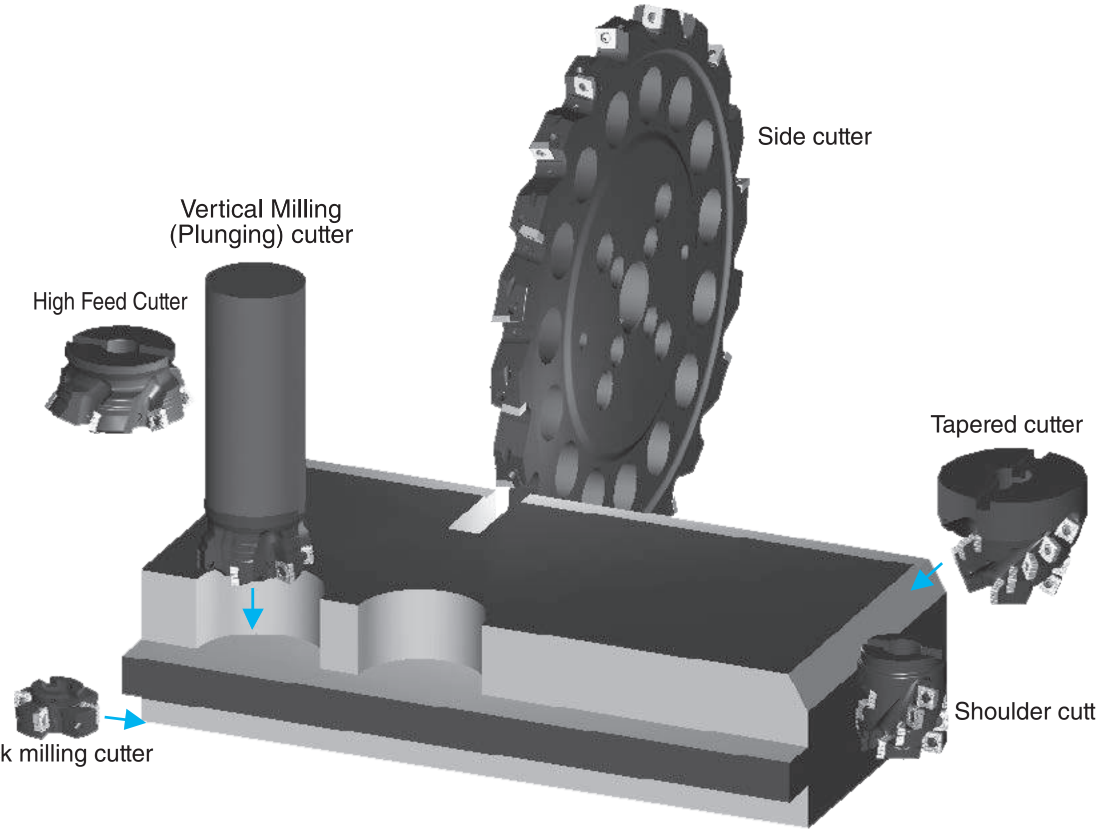
High Feed Cutter

Shoulder cutter

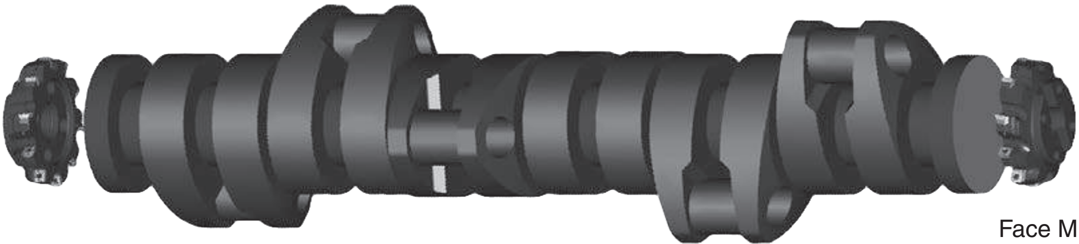
Applicable Inserts: Available for various applications

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 angle, number of insert stages.

MSRS90

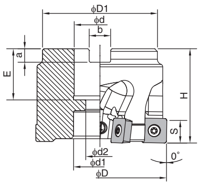


Fig.1

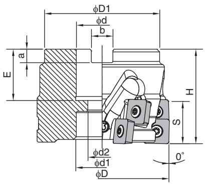


Fig.2

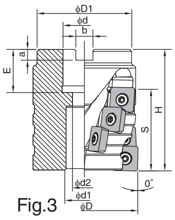


Fig.3

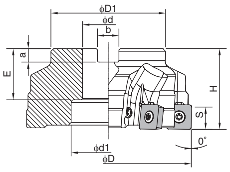


Fig.4

Rake Angle	
A.R.	R.R.
+7°	-10°

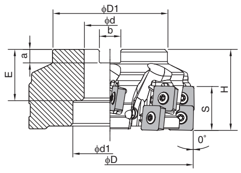


Fig.5

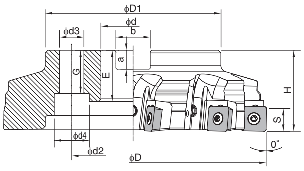


Fig.6

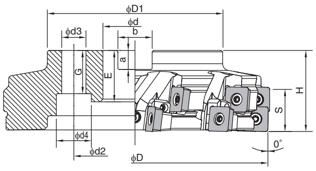


Fig.7

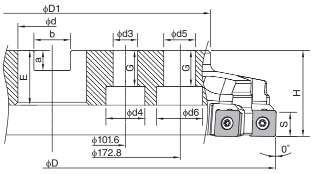


Fig.8

Toolholder Dimensions

Description		Std.	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)															Drawing	Weight (kg)
						φD	φD1	φd	φd1	φd2	H	E	a	b	S	φd3	φd4	φd5	φd6	G		
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

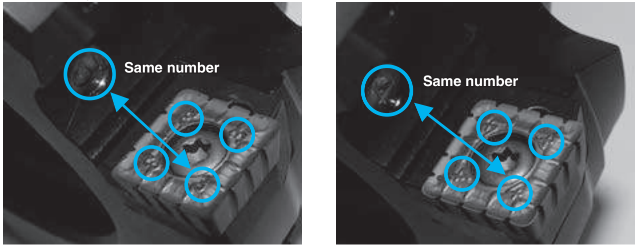
Description	Applicable Inserts ➡ **M24**				
	 3-Notched	 4-Notched	 3-Notched / Low Cutting Force	 4-Notched / Low Cutting Force	 Without notch
MSRS90…	**SPMT180616EN-NB3**	**SPMT180616EN-NB4**	**SPMT180616EN-NB3P**	**SPMT180616EN-NB4P**	**SPMT180616EN-V**

Caution when installing Notched Insert

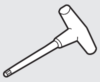
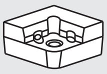
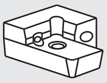
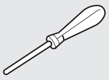
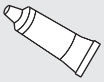
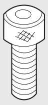
It is important to install the appropriate notched insert into the correct position. If it is installed in incorrect position, the tool cannot cut the workpiece and it may damage the toolholder body. For MSRS90, Notched Insert location indicator is marked at insert installed pocket of the cutter body.

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-M**	SB-60120TR for Insert Clamp Recommended tightening torque 7.5N•m	TT-25L	-	-	-	-	MP-1	HH12X35
	90100R- ○ -6T-M								-
	90125R- ○ -8T-M								
With cartridge	**MSRS 90160R- ○ -8T-M** ≀ **90315R- ○ -14T-M**			MAP-1806M*1	MAP-1806S*2	SB-40140TR for Cartridge Clamp Recommended tightening torque 3.5N•m	DT-15		
Without cartridge	**MSRS 90080R- ○ -4T**			-	-	-	-		HH16X45
	90100R- ○ -6T								HH20X55
	90125R- ○ -8T								-
With cartridge	**MSRS 90160R- ○ -8T** ≀ **90315R- ○ -14T**			MAP-1806M*1	MAP-1806S*2	SB-40140TR for Cartridge Clamp Recommended tightening torque 3.5N•m	DT-15		

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

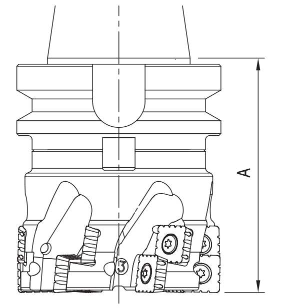
MSRS90

Cutting Conditions (Shouldering)

In case of MSRS90100R-1-6T

Workpiece Material	Overhang Length A (mm)	Cutting Conditions		apxae (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 A (mm)



In case of MSRS90100R-2-6T

Workpiece Material	Overhang Length A (mm)	Cutting Conditions		apxae (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

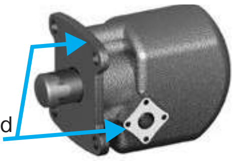
Workpiece Material	Overhang Length A (mm)	Cutting Conditions		apxae (mm)	Chip Evacuation Rate (cc/min)
		Cutting Speed Vc (m/min)	Feed fz (mm/t)		
Cast Iron	Less than 140mm	180	0.2	60×20	826
	140~200mm	180	0.2	60×10	413
	201mm and over	230	0.1	60×10	263
Carbon Steel	Less than 140mm	150	0.2	60×20	689
	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
·apxae=6×65mm
·fz=0.15mm/t
(Vf=430mm/min)

MSRS90100R-1-6T (ϕ100 ·6 inserts)
SPMT180616EN-NB3 / NB4
(PR1210)



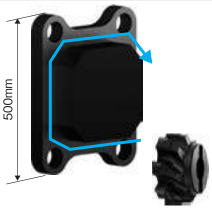
MSRS90(PR1210)	**Chip Evacuation Rate = 258cc/min**
Competitor B	107cc/min

·MSRS90 more than doubled the machining efficiency compared with competitor B.
·Competitor B machined with 2 passes (apxae=3×65mm).
MSRS90 machined with only 1 pass.
·Cutting time was reduced.
(Evaluation by the user)

SCM420

Construction machine part
·Vc=200m/min
·apxae=10x50mm
·fz=0.1mm/t
(Vf=400mm/min)

MSRS90125R-1-8T (ϕ125 ·8 inserts)
SPMT180616EN-NB3 / NB4
(PR1230)



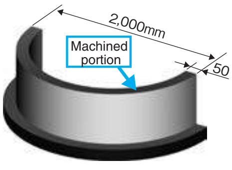
MSRS90(PR1230)	**Chip Evacuation Rate = 200cc/min**
Competitor C	153cc/min

·MSRS90 improved the machining efficiency to 1.3 times that of competitor C.
·Competitor C machined with apxae=5x50mm
·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. (Evaluation by the user)

SKD

Shipbuilding parts
·Vc=150m/min
·apxae=10x10~50mm
·fz=0.1mm/t
(Vf=240mm/min)

MSRS90160R-1-8T (ϕ160 ·8 inserts)
SPMT180616EN-NB3 / NB4
(PR1230)



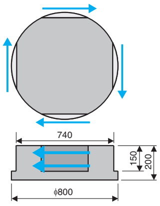
MSRS90(PR1230)	**Chip Evacuation Rate = 120cc/min**
Competitor D	60cc/min

·MSRS90 more than doubled the machining efficiency compared with competitor D.
·Competitor D machined with apxae=5x10~50mm
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). (Evaluation by the user)

SNCM

Power generation parts
·Vc=160m/min
·apxae=10x0~20mm
·fz=0.15mm/t
(Vf=500mm/min)

MSRS90125R-1-8T (ϕ125 ·8 inserts)
SPMT180616EN-NB3 / NB4
(PR1230)



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

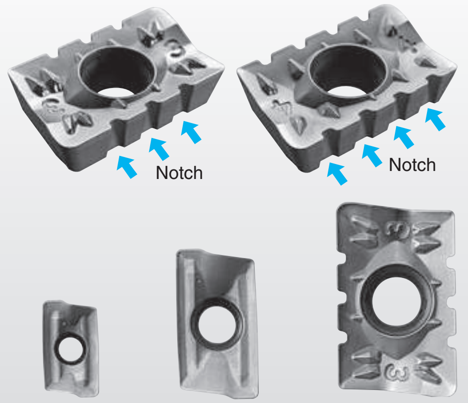
·MSRS90 showed 1.5 times longer tool life than that of competitor E.
·Competitor E machined with 2 passes on a side (apxae=12x0 to 10mm).
Competitor E was poor in feed rate (Vf=400mm/min). ⇒Machining efficiency was improved by MSRS90 (by achieving reduction in cutting time).
·Although competitor E is load due to high cutting force. MSRS90 operates fairly quietly. (Evaluation by the user)

Heavy Milling Cutter MSR

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

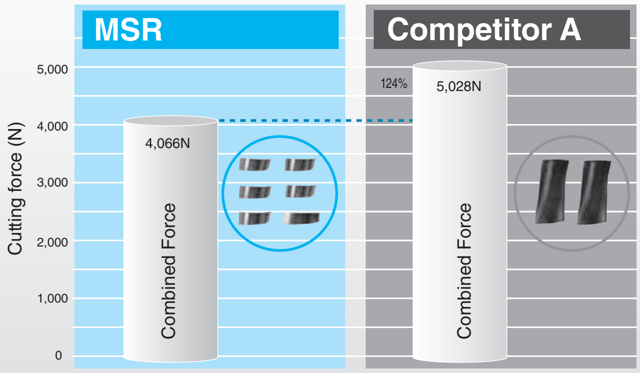
Notched Insert

Size Comparison (Full-Scale)



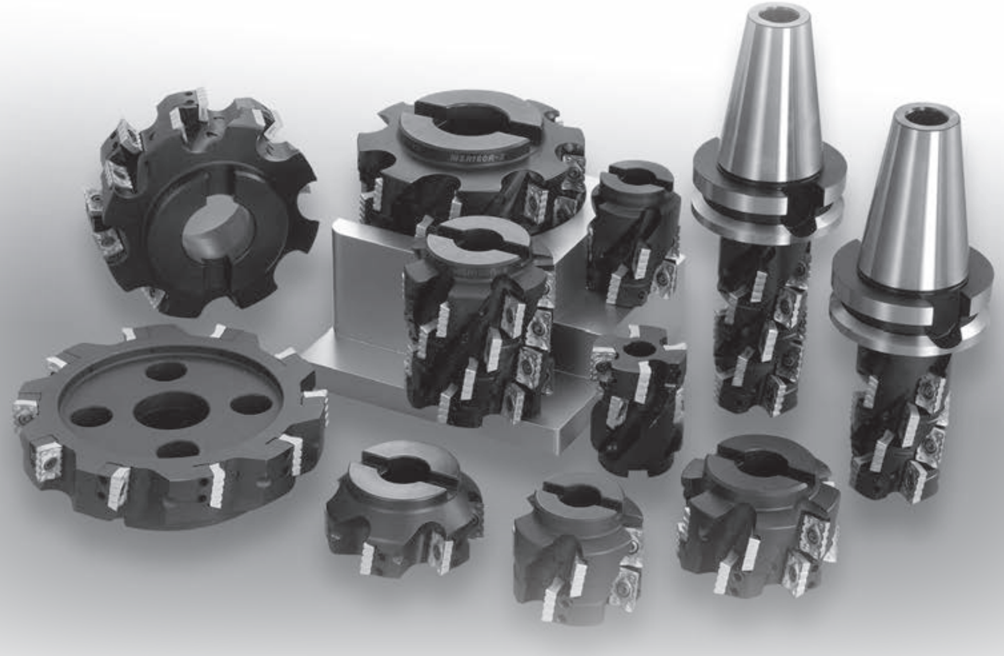
11 Type 17 Type APMT25 Type

Cutting Force Comparison



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

(Internal evaluation)

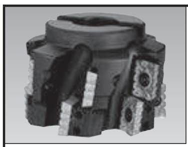


Shouldering | *Slotting | Facing

* Not recommended for 4 stages type

MSR

Rake Angle
ϕ63~ϕ80 A.R.:+9° R.R.:-8°
ϕ100~ A.R.:+9° R.R.:-5°



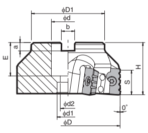


Fig.1

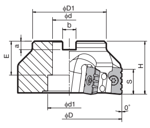


Fig.2

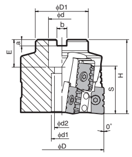


Fig.3

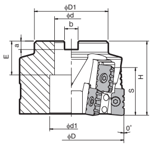


Fig.4

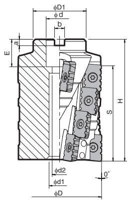


Fig.5

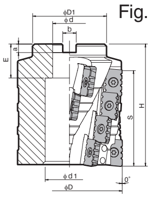


Fig.6

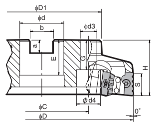


Fig.7

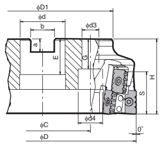


Fig.8

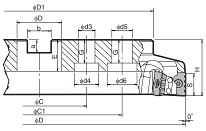


Fig.9

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

Description	Spare Parts					
	Clamp Screw	Wrench	Shim	Clamp Screw	Wrench	Anti-seize Compound
MSR 063R-○□	SB-60120TR	TT-25L	-	-	-	MP-1
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	Std.	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)																	Drawing	Weight (kg)
					ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S	ϕd3	ϕd4	ϕd5	ϕd6	ϕC	ϕC1	G		
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	-	-	101.6	-	32	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	-	-	101.6	-	32	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	101.6	177.8	25	Fig.9	15.5

- Shim is not available for MSR063R (ϕD=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. ϕd: Inch spec)

Description	Std.	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)																	Drawing	Weight (kg)
					ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S	ϕd3	ϕd4	ϕd5	ϕd6	ϕC	ϕC1	G		
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	-	-	101.6	-	32	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	-	-	101.6	-	32	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	101.6	177.8	25	Fig.9	16.0

- Shim is not available for MSR063R (ϕD=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

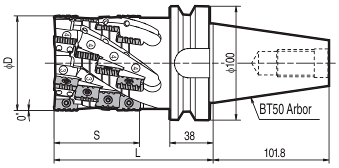


Fig.1

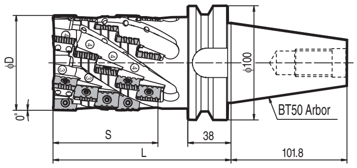


Fig.2

Toolholder Dimensions (BT50 Integral Arbor type)

Description		Std.	No. of Inserts	No. of Flutes	No. of Stages	Dimension (mm)			Rake Angle		Drawing	Weight (kg)	Spare Parts					
						ϕD	L	S	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	TT-25L	-	-	-	MP-1
	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	DT-15	
	080R-BT50-5	●	20		5		180	111			Fig.2	7.4	for Insert Clamp					
	100R-BT50-4	●	24	6	4	100	160	90	+9°	-5°	Fig.1	9.6				for Shim Clamp		
	100R-BT50-5	●	30		5		180	111			Fig.2	10.5						

· Shim is not available for MSR063R (ϕ D=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 ➜ **M18** (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 ➜ **M106**

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)

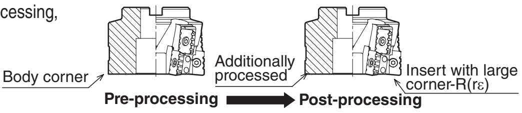
Description		No. of Inserts	No. of Flutes	No. of Inserts	
				Notched	
				NB3	NB4
MSR	100R-1	6	6	3	3
	100R-2	12		6	6
	100R-4	24		12	12

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

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

Insert Corner-R(rε) (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

MSR

Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)		
	Low Cutting Force	General purpose	MEGACOAT		PVD Coated Carbide
	NB3P+NB4P	NB3+NB4	**PR1230**	**PR1210**	**PR830**
Carbon Steel	0.15	0.2	★ 100~**150**~200	-	☆ 100~**150**~180
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.

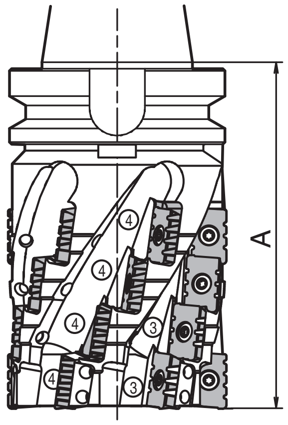
Cutting Conditions

1) Shouldering

In case of MSR100R-1

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

Overhang Length A (mm)



In case of MSR100R-2

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

In case of MSR100R-4

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

2) Slotting

● In case of MSR100R-1

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

● In case of MSR100R-2

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

● In case of MSR160R-1

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

● In case of MSR160R-2

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

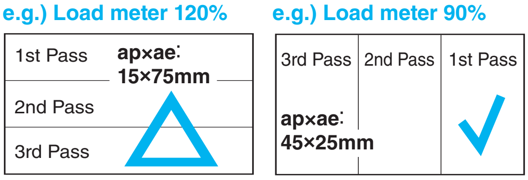
Notes) MSR...-4 (No. of stage)
Slotting is not recommended.

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



Q-2 Required equipment for MSR?

A-2 Max. spindle revolution is under 4,000min^{-1}. 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 is the points to remember in case of less power machine?

A-3 Do not use large size cutters. ⇒ ϕ63 or ϕ80 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?

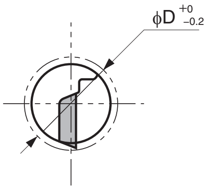
A-5 Chip weight: 700kg/Corner (Result by PR660)
Cutting time: 90min. (calculated value)
Cutting distance: 65m (calculated value)
How great 1,000cc/min? ⇒ About 7.8kg chips removed per minute
Tool life time=700kg (Chip weight)÷7.8kg (Chip evacuation amount per 1min)=90min
Cutting distance=90min (Time 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 inserts)

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

DMC End Mill



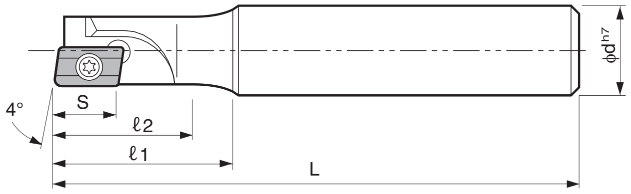


Fig.1

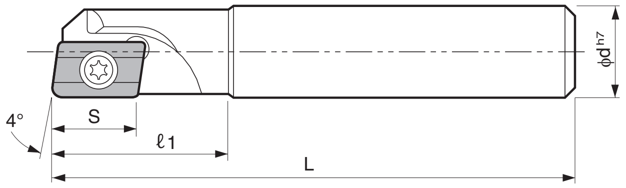
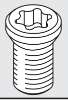
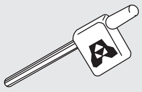


Fig.2

Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension（mm）						Rake Angle		Drawing	Spare Parts		
												Clamp Screw	Wrench	
			ϕD	ϕd	L	ℓ1	ℓ2	S	A.R.	R.R.				
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°					
813-S16	●		13			28.5				-9°				
814-S16	●		14		100	33.5	25		+6°	-8°				
815-S16	●		15											
816-S16	●	2	16			31				-4°				
818-S20	●		18	20						-3°				
820-S20	●	3	20		120	36	30		+8°	-6°				
822-S25	☐		22	25						-5°				
825-S25	●		25			46	40							
DMC 810	●	1	10	10	70	20	-	8.5	+3°	-6°	Fig.2	SB-2545TR	FT-8	
812	●		12	12	80	25				-5°				
DMC 014	●	1	14	16	90	25	-	11.0	+3°	-4°	Fig.2	SB-3060TR	FT-10	
016	●		16						+4°	-2°				
020	●	2	20	20	110	30			+5°	0°				

Applicable Inserts

Description	Applicable Inserts ➡ **M20**	
		
DMC8○○(-S○○)	NDCT 090204TR 090204FR	NDMM 090204ER-SP
DMC0○○	NDCT 120208TR 120208FR	NDMM 120204ER-SP 120208ER-SP

Recommended Cutting Conditions ➡ **M110**

● : Std. Item
☐ : Deleted from the next catalogue

DMC-SX End Mill

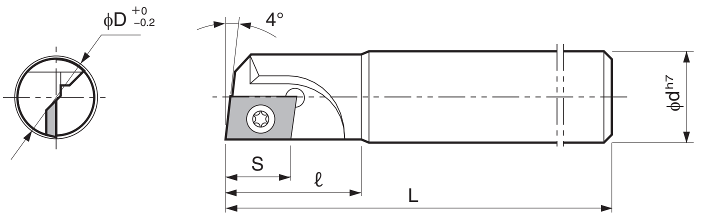


Fig.1

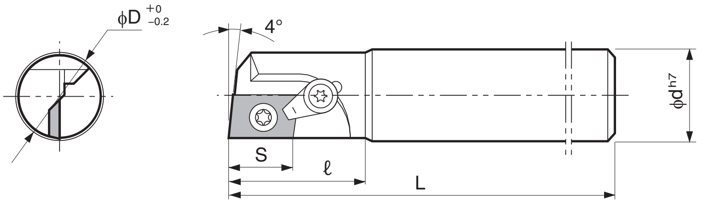
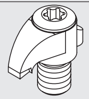
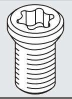
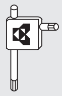


Fig.2

Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
												Clamp Set	Clamp Screw	Wrench
			ϕD	ϕd	L	ℓ	S		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

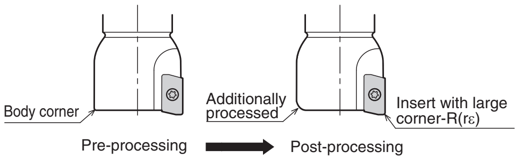
Description	Applicable Inserts ➡ **M20**		
			
DMC 316SXT	NDCW 150302TR	NDCT 150308TR 150308FR (NDCT 150308TRX)	NDMM 150304ER-SP 150308ER-SP
320SX	150304TR		
325SX	150308TR		
332SX	150320TR		
340SX	150330TR		
DMC 320SX-200	150340TR		
325SX-220	(NDCW150308TRX)		
332SX-250	(NDCW150308FRX)		

( ) insert is also attachable, however toolholder will be out from insert bottom. (Ref. to lower section of **M111**)

■ When using inserts with corner-R(rε) 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(rε) is 0.8mm or less.)

Insert Corner-R(rε) (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

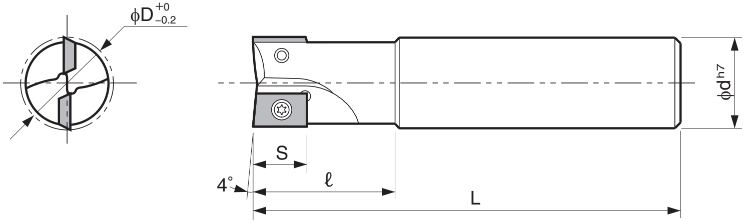
Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)		Max. ap (mm)		
		Cermet	Carbide			
		TN100M	**KW10**	Cutting Dia. (ϕD)	Slotting (ap)	Shouldering (ap×ae)
Carbon Steel	~0.2	★ 120~200		~ϕ12	2	6×2
				ϕ14~	3	9×3
Alloy Steel	~0.2	★ 100~180		~ϕ12	2	6×2
				ϕ14~	3	9×3
Mold Steel	~0.15	★ 100~180		~ϕ12	2	6×2
				ϕ14~	3	9×3
Stainless Steel	~0.15	☆ 120~200		~ϕ12	1.5	4×2
				ϕ14~	2	6×2
Cast Iron	~0.2		★ 80~150	~ϕ12	2	6×2
				ϕ14~	3	9×3
Non-ferrous Metals	~0.2		★ 100~300	~ϕ12	2	6×2
				ϕ14~	3	9×3

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

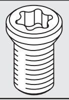
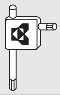
★ : 1st Recommendation ☆ : 2nd Recommendation

● : Std. Item

DMC-H End Mill (High Rake)



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
												Clamp Screw	Wrench	
			φD	φd	L	ℓ	S		A.R.	R.R.				
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

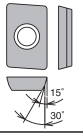
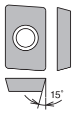
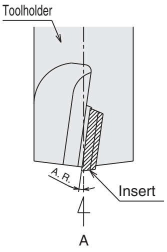
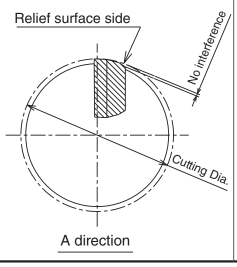
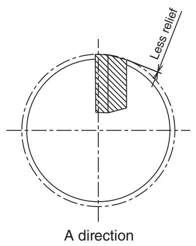
Description	Applicable Inserts ➡ **M20**			Applicable Inserts ➡ **M25**
				
DMC 316H **320H** **325H** **332H** **340H**	NDMM 150304ER-SP 150308ER-SP	NDCT 150308TRX	NDCW 150308TRX 150308FRX	NDCW 150302FRX-NE 150302FRX (PCD)

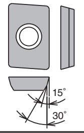
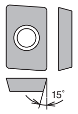
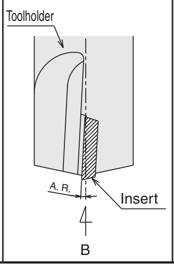
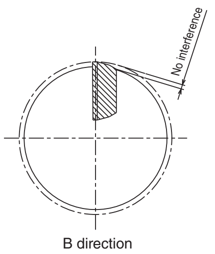
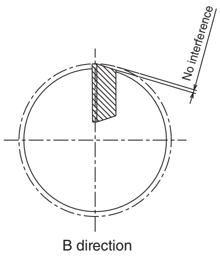
DMC-H Recommended Cutting Conditions

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. (φD)	Slotting (ap)	Shouldering (ap×ae)
Carbon Steel	~0.2	★ 120~200				~φ20	4	8×4
						φ25~	8	14×6
Alloy Steel	~0.2	★ 100~180				~φ20	4	8×4
						φ25~	8	13×6
Mold Steel	~0.15	★ 100~180				~φ20	3	5×2
						φ25~	6	10×3
Stainless Steel	~0.15	☆ 120~200				~φ20	3	6×2
						φ25~	6	13×3
Cast Iron	~0.2		★ 80~150			~φ20	4	8×4
						φ25~	6	14×6
Non-ferrous Metals	~0.2		★ 100~300	★ 300~500	☆ 300~500	~φ20	4	8×4
						φ25~	6	14×6

★ : 1st Recommendation ☆ : 2nd Recommendation

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

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. 

Insert Description / Toolholder Description	NDCT・・・TRX NDCW・・・(T/F)RX 	NDCW・・・TR NDCT・・・(T/F)R 
DMC-SX	No interference of relief surface	No interference of relief surface
		

● : Std. Item

End Mill for Aluminum Machining MEAL

Shouldering Slotting Facing

MEAL (Aluminum Machining: with coolant hole)

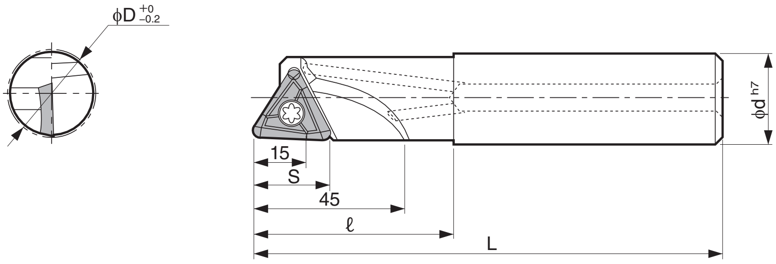


Fig.1

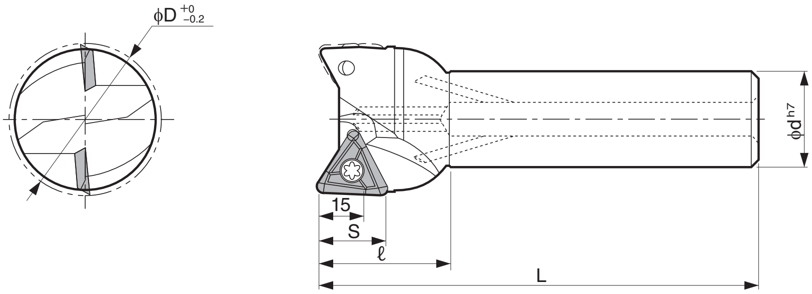
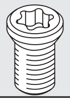
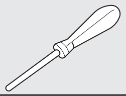
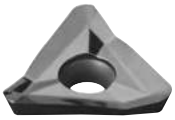


Fig.2

Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension（mm）						Rake Angle		Drawing	Spare Parts		
												Clamp Screw	Wrench	
			ϕD	ϕd	L	ℓ	S		A.R.	R.R.				
MEAL 25-S25	●	1	25	25	140	60	20		+12°	-7°	Fig.1	SB-5085TR	DT-20	
50-S32	●	2	50	32	150	45				-3.5°	Fig.2			

Applicable Inserts

Description	Applicable Inserts ➡ **M24**
	
MEAL 25-S25 **50-S32**	TEMT250624-AQ

Recommended Cutting Conditions

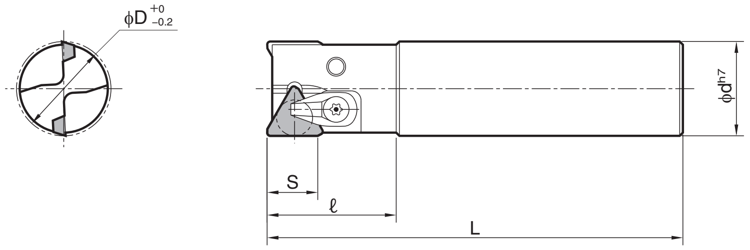
Workpiece Material	fz (mm/t)	Recommended Insert Grades（Cutting Speed Vc: m/min）
		Carbide
		KW10
Non-ferrous Metals	0.1~0.3	★ 300~500

・ap is recommended to be under 15mm.

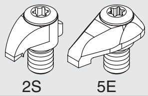
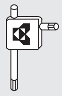
★：1st Recommendation

●: Std. Item

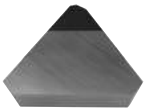
MTPS / MTES



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension（mm）						Rake Angle		Spare Parts		
											Clamp Set	Wrench	
			ϕD	ϕd	L	ℓ	S		A.R.	R.R.	 2S 5E		
MTPS 216	○	1	16	16	80	25	9.0		+3°	-5°	CPS-2S	FT-15	
220	○	2	20	20	90	30			+5°	-4°			
MTES 325	○	2	25	25	110	35	13.5		+11°	-2°	CPS-5E	FT-15	
330	☐	2	30	32	125	45			+15°				
335	○	3	35	32	125	45				0°			

Applicable Inserts

Description	Applicable Inserts				
	➡ M12	➡ M25	➡ M12	➡ M12	➡ M25
					
MTPS 216 **220**	TPGN 110302 110304 110308 TPMN 110304 110308	TPGN 110302 110304 110308 (PCD)	-	-	-
MTES 325 **330** **335**	-	-	TEMR 1603PTER-H	TEKN 1603PTTR 1603PTFR	TEEN 1603PTFR-NE 1603PTFR (PCD)

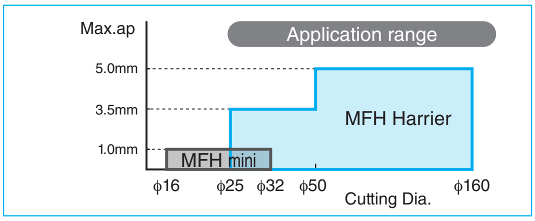
Recommended Cutting Conditions

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc : m/min)						Max. ap (mm)		
		Cermet		MEGACOAT		Carbide	PCD			
		TN60	TN100M	PR1225	PR1210	KW10	KPD001 (KPD010)	Cutting Dia. (ϕD)	Slotting (ap)	Shouldering (ap×ae)
Carbon Steel	~0.15	☆ 150~200	★ 120~200	★ 120~250	-	-	-	~ϕ20	3	5×2
								ϕ25~	6	13×5
Alloy Steel	~0.15	☆ 120~200	★ 100~180	★ 100~220	-	-	-	~ϕ20	3	5×2
								ϕ25~	6	13×5
Mold Steel	~0.15	☆ 120~200	★ 100~180	★ 80~180	-	-	-	~ϕ20	3	5×2
								ϕ25~	6	13×5
Stainless Steel	~0.12	-	☆ 120~200	★ 120~220	-	-	-	~ϕ20	2	5×2
								ϕ25~	4	13×5
Cast Iron	~0.2	-	-	-	★ 100~220	☆ 80~150	-	~ϕ20	3	5×2
								ϕ25~	6	13×5
Non-ferrous Metals	~0.2	-	-	-	-	★ 100~300	★ 300~500	~ϕ20	3	5×2
								ϕ25~	6	13×5

★ : 1st Recommendation ☆ : 2nd Recommendation

○ : Check Availability
☐ : Deleted from the next catalogue

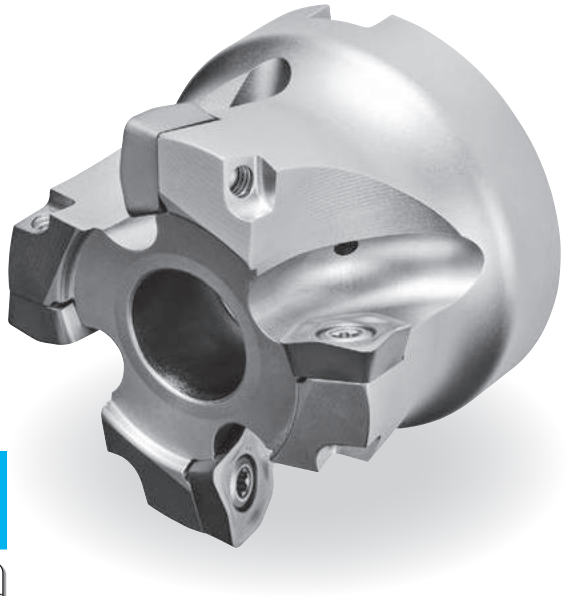
MFH Harrier



Anti chattering

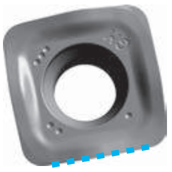
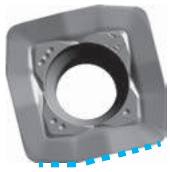
Applicable to various applications with 3 types of inserts

Increased chip evacuation and shortened cutting time



POINT.1 Various applications

with 3 types of inserts

	GM (General purpose)	LD (Large ap)	FL (With Wiper Edge)
Shape			
Applications	**1st recommendation for general purpose** → Facing, Pocketing, Helical milling	**Max. ap=5mm** → Applicable for scale removal at high efficiency	**Wide wiper edge** → Applicable for both roughing and finishing, for small machining center

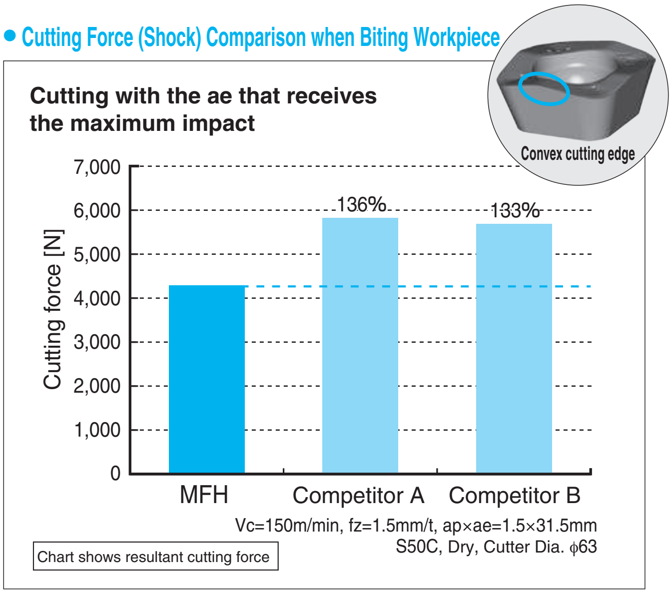
3 types of inserts according to your application
Applicable to a wide range of application

・For inclination angle at contouring, refer to the table above **M122**

POINT.2 3D convex cutting edge

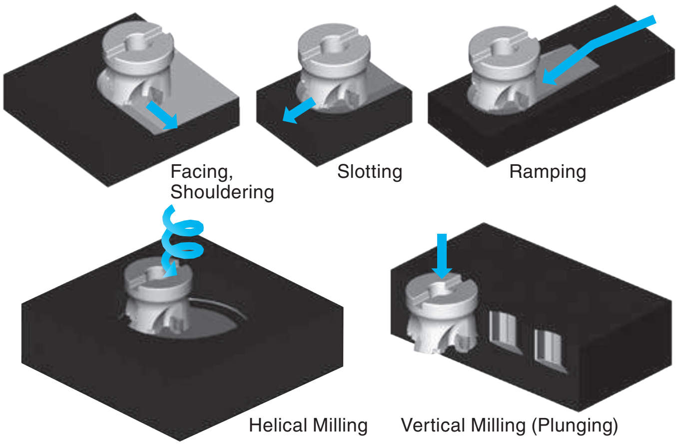
reduces shock of biting workpiece

● Cutting Force (Shock) Comparison when Biting Workpiece



POINT.3 Multi-functional cutter

for ramping, helical milling, etc.

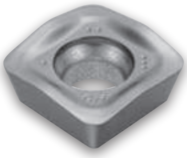


* GM type is applicable for all the above applications
* LD type and FL type are not applicable for Helical Milling, Plunging and Contouring of rising wall (Please refer to **M122**)

POINT.4 Applicable for Variety of Workpieces

from Steel to Heat-resistant Alloys

New grade for difficult-to-cut material which controls sudden fracture and realizes stable machining

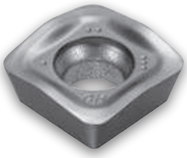


CA6535

For Martensitic stainless steel and Ni-base heat-resistant alloys

High heat resistance and wear resistance with CVD coating

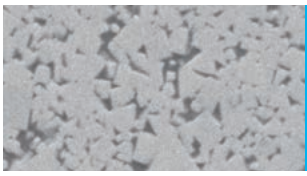
Improved stability due to thin layer coating technology



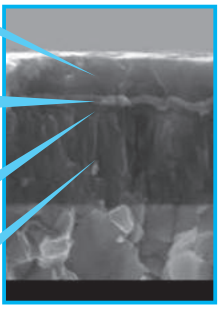
PR1535

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



New Development High Toughness Substrate



Smooth TiN layer

Smooth & less adhesion
Improved stability

Tough α-Al_2O_3 layer

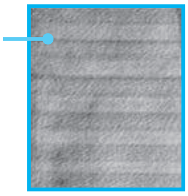
Prevents oxidation and wear of coating layer due to high heat-resistance of aluminum oxide

Special Interlayer

Prevents peeling of coating layer

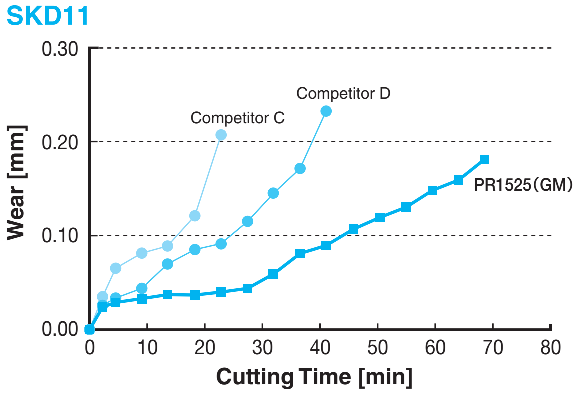
Ultra Fine TiCN layer

High aspect ratio and micro columnar TiCN coating layer improves abrasive wear resistance

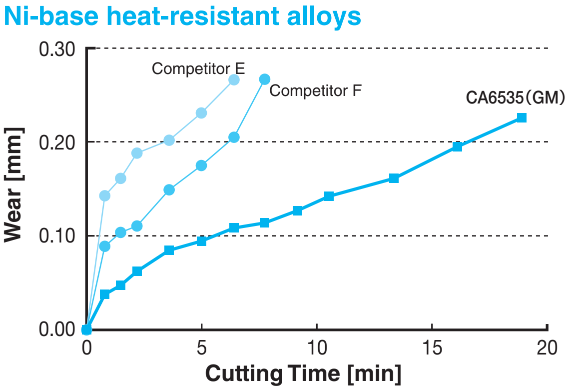


MEGACOAT base multi-layer structure

Wear Resistance Comparison



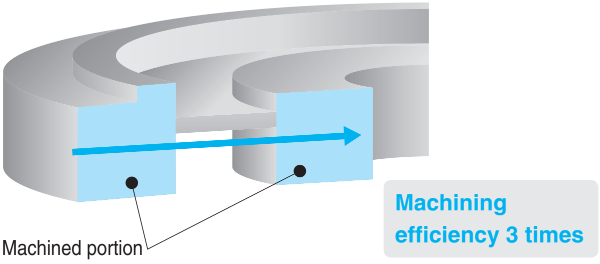
<Cutting Conditions> Vc=150m/min, fz=1.5mm/t, apxae=1.0×16mm, Dry



<Cutting Conditions> Vc=30m/min, fz=0.8mm/t, apxae=1.0×40mm, Wet

Case Studies

SFVAF22B (Forged alloy steel)



Machining efficiency 3 times

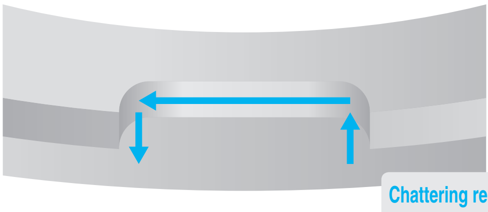
- Turbine parts ・Vc=160m/min ・fz=1.17mm/t
- apxae=1.5×max.160mm ・Dry
- MFH160R-14-8T (8 inserts) ・SOMT140520ER-GM (PR1525)

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

(Evaluation by the user)

SUS304F



Chattering reduced
Machining efficiency 1.6 times

- Clutch ・Vc=120m/min ・fz=1.2mm/t
- apxae=1.0×20mm ・Dry
- MFH32-S32-10-2T (2 inserts) ・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

(Evaluation by the user)

MFH High Feed Cutter NEW

MFH Harrier Face Mill

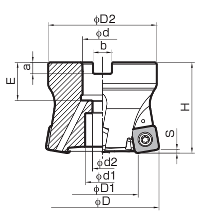


Fig.1

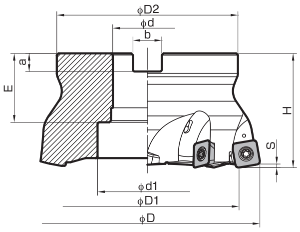


Fig.2

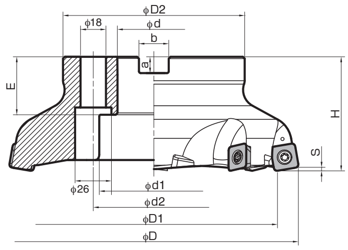


Fig.3

Toolholder Dimensions (SOMT10 type)

Description	Standard	No. of inserts	Dimension (mm)														Rake angle (°)		Coolant hole	Drawing	Weight (kg)	Max. revolution (min^{-1})
			øD	øD$_1$			øD$_2$	ød	ød$_1$	ød$_2$	H	E	a	b	S	S$_L$*1	A.R.	R.R.				
				GM	LD	FL																
MFH 050R-10-4T-M	●	4	50	33	37.5	36.5	47	22	19	11	50	21	6.3	10.4	1.5 (1.2)*2	3.5	+10°	-5°	Yes	#1	0.4	10,000
050R-10-5T-M	●	5																				
052R-10-4T-M	●	4	52	35	39.5	38.5	47															
052R-10-5T-M	●	5																				
063R-10-5T-22M	●	5	63	46	50.5	49.5	60											-4°			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

*1 For S$_L$ dimension, refer to the figure in the next page
*2 Dimension in ( ) is when attaching LD type

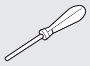
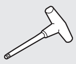
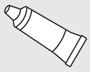
Toolholder Dimensions (SOMT14 type)

Description	Standard	No. of inserts	Dimension (mm)														Rake angle (°)		Coolant hole	Drawing	Weight (kg)	Max. revolution (min^{-1})
			øD	øD$_1$			øD$_2$	ød	ød$_1$	ød$_2$	H	E	a	b	S	S$_L$*1	A.R.	R.R.				
				GM	LD	FL																
MFH 063R-14-4T-22M	●	4	63	40	46	45	60	22	19	11	50	21	6.3	10.4	2	5	+10°	-10°	Yes	#1	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																				
066R-14-4T-22M	●	4	66	43	49	48	60	22	19	11		21	6.3	10.4								
066R-14-5T-22M	●	5																				
066R-14-4T-27M	●	4						27	20	13		24	7	12.4								
066R-14-5T-27M	●	5																				
080R-14-5T-M	●	5	80	57	63	62	76	27	20	13	63	24	7	12.4				-8°			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				-7°		#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	66.7		32						-6°	No	#3	3.7	4,200

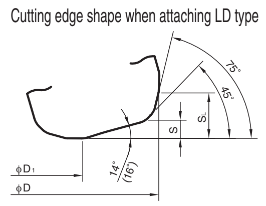
*1 for S$_L$ dimension, refer to the figure in the next page

● : Std. Item

Spare Parts (Face Mill)

Description		Spare Parts				
		Clamp Screw	Wrench		Anti-seize Compound	Mounting bolt
			DTPM	TTP		
						
MFH	050R-10-…	SB-4090TRPN	DTPM-15 for Insert Clamp Recommended tightening torque 3.5N·m		MP-1	HH10X30
	050R-10-…-M					
	063R-10-…					
	063R-10-…-22M					
	063R-10-…-27M					HH12X35
	080R-10-…					HH16X40
	080R-10-…-M					HH12X35
MFH	063R-14-…	SB-50120TRP		TTP-20 for Insert Clamp Recommended tightening torque 4.5N·m	MP-1	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-…					—

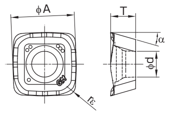
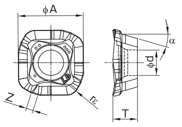
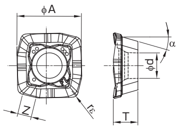
Recommended Cutting Conditions ➡ M121



Angle in ( ) is for SOMT14 type

- **Max. Revolution**
  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Applicable Inserts ➡ M17

Insert Handed Insert shows Right-hand		Description	Dimension (mm)					Angle	CVD Coated Carbide	MEGACOAT NANO		
			A	T	ϕd	Z	rε	α	CA6535	PR1535	PR1525	PR1510
 General purpose	 	**SOMT 100420ER-GM**	10.30	4.58	4.6	-	2.0	16°	●	●	●	●
		140520ER-GM	14.14	5.56	5.8				●	●	●	●
 Large ap	 	**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		●	●	●	●

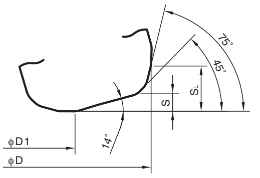
● : Std. Item

MFH High Feed Cutter NEW

MFH Harrier End Mill (SOMT10 type)

(Cylindrical)

Cutting edge shape when attaching LD type



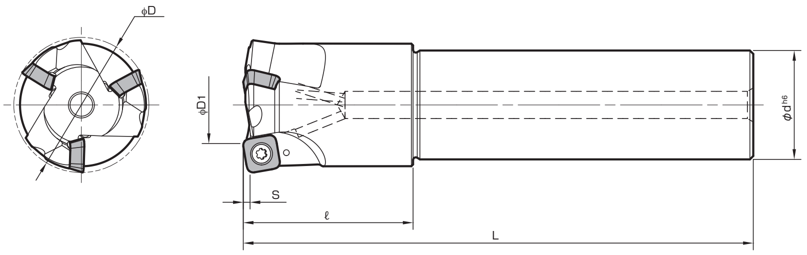


Fig.1

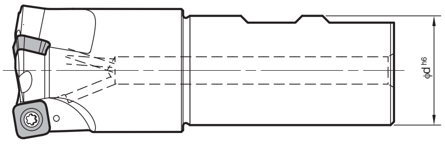


Fig.2

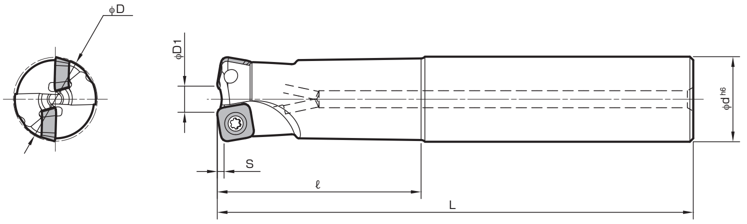


Fig.3

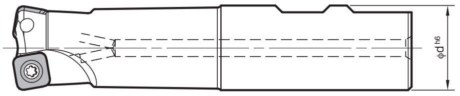


Fig.4

Toolholder Dimensions

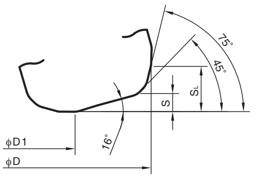
Description		Std.	No. of Inserts	Dimension (mm)									Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min⁻¹)
				ϕD	ϕD1 GM	ϕD1 LD	ϕD1 FL	ϕd	L	ℓ	S	S_L	A.R.				
Cylindrical	**MFH 25-S25-10-2T**	●	2	25	8	12.5	11.5	25	140	60	1.5 *(1.2)	3.5	+10°	Yes	Fig.3	0.4	17,000
	28-S25-10-2T	●	2	28	11	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 *(1.2)	3.5	+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 *(1.2)	3.5	+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 *(1.2)	3.5	+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



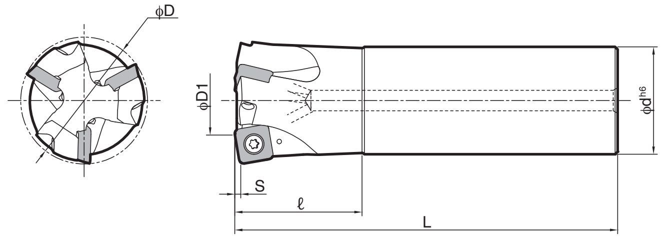


Fig.1

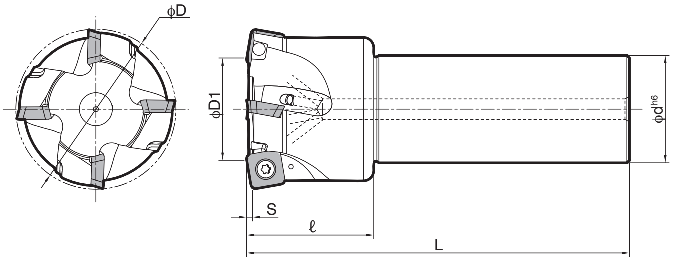
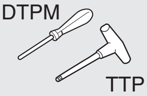
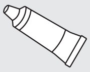


Fig.2

Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)									Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
			ϕD	ϕD1			ϕd	L	ℓ	S	SL	A.R.				
				GM	LD	FL										
MFH 50-S42-14-3T	●	3	50	27	33	32	42	150	50	2	5	+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

Spare Parts and Applicable Inserts

Description	Spare Parts			Applicable Inserts ➡ **M17, M117**
	Clamp Screw	Wrench	Anti-seize Compound	
		DTPM  TTP		
MFH …-10-…	SB-4075TRP for Insert Clamp Recommended tightening torque 3.5N·m	DTPM-15	MP-1	SOMT100420ER-GM SOMT100420ER-LD SOMT100420ER-FL
MFH …-14-…	SB-50120TRP for Insert Clamp Recommended tightening torque 4.5N·m	TTP-20	MP-1	SOMT140520ER-GM SOMT140520ER-LD SOMT140514ER-FL

- **Max. Revolution**
When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

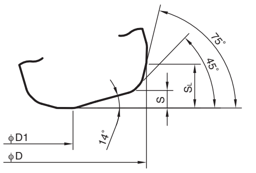
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

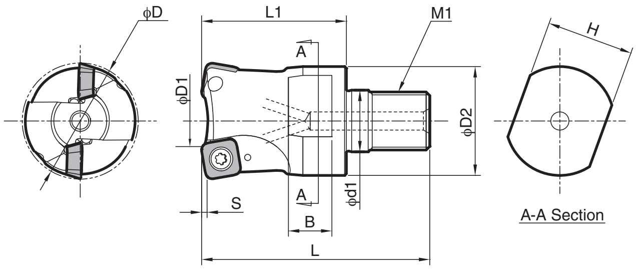
Recommended Cutting Conditions ➡ **M121**

● : Std. Item

MFH Harrier type Head

Cutting edge shape when attaching LD type





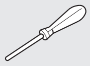
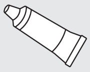
Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)													Rake Angle	Coolant Hole	Max. Revolution (min^{-1})
			ϕD	ϕD1			ϕD2	ϕd1	L	L1	M1	H	B	S	S_L	A.R.		
				GM	LD	FL												
MFH 25-M12-10-2T	●	2	25	8	12.5	11.5	23	12.5	57	35	M12xP1.75	19	10	1.5 *(1.2)	3.5	+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	12					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																

Ref. to page ➡ **M58** 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 ➡ **M17, M117**
	Clamp Screw	Wrench	Anti-seize Compound	
				
MFH ...-10-...	SB-4075TRP	DTPM-15	MP-1	SOMT100420ER-GM SOMT100420ER-LD SOMT100420ER-FL
	for Insert Clamp Recommended tightening torque 3.5N•m			

- **Max. Revolution**
  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

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

Recommended Cutting Conditions ➡ **M121**

● : 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			CVD Coated Carbide
							PR1535	**PR1525**	**PR1510**	**CA6535**
GM	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	—
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.

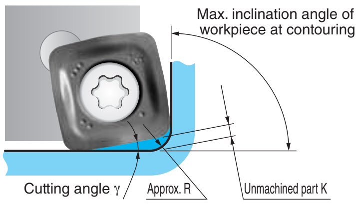
* When finishing with LD type and FL type inserts, recommended feed rate for SOMT14 LD type: f=1.5(mm/rev) or less / for SOMT10 LD type: f=0.9(mm/rev)
for SOMT14 FL type: f=3.0(mm/rev) or less / for SOMT10 FL type: f=1.4(mm/rev)

* For machining center equivalent to BT30, reduce feed rate to 25% or less of the recommended condition.

* For slotting, internal coolant is recommended.

MFH High Feed Cutter NEW

Note for Machining Program (Approx. R)

Shape	Description	Insert Type	Cutting angle γ	Approx. R (mm)	Unmachined part K (mm)	Max. inclination angle of workpiece at contouring
	MFH…-10-…	GM	10°	3.0	0.85	90°
		FL	14°	3.0	0.89	80°
		LD	14°	3.5	0.69	65°
	MFH…-14-…	GM	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. ϕD (mm)	25	28	32	35	40	50	63	80
Max. ramping angle α_{max}	5°	4.5°	4°	3.5°	3°	2.5°	2°	1°
tan α_{max}	0.087	0.078	0.070	0.061	0.052	0.043	0.035	0.017

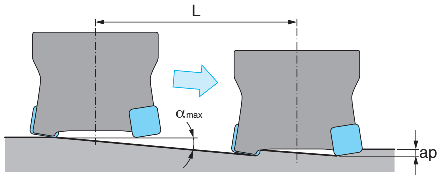
MFH…-14-…

Cutter Dia. ϕD (mm)	50	63	80	100	125	160
Max. ramping angle α_{max}	2°	1.8°	1°	0.5°	0.4°	0.2°
tan α_{max}	0.035	0.031	0.017	0.009	0.007	0.003

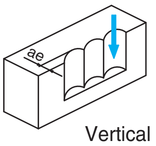
Guide for Ramping (Slant Milling)

- Ramping angle should be under α_{max} (Maximum ramping angle) in the above cutting conditions.
- Feed rate should be under 70% of the above cutting conditions.

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



Vertical Milling (Plunging)



Insert Description	Max. Width of Cut (ae)
SOMT10	8mm
SOMT14	11.5mm

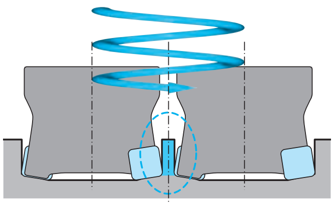
Vertical Milling (Plunging) is available only with GM type insert.
(LD type and FL type are not applicable)

·For vertical milling (plunging), reduce feed rate to fz=0.2mm/t or less.

Guide for Helical milling

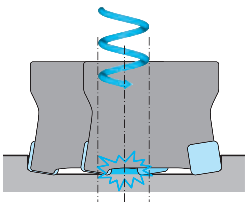
For helical milling, use between Min. cutting dia. and Max. cutting dia.

Over Max. Cutting Dia.



Center core part remains after machining

Under Min. Cutting Dia.

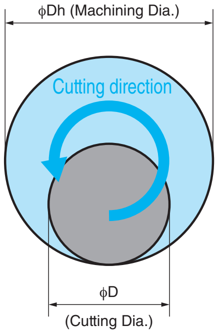


Center core part interferes with toolholder

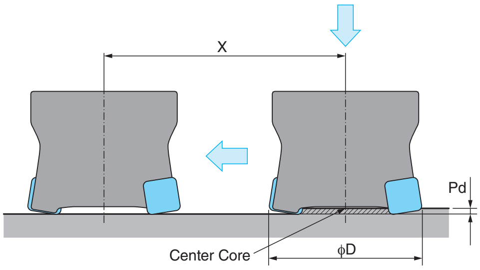
Description	Min. Cutting Dia.	Max. Cutting Dia.
MFH…-10-…	2×D-18	2×D-2
MFH…-14-…	2×D-25	2×D-2

Unit : mm

·Sinking depth (h) at helical milling should be under Max. depth of cut (S) in the cutter dimension chart.
·Down-cut milling is recommended (refer to the right figure)
·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



3D machining

Insert Type	Ramping	Contouring (rising wall angle)	Vertical	Helical Milling	Pocketing
GM	✓	✓ (90°)	✓	✓	✓
LD	✓	△ (65°)	N/A	N/A	N/A
FL	✓	△ (80°)	N/A	N/A	N/A

·Some applications are not available depending on insert type.
·For FL and LD type, there is a limit of rising wall angle at contouring.

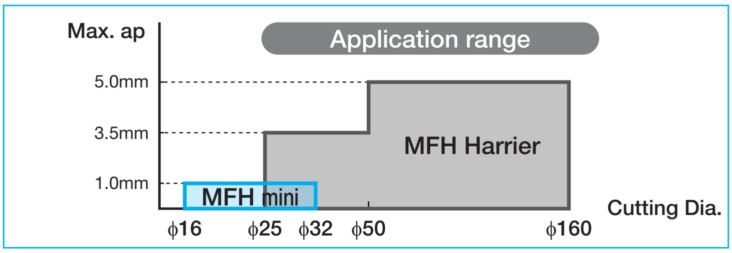
Description	GM		LD		FL	
	Max. cutting depth Pd	Min. cutting length X for flat bottom surface	Max. cutting depth Pd	Min. cutting length X for flat bottom surface	Max. cutting depth Pd	Min. cutting length X for flat bottom surface
MFH…-10-…	1.5	D-18	1.5	D-14	1.5	D-15
MFH…-14-…	2	D-24	2	D-18	2	D-19

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 under f=0.2mm/rev.

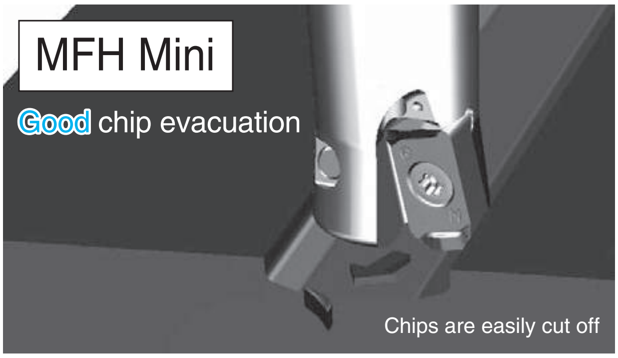
MFH Mini

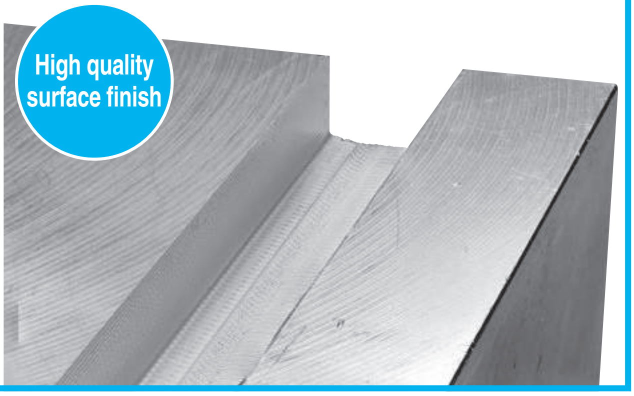
Cutter Dia.：ϕ16～ϕ32

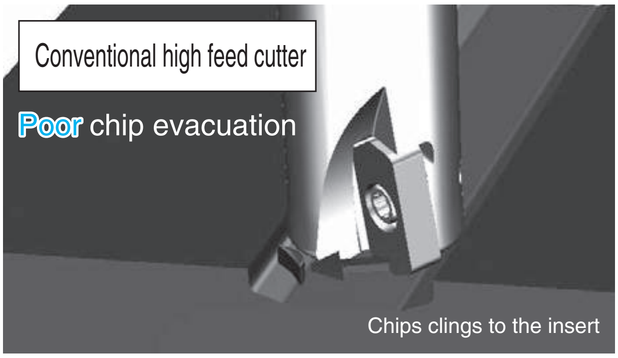


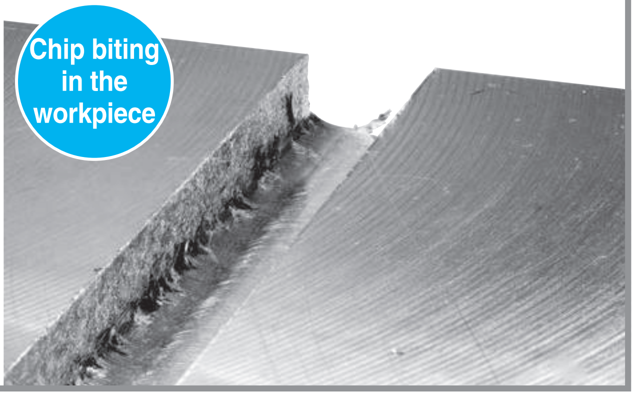
- **Economical Double-sided 4-edge Insert**
- **High efficiency and high feed machining at small dia. machining and small machining center**

POINT.1 Good Chip Evacuation

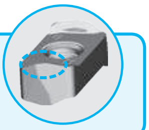








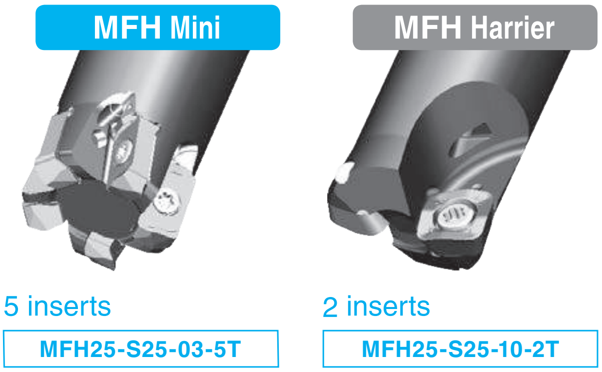
MFH Mini controls chip biting with 3D convex cutting edge



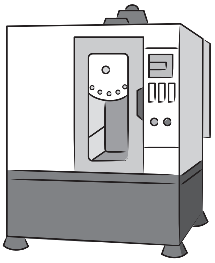
Cutting Conditions：Workpiece Material SS400 Cutter Dia. ϕ16 Vc=150m/min fz=0.6mm/t ap×ae=10mm (0.5mm×20 passes)×16mm Dry

POINT.2 Multi edge design enables high efficiency machining

·Cutter Dia. ϕ25



POINT.3 High efficiency and high feed machining at small machining center (BT30/BT40)



Suitable for roughing of mold

MFH Mini End Mill

(Cylindrical)

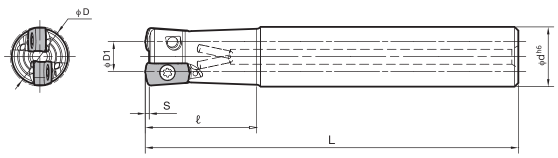


Fig.1

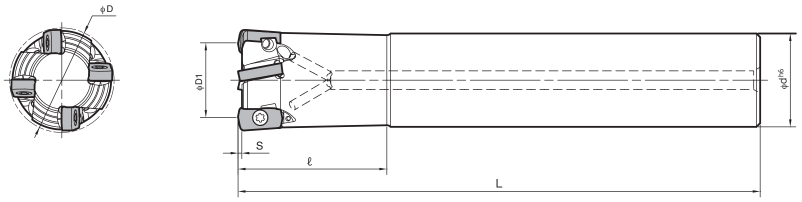


Fig.2

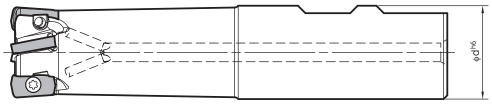


Fig.3

Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension(mm)						Rake Angle	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				φD	φD1	φd	L	ℓ	S	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.

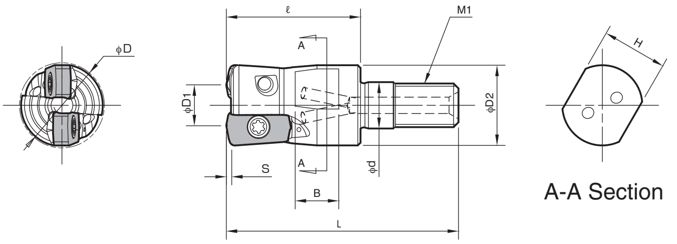
Recommended Cutting Conditions ➜ **M126**

- **Max. Revolution**

When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

● : Std. Item

MFH Mini type Head



Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension(mm)										Rake Angle	Coolant Hole	Max. Revolution (min^{-1})
			φD	φD1	φD2	φd	L	ℓ	M1	H	B	S	A.R.		
MFH 16-M08-03-2T	●	2	16	8	14.7	8.5	43	25	M8xP1.25	12	8	1	-10°	Yes	18,880
17-M08-03-2T	●		17	9											17,900
18-M08-03-2T	●		18	10											17,000
20-M10-03-3T	●	3	20	12	18.7	10.5	49	30	M10xP1.5	15	9				15,700
20-M10-03-4T	●	4													
22-M10-03-3T	●	3	22	14											14,700
22-M10-03-4T	●	4													
25-M12-03-4T	●		25	17	23	12.5	57	35	M12xP1.75	19	10				13,400
25-M12-03-5T	●	5													
28-M12-03-4T	●	4	28	20	23										12,400
28-M12-03-5T	●	5													
32-M16-03-5T	●		32	24	30	17	63	40	M16xP2.0	24	12				11,400
32-M16-03-6T	●	6													
35-M16-03-6T	○	6	35	27											
42-M16-03-7T	○	7	42	34											

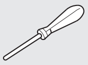
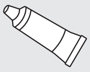
Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Recommended Cutting Conditions ➡ **M126**

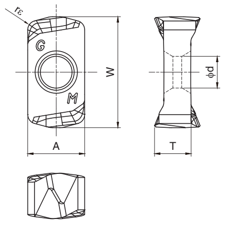
■ **Max. Revolution**
When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

Ref. to page ➡ **M58** for applicable arbor (BT arbor for exchangeable head / double-face clamping spindle)

Spare Parts

Description	Spare Parts		
	Clamp Screw	Wrench	Anti-seize Compound
			
MFH …-03-…	SB-3065TRP	DTPM-8	MP-1
	for Insert Clamp Recommended tightening torque 1.2N·m		

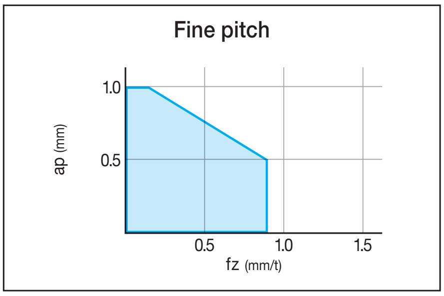
Applicable Inserts ➡ M13

Insert		Description	Dimension (mm)						Angle	MEGACOAT NANO			CVD Coated Carbide
			A	T	φd	W	Z	rε	α	PR1535	PR1525	PR1510	CA6535
 General purpose		**LOGU 030310ER-GM**	6.2	3.96	3.45	11.9	—	1.0	—	●	●	●	●

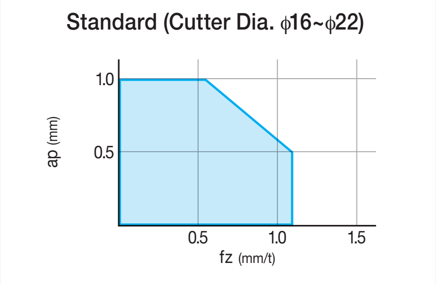
● : Std. Item

MFH High Feed Cutter NEW

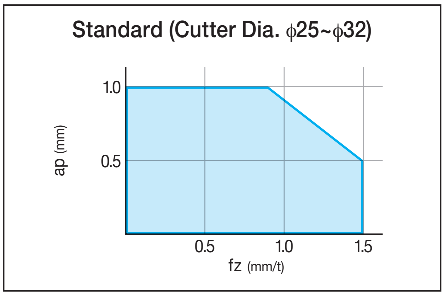
Cutting Performance (GM)



MFH20-····-4T, MFH22-····-4T, MFH25-····-5T
MFH28-····-5T, MFH32-····-6T



MFH16-····-2T, MFH17-····-2T, MFH18-····-2T
MFH20-····-3T, MFH22-····-3T



MFH25-····-4T, MFH28-····-4T, MFH32-····-5T

When using fine pitch type, reduce the cutting conditions compared with standard type.

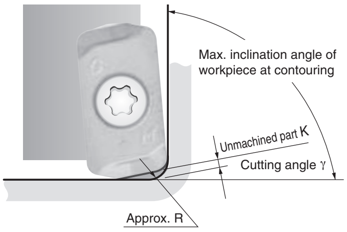
Recommended Cutting Conditions

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	MEGACOAT NANO			CVD Coated Carbide
									PR1535	PR1525	PR1510	CA6535
GM	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	☆ 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	☆ 80~**140**~180	★ 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	☆ 60~**100**~130	★ 60~**100**~130	–	–
	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	★ 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~**0.7**~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	–	–	★ 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	–	–	★ 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	☆ 20~**30**~50	–	–	★ 20~**30**~50
	Titanium Alloys								★ 40~**60**~80	–	☆ 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.

Note for Machining Program (Approx. R)

Shape	Description	Insert Type	Cutting angle γ	Approx. R (mm)	Unmachined part K (mm)	Max. inclination angle of workpiece at contouring
	MFH…-03-…	GM	12°	1.6	0.39	90°

Reference data for Ramping

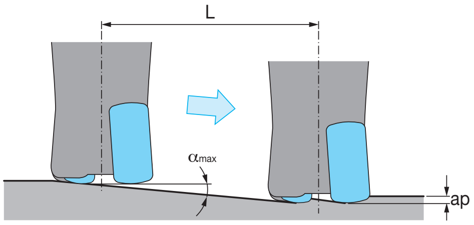
Description	Cutter Dia. φD (mm)	16	17	18	20	22	25	28	32
MFH…-03-…	Max. ramping angle α_{max}	2.8°	2.5°	2.1°	1.7°	1.4°	1.2°	1°	0.8°
	tan α_{max}	0.049	0.042	0.037	0.03	0.024	0.021	0.017	0.014

Guide for Ramping (Slant Milling)

·Ramping angle should be under α_{max} (Maximum ramping angle) in the above cutting conditions.
·Feed rate should be under 70% of the above cutting conditions.

Formula of the cutting length "**L**" at Max. ramping angle

$$L = \frac{ap}{\tan \alpha_{max}}$$

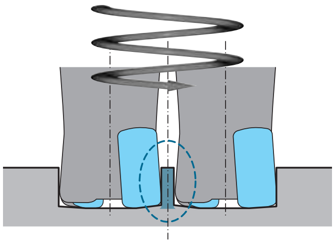


Guide for Helical milling

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

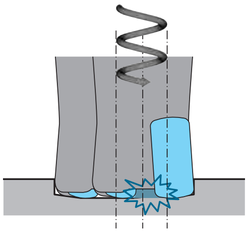
Over Max. Cutting Dia.

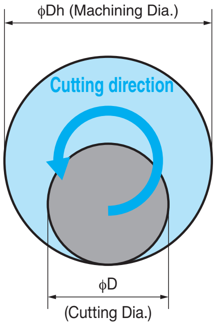
Center core part remains after machining



Under Min. Cutting Dia.

Center core part interferes with toolholder



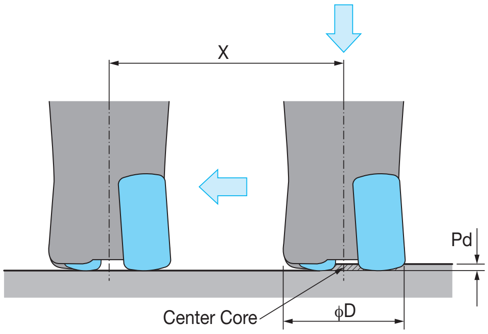


Description	Min. Cutting Dia. φDh1	Max. Cutting Dia. φDh2
MFH…-03-…	2×D-8	2×D-2

Unit：mm

- Sinking depth at helical milling should be under Max. ap (1mm).
- 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



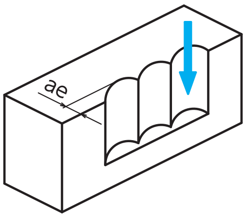
Description	GM	
	Max. cutting depth Pd	Min. cutting length X for flat bottom surface
MFH…-03-…	1.0	φD-9

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 under f=0.2mm/rev.

Vertical milling (Plunging)

Vertical milling (Plunging)



·Available for vertical milling (plunging).

Insert Description	Max. Width of Cut (ae)
LOGU03	3.5mm

·For vertical milling (plunging), reduce feed rate to fz=0.2mm/t or less.

MFH Micro

Cutter Dia.: φ8~φ16

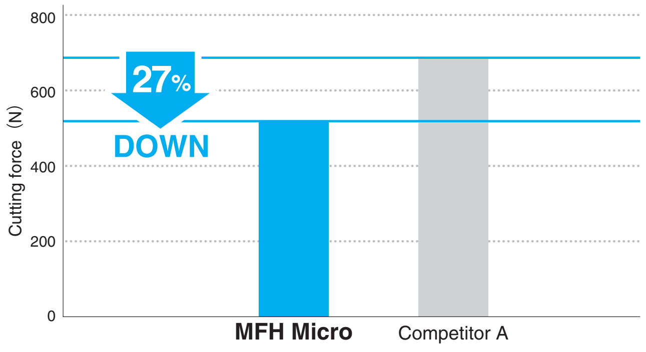
- **Low Resistance and Durable Against Chatter for Highly Efficient Machining**
- **Max. ap 0.5 mm. Stable High Feed Machining on a Wide Range of Applications**

High Precision G Class Insert

POINT.1 Stable Machining with Chattering Resistance

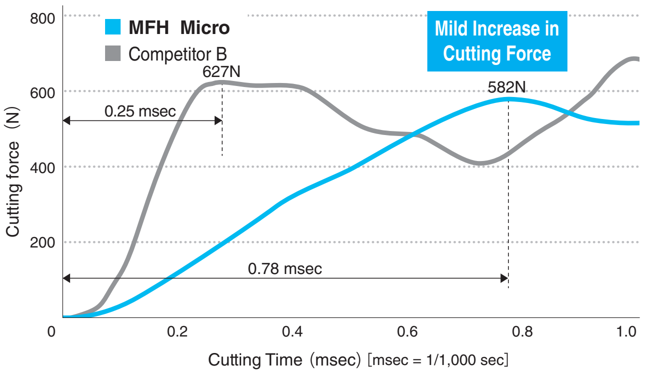
Molded Convex Cutting Edge Controls Initial Impact when Entering the Workpiece

Cutting Force Comparison (Internal evaluation)



Cutting Conditions : Vc=120m/min, fz=0.6mm/t, ap=0.4mm
Cutter Dia. φ10mm, Slotting, Dry   Workpiece Material : S50C

Increase in Cutting Force when Entering Workpiece (Internal evaluation)



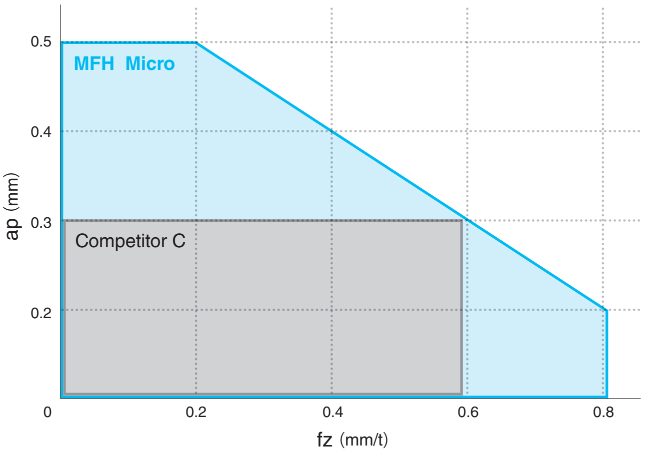
Cutting Conditions : Vc=120m/min, fz=0.6mm/t, ap×ae=0.4×5mm
Cutter Dia. φ10mm, Dry   Workpiece Material : S50C

POINT.2 Wide Range of Machining Applications

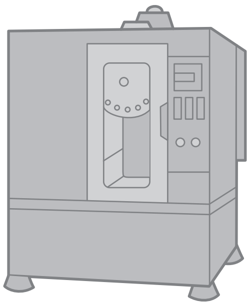
Wide Range of Machining Applications at a Maximum Depth of Cut of 0.5 mm

Stable Machining Even with Small Machining Centers

Cutting Performance Map (Cutter Dia. φ10mm)



(Internal evaluation)

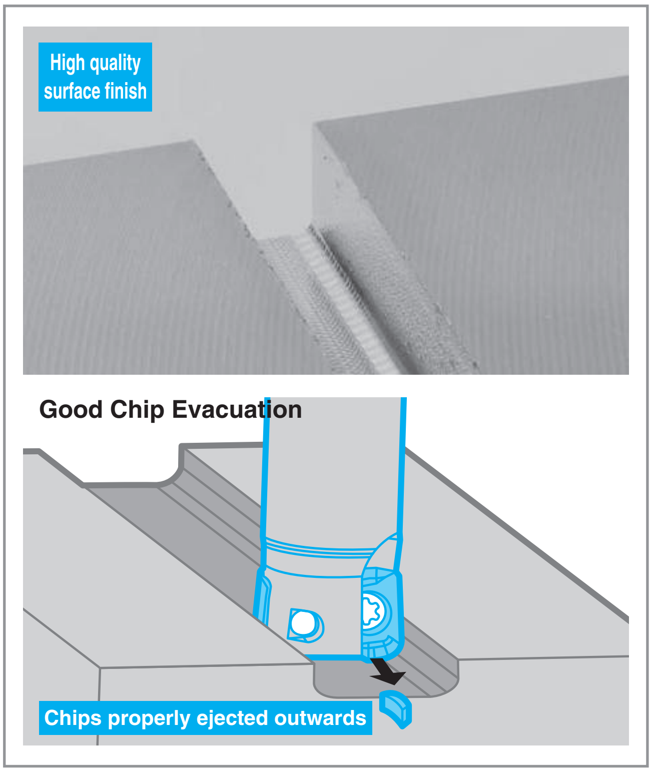


Applicable for BT30/ BT40

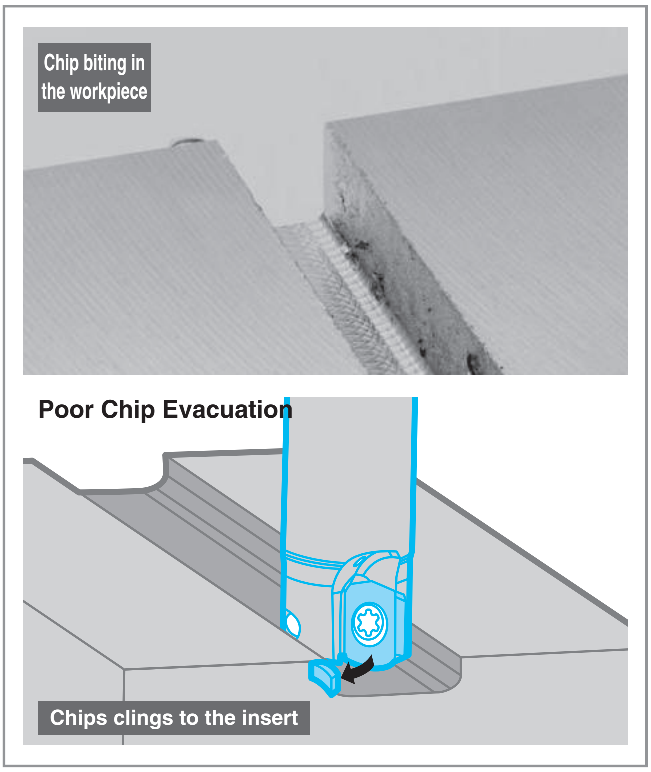
POINT.3 Good Chip Evacuation

Controls Chip Biting with Convex Cutting Edge

MFH Micro



Competitor F



Cutting Conditions : Cutter Dia. Dc=ϕ10mm, Vc=120m/min, fz=0.6mm/t, ap=0.4mm(25passes) Total10mm, Dry Workpiece Material : SS400 (Internal evaluation)

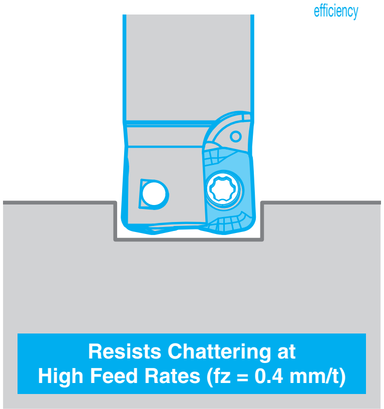
POINT.4 Replaces Solid End Mills to Reduce Machining Costs

Suppresses Chattering and Increases Milling Efficiency

MFH Micro Compared to Solid End Mills

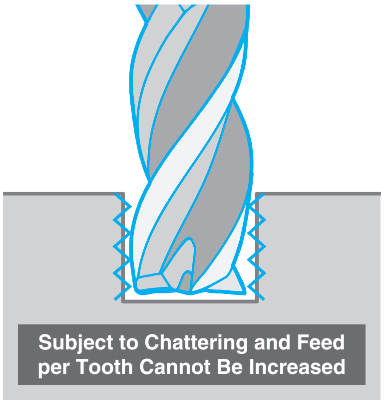
MFH Micro Q=15.3cc/min

Vc=150m/min, fz=0.4mm/t
apxae=0.4×10mm, Dry
MFH10-S10-01-2T (2 inserts)
LPGT010210ER-GM (PR1525)



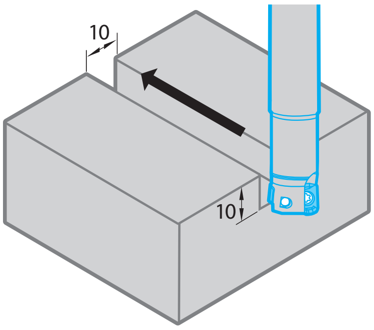
Solid End Mill Q=12.2cc/min

Vc=80m/min, fz=0.04mm/t
apxae=3×10mm, Dry
ϕ10 (4 flutes)



Machine Part Slotting

Workpiece Material : S50C



(Evaluation by the user)

MFH Micro End Mill

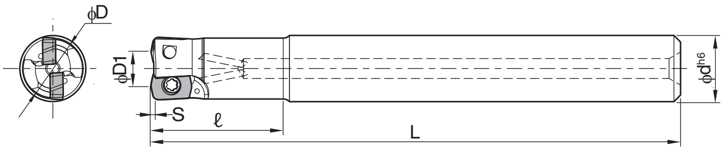


Fig.1

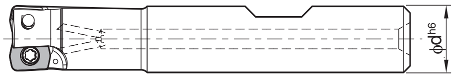


Fig.2

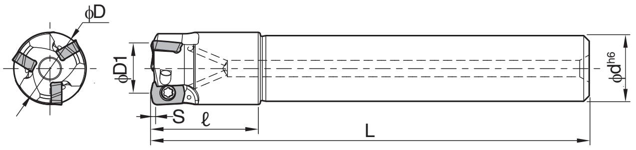


Fig.3

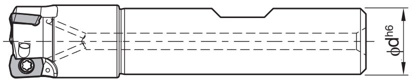


Fig.4

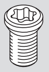
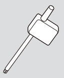
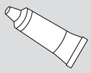
Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Max. ramping angle	A.R.	Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				ϕD	ϕD1	ϕd	L	ℓ	S						
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.

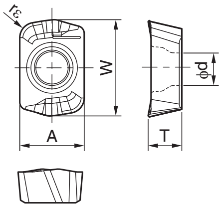
■ **Max. Revolution**
When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.

Spare Parts

Description	Spare Parts		
	Clamp Screw	Wrench	Anti-seize Compound
			
MFH...-01-...	SB-1840TRP	FTP-6	MP-1

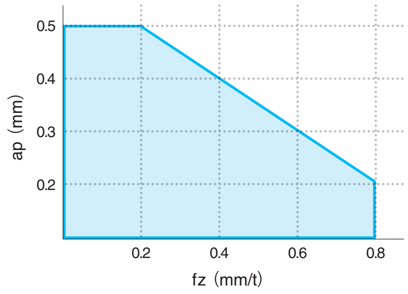
● : Std. Item

Applicable Inserts ➔ M13

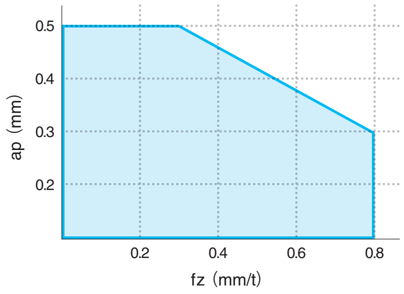
Insert		Description	Dimension (mm)					MEGACOAT NANO		CVD Coated Carbide
			A	T	ϕd	W	rε	PR1535	PR1525	CA6535
 General purpose		LPGT 010210ER-GM	4.19	2.19	2.1	6.26	1.0	●	●	●

Cutting Performance

Cutter Dia. : ϕ8~ϕ12



Cutter Dia. : ϕ14~ϕ16



Recommended Cutting Conditions

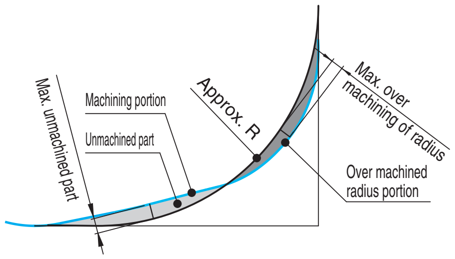
Insert Type	Workpiece Material	Toolholder Description and Feed Rate (fz [mm/t]) * Recommended feed rate (Reference value) : ap=0.3mm					Recommended Insert Grades (Cutting Speed Vc : m/min)		
		MFH08- …-1T	**MFH10- …-2T**	**MFH12- …-3T**	**MFH14- …-3T**	**MFH16- …-4T**	MEGACOAT NANO		CVD Coated Carbide
							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	-

* 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.

★1st Recommendation ☆2nd Recommendation

● : Std. Item

Note for Machining Program (Approx. R)

Shape	Approx. R (mm)	Max. over machining of radius (mm)	Max. unmachined part (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. ϕD (mm)	8	10	12	14	16
MFH…-01-…	Max. ramping angle α_{max}	4.0°	3.0°	2.0°	1.5°	1.2°
	tan α_{max}	0.070	0.052	0.035	0.026	0.021

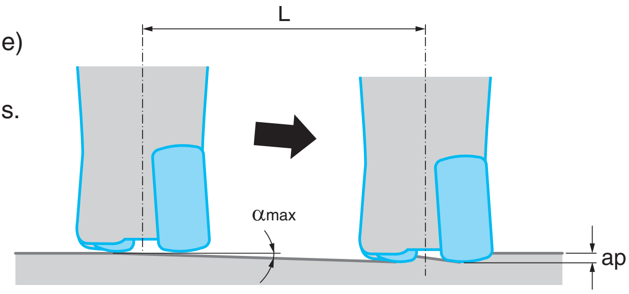
Decrease ramping angle if chips become excessively long

Guide for Ramping (Slant Milling)

Guide for Ramping (Slant Milling)
Ramping angle should be under α_{max} (Maximum ramping angle) in the above cutting conditions.
Feed rate should be under 70% of the above cutting conditions.

Formula of the cutting length "L" at Max. ramping angle

$$L = \frac{ap}{\tan \alpha_{max}}$$

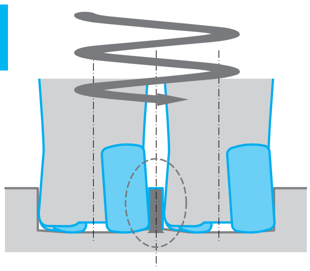


Guide for Helical milling

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

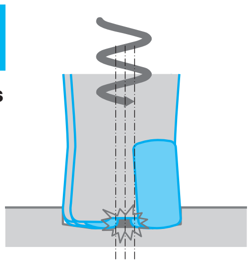
Exceeding Max. Cutting Dia.

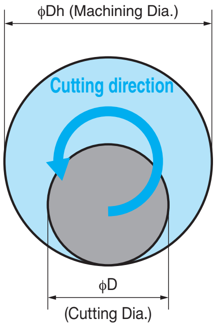
Center core part remains after machining



Under Min. Cutting Dia.

Center core part interferes with toolholder



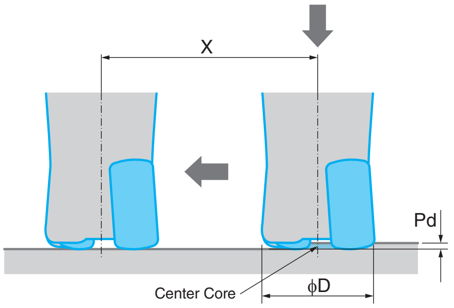


Description	Min. Cutting Dia. ϕDh1	Max. Cutting Dia. ϕDh2
MFH…-01-…	2×D-3.5	2×D-2

Unit：mm

- Sinking depth at helical milling should be under Max. ap (0.5mm).
- 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



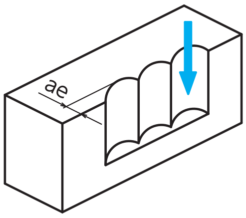
Description	GM	
	Max. Cutting Depth Pd	Min. cutting length X for flat bottom surface
MFH…-01-…	0.5	ϕD-3.5

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	1.7mm

·For vertical milling (plunging), reduce feed rate to fz=0.2mm/t or less.

Multi-Function Machining End Mill MEY

Pocketing | Drilling | Shouldering | Deep Slotting | Facing

MEY


Standard


Long Head


Long Shank

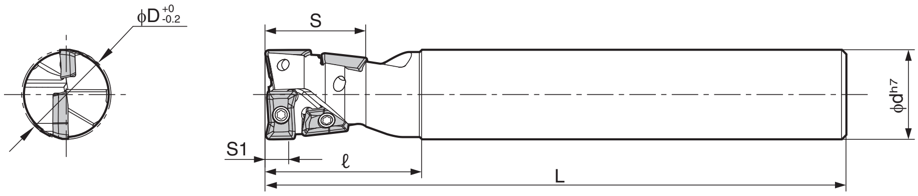


Fig.1

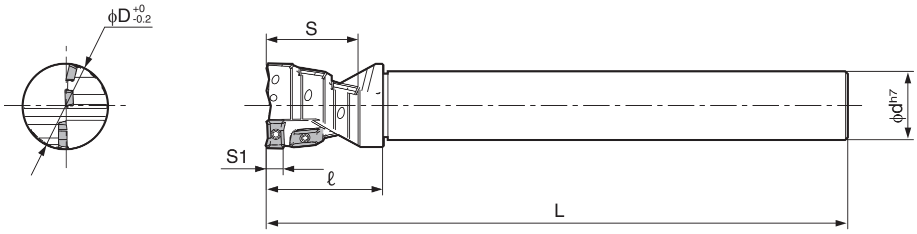


Fig.2

Toolholder Dimensions

Description		Std.	No. of Inserts	No. of Flutes	Dimension (mm)						Rake Angle		Drawing	Spare Parts		
					φD	φd	L	ℓ	S	S1	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	MP-1
	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	MP-1
	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	MP-1
	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	
Weldon	MEY 16-S16-80W-H	●	4	2	16	16	80	31	19	4.5	+11°	-11°		SB-2040TRG	DTM-6	MP-1
	17-S16-80W-H	●			17											
	20-S20-85W-H	●			20	20	85	35	22	6	+13°	-9°		SB-2555TRG	DT-8	
	21-S20-85W-H	●			21											
	25-S25-95W-H	●			25	25	95	40	28	7.5		-11°		SB-3070TRG	DT-10	
	26-S25-95W-H	●			26											
	32-S32-110W-H	●			32	32	110	50	36	9.5		-9°		SB-4070TRG	DT-15	
	33-S32-110W-H	●			33											
	40-S32-130W-H	●	7		40		130	55	42	7.5		-11°		SB-3070TRG	DT-10	
	50-S40-140W-H	●			50	40	140	70	54	9.5		-9°		SB-4070TRG	DT-15	

- S1 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 ➡ M19			
					
		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		PVD Coated Carbide
	Drilling	Shouldering Slotting	**PR1225**	**PR1210**	**PR830**
Carbon Steel	0.08~0.15	0.05~0.25	★ 120~250	-	☆ 120~200
Alloy Steel	0.08~0.15	0.05~0.25	★ 100~220	-	☆ 100~180
Mold Steel	0.08~0.12	0.05~0.15	★ 80~180	-	☆ 80~150
Stainless Steel	0.08~0.12	0.05~0.15	★ 120~220	-	☆ 100~180
Cast Iron	0.05~0.20	0.05~0.25	-	★ 100~220	-

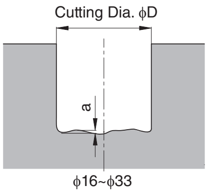
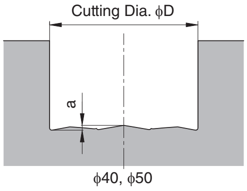
★ : 1st Recommendation ☆ : 2nd Recommendation

Caution of drilling

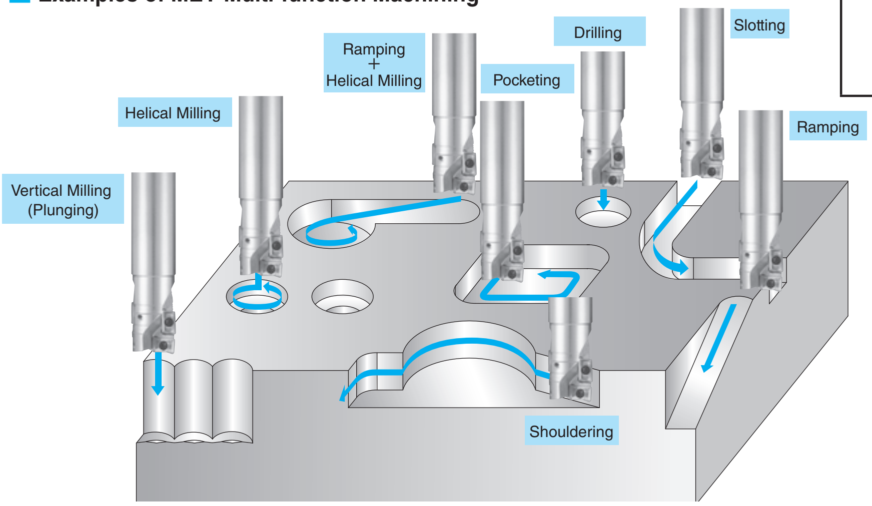
(1) Drilling conditions should be calculated as one flute line.
(2) Use compressed air during drilling.
(3) Carbon steel other than low carbon steel can be drilled to a depth of 0.5D without step feeding.
For soft steel or sticky material such as stainless steel, step feed drilling (0.5-1.0mm) is recommended.
(4) For stainless steel drilling, coolant is recommended.
(5) Please refer to right list for maximum hole depth.

Cutting Dia. (ϕD)	Max. hole depth (mm)
ϕ16	13
ϕ17	13
ϕ20	17
ϕ21	17
ϕ25	22
ϕ26	22
ϕ32	29
ϕ33	29
ϕ40	36
ϕ50	40

Shape of the bottom of the drilled hole

Cutting Dia.	a (mm)	Shape of the bottom
ϕ16, ϕ17	0.5	
ϕ20, ϕ21	0.64	
ϕ25, ϕ26	0.85	
ϕ32, ϕ33	1.12	
ϕ40	1.54	
ϕ50	1.65	

Examples of MEY Multi-function Machining



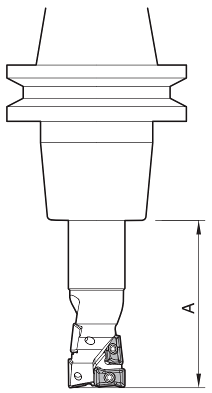
Multi-Function Machining End Mill MEY

Cutting Performance of MEY

〔Workpiece Material：S50C〕

Cutting Dia.	Description	Overhang Length A (mm) ■	▨	□
φ16	**MEY16-S16**	31	[~61]	(Not Recommended)
	MEY16-S16-140H	-	~61	[~91]
	MEY16-S16-190	-	61	~91
φ17	**MEY17-S16**	31	[~61]	(Not Recommended)
	MEY17-S16-190	31	~61	~91
φ20	**MEY20-S20**	35	[~65]	(Not Recommended)
	MEY20-S20-150H	-	~65	[~95]
	MEY20-S20-200	-	65	~95
φ21	**MEY21-S20**	35	[~65]	(Not Recommended)
	MEY21-S20-200	35	~65	~95

When using in [ ] dimension, be careful that the chucking length to the shank may get too short.

Cutting Dia.	Description	Overhang Length A (mm) ■	▨	□	Shape
φ25	**MEY25-S25**	40	[~70]	(Not Recommended)	 A
	MEY25-S25-170H	-	70	[~100]	
	MEY25-S25-220	-	~80	~100	
φ26	**MEY26-S25**	40	[~70]	(Not Recommended)	
	MEY26-S25-220	40	~70	~100	
φ32	**MEY32-S32**	50	[~80]	(Not Recommended)	
	MEY32-S32-180H	-	~80	[~110]	
	MEY32-S32-230	-	90	~110	
φ33	**MEY33-S32**	50	[~80]	(Not Recommended)	
	MEY33-S32-230	50	~80	~110	
φ40	**MEY40-S32**	55	[~85]	[~115]	
	MEY40-S32-240	55	~85	~115	
φ50	**MEY50-S42**	70	[~100]	[~130]	
	MEY50-S42-250	70	~100	~130	

Description

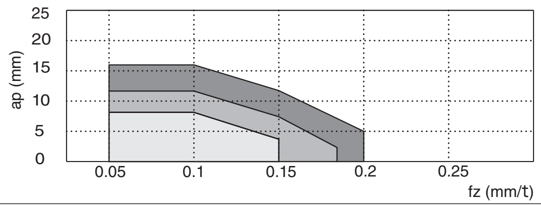
■ Shouldering (Cutting width ae = φD/2)

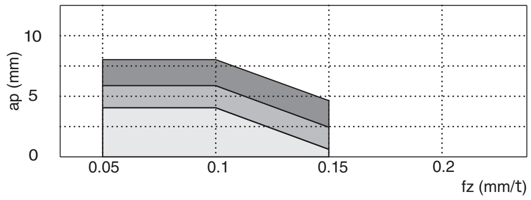
Note) ▨ Part ae = φD/4

■ Slotting

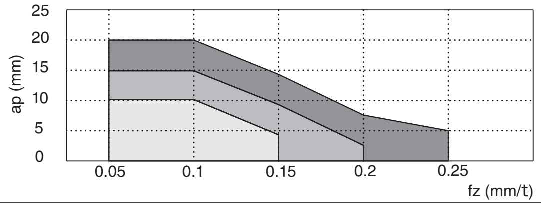
■ Ramping and Helical Milling

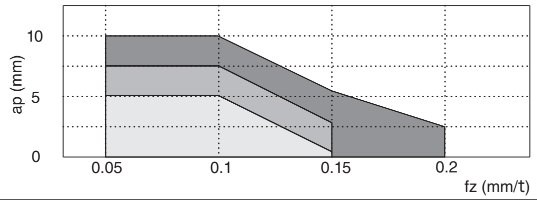
MEY16-S16
MEY17-S16



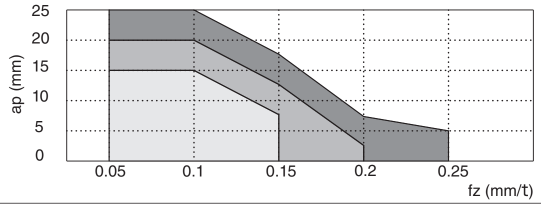


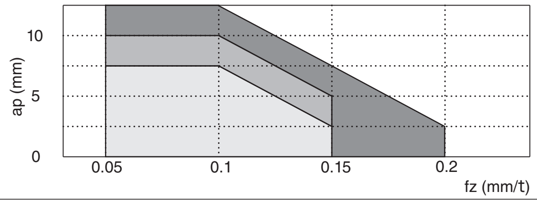
MEY20-S20
MEY21-S20



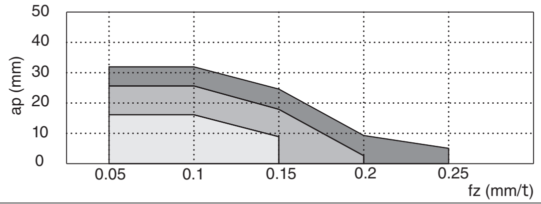


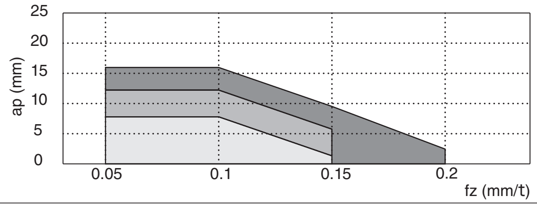
MEY25-S25
MEY26-S25



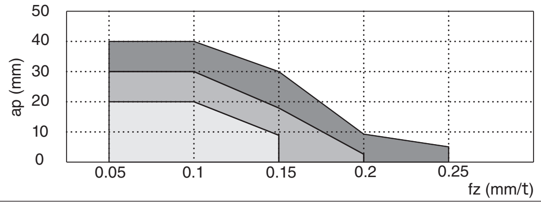


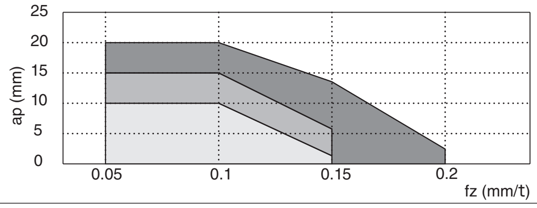
MEY32-S32
MEY33-S32



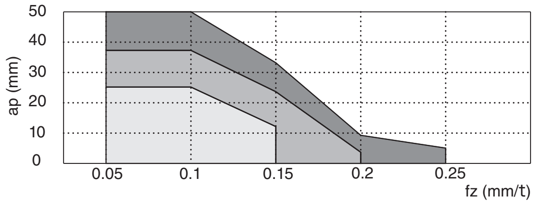


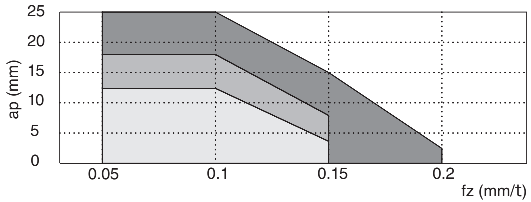
MEY40-S32





MEY50-S42

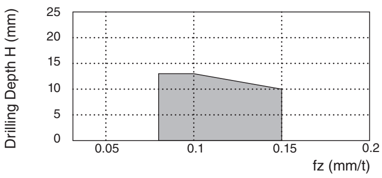




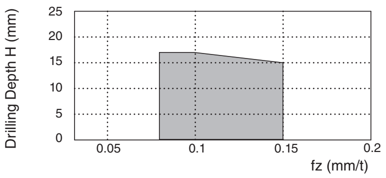
M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

Drilling [Standard / Long Head / Long Shank: S50C]

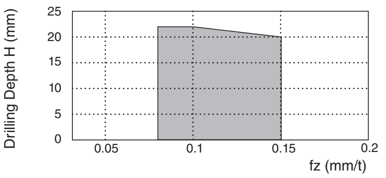
MEY16-S16
MEY17-S16



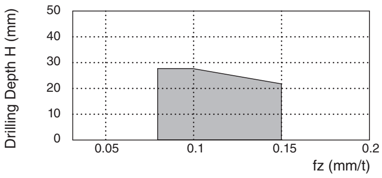
MEY20-S20
MEY21-S20



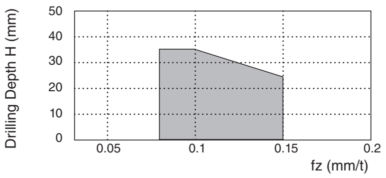
MEY25-S25
MEY26-S25



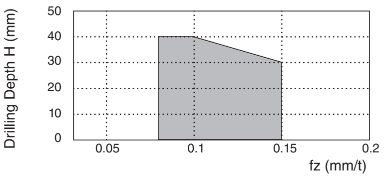
MEY32-S32
MEY33-S32



MEY40-S32



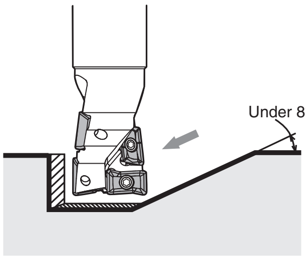
MEY50-S42

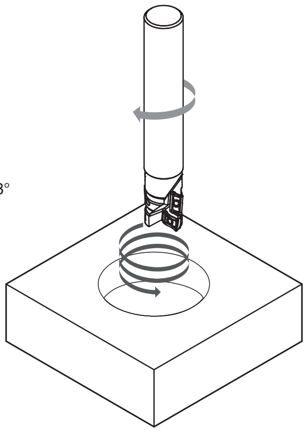


How to Use MEY Effectively

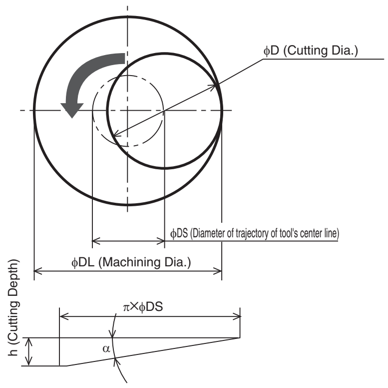
Ramping / Helical Milling

- **Ramping angle is recommended to be under 8°.**
- **Sinking depth at helical milling should be set under 1/2 of the tool diameter.**
  Use compressed air during machining.





Helical Milling Factors



ϕDS(How to find diameter of trajectory of tool's center line)

$\phi DS=\phi DL-\phi D$

h (How to find "h")

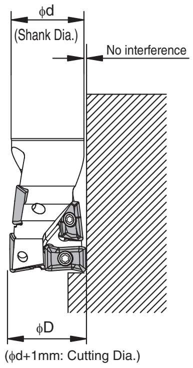
$h=\pi\times\phi DS\times\tan\alpha$

(α should be under 8°)

Shouldering

- **Tools with 1mm larger cutting diameter than shank diameter are available.**
  High wall shouldering is possible.
- **Lineup** (mm)

Description	ϕD	ϕd
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

Pocketing | Drilling | Shouldering | Deep Slotting | Facing

MEZ-G


Standard


Long Shank / Long Head

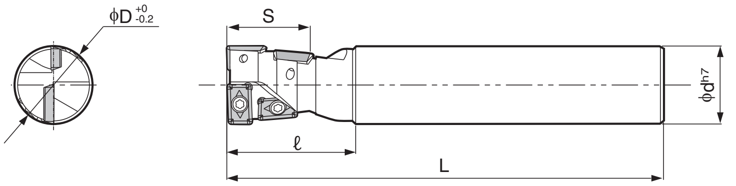


Fig.1

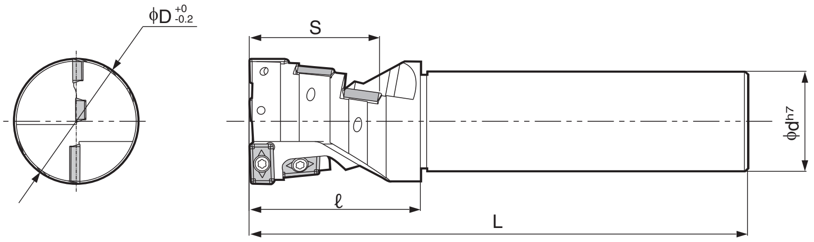
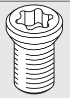
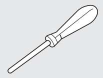


Fig.2

Toolholder Dimensions

Description		Std.	No. of Inserts	No. of Flutes	Dimension (mm)					Rake Angle		Drawing	Spare Parts		Ref. to Page for Applicable Inserts ➡ M20
													Clamp Screw	Wrench	
					ϕD	ϕd	L	ℓ	S	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☐

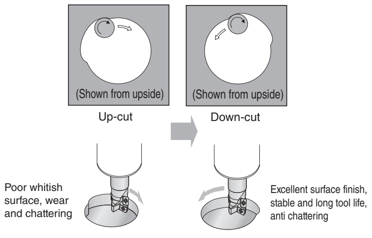
Recommended Cutting Conditions

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.

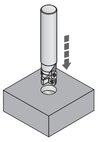
- Down-cut milling is recommended for the improvement of tool life and surface finish.
- Compressed air is recommended.



How to use MEZ-G effectively

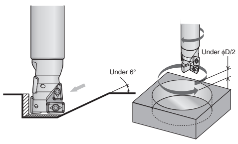
Drilling

- **Step feeding is recommended for good chip control. (Depth approx. 1mm)**
- **Drill depth should be under 0.5D. (D:Drilling Dia.) Use compressed air during machining.**



Ramping / Helical Milling

- **Ramping angle is recommended to be under 6°.**
- **Plunge depth per revolution when helical milling should be under 1/2D. Use compressed air during machining.**



End Milling

- **Tough edge insert is recommended for high load end milling. (High feed rate, large ap) Use a low cutting force insert to prevent chattering.**

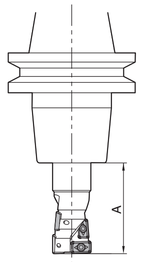

N(D/E)MT...ER-DH **(Tough Edge)**


N(D/E)MT...ER-D **(Low Cutting Force)**

● : Std. Item

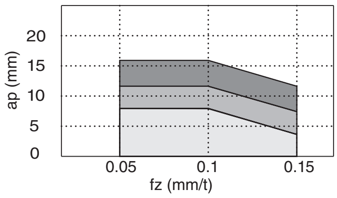
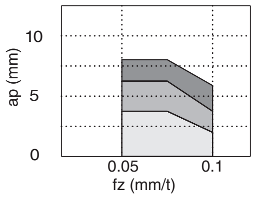
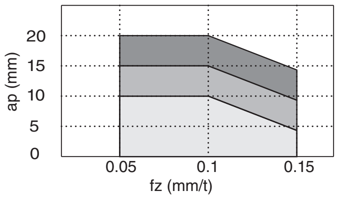
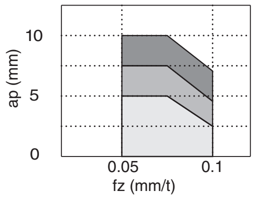
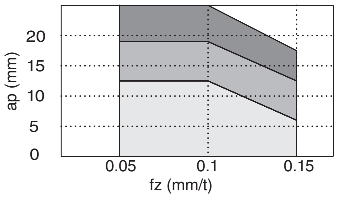
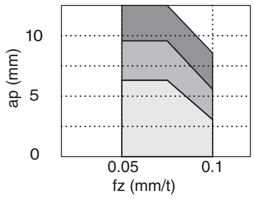
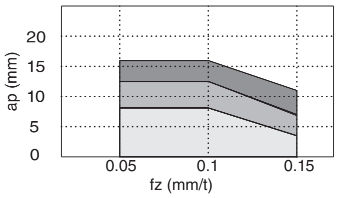
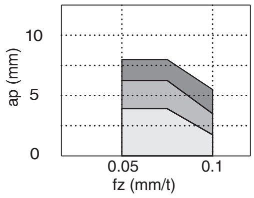
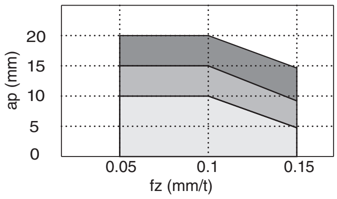
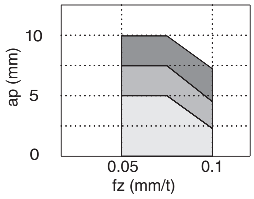
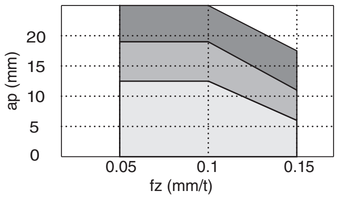
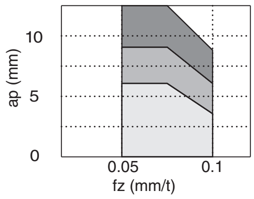
Cutting Performance of MEZ-G

〔Workpiece Material：S50C〕

Cutting Dia.	Description	Overhang Length A (mm)			Cutting Dia.	Description	Overhang Length A (mm)			Shape
		■	▨	□			■	▨	□	
φ16	**MEZ16-S16G**	31	[~61]	(Not Recommended)	φ32	**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	
φ20	**MEZ20-S20G**	33	[~63]	(Not Recommended)	φ39	**MEZ40-S32G**	55	[~85]	[~115]	
	MEZ20-S20-150HG	-	~63	[~93]		**-**	-	-	-	
	MEZ20-S20-200G	-	63	~93		**MEZ40-S32-240G**	55	~85	~115	
φ25	**MEZ25-S25G**	40	[~70]	(Not Recommended)	φ49	**MEZ50-S42G**	70	[~100]	[~130]	
	MEZ25-S25-170HG	-	70	[~100]		**-**	-	-	-	
	MEZ25-S25-220G	-	80	~100		**MEZ50-S42-250G**	70	~100	~130	

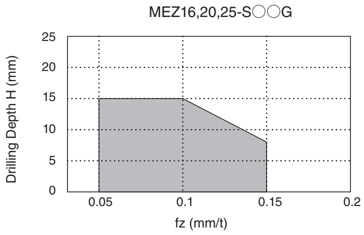
When using in [ ] dimension, be careful that the chucking length to the shank may get too short.

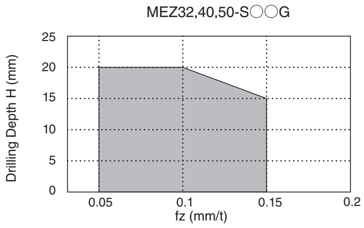
Shouldering / Slotting

Description	■ Shouldering (Cutting width ae = φD/2) Note) □ Part ae = φD/4	■ Slotting ■ Ramping and Helical Milling
MEZ16-S16G		
MEZ20-S20G		
MEZ25-S25G		
MEZ32-S32G		
MEZ40-S32G		
MEZ50-S42G		

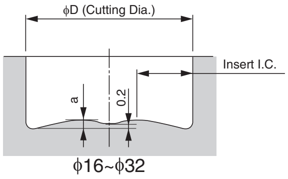
Drilling

■ Drilling
(Standard / Long Head / Long Shank)



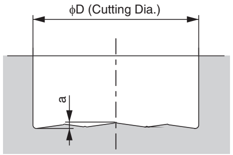


Shape of the bottom of the drilled hole
(φ16~φ49)



φ16~φ32

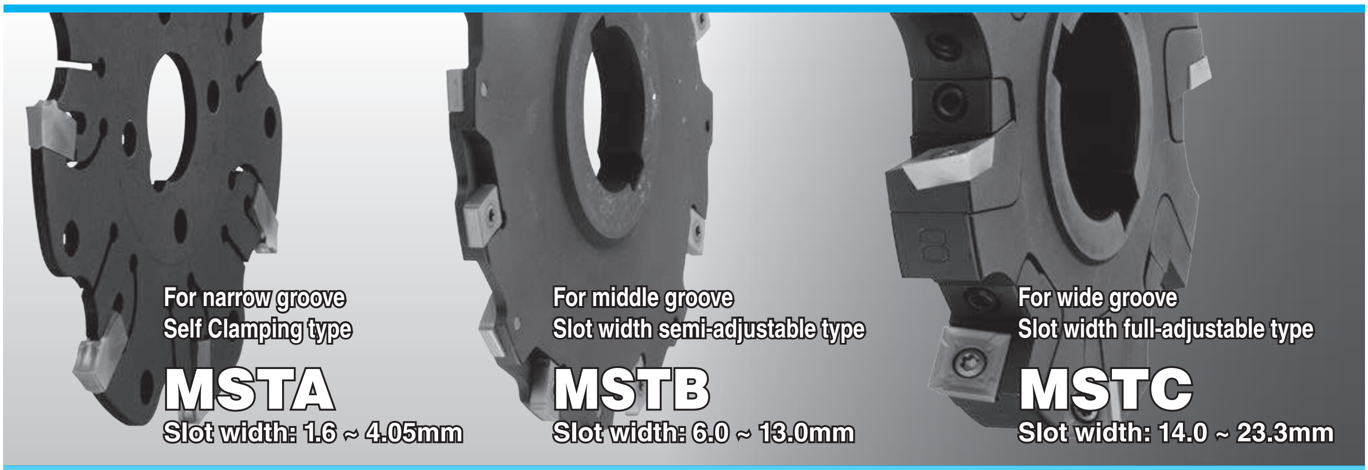
Cutting Dia.	φ16	φ20	φ25	φ32
a (mm)	0.30	0.33	0.38	0.45



φ39,φ49

Cutting Dia.	φ39	φ49
a (mm)	0.68	0.74

Slot Mill MST



For narrow groove
Self Clamping type
MSTA
Slot width: 1.6 ~ 4.05mm

For middle groove
Slot width semi-adjustable type
MSTB
Slot width: 6.0 ~ 13.0mm

For wide groove
Slot width full-adjustable type
MSTC
Slot width: 14.0 ~ 23.3mm

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					↔	↔	↔	↔						
MSTC	SP..10T3..	14~18mm full-adjustable									↔	↔	↔			
	SD..1204...	18~23.3mm full-adjustable												↔	↔	↔

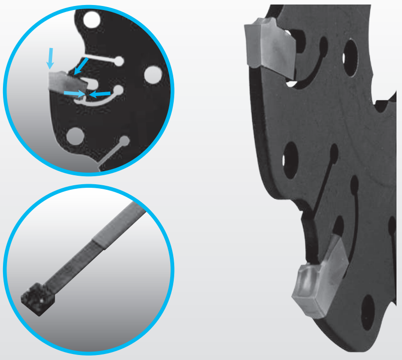
* Adjustable in 0.5mm increments between 6mm and 13mm with the combination of inserts

* Adjustable between 14mm and 18mm

* Adjustable between 18mm and 23.3mm

Slot Mill MSTA (Slot width 1.6, 2.2(2.25), 3.05, 4.05mm)

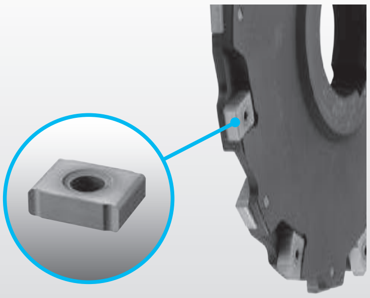
- Self-clamping type Slot Mill
  MSTA Slot Mills have simple self-clamping system to allow for easy attachment by just installing the insert.
- High Rigidity Clamping System
  Owing to the high rigidity clamping system - with an end - stopper, the toolholder enable high operability and stable slotting by maintaining an accurate edge position.
- Double-Prism Clamping System
  High replacement precision due to 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.

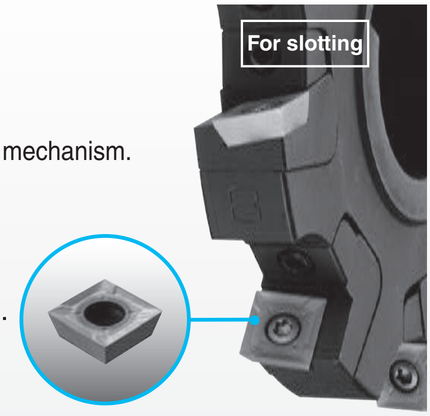
Slot Mill MSTB (Slot width 6.0~13.0mm)

- 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 4-edge Insert
- 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.

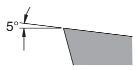
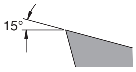
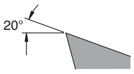
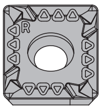
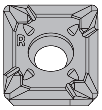
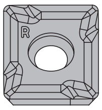


Slot Mill MSTC (Slot width 14.0~23.3mm)

- 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
- Wide range corner-R repertories are 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			
Shape			

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

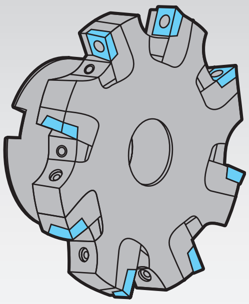
·TiN+TiCN+TiN based Multi-layer PVD Coated Carbide
·For Carbon Steel, Alloy Steel, Stainless Steel, Heat-resistant Alloys and Cast Iron.
·For middle speed machining.

PR0110

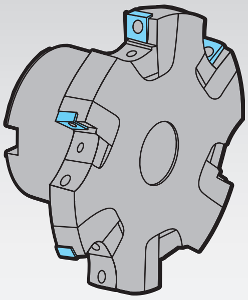
·TiB_2 based PVD Coated Carbide
·For Non-ferrous Metals such as Aluminum Alloys (Si<10%) and Titanium Alloys.
·For high speed machining.

With Boss

Right-hand



Left-hand



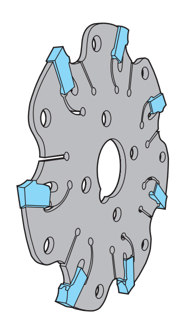
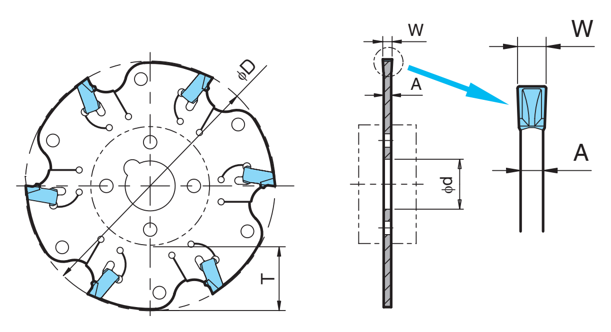
Slot Mill MSTA (Self-clamping type)

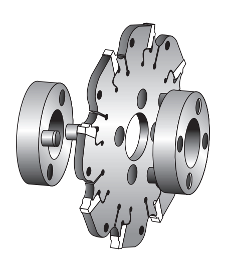
Identification System

MSTA Slot Mill

MSTA	○○○	N	○○○-○○	T
Self-clamping type Slot Mill	Cutting Dia.	Neutral	Edge Width	No. of Inserts

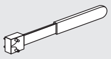
MSTA (Metric)



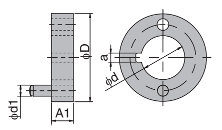
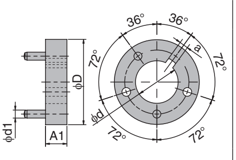
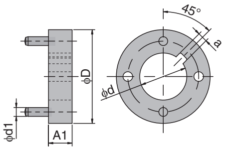
Drive Ring (sold separately)
Assembly Example

Toolholder Dimensions

Description		Std.	Edge Width W (mm)	Slot Depth T (mm)	No. of Inserts	Dimension (mm) φD	Dimension (mm) φd (H7)	Dimension (mm) A	Weight (kg)	Applicable Inserts ➡ M144	Max. Revolution (min^{-1})	Spare Parts Wrench 	Recommended Cutting Conditions	Applicable Arbor
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 **→M145**	**M145**	**M165**
	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 singulary.
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.

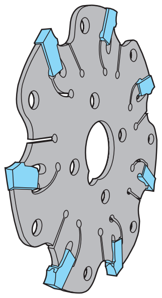
Drive Ring (For Metric)

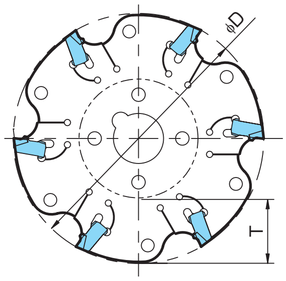
Shape			Description	Std.	Dimension (mm) φd	Dimension (mm) φD	Dimension (mm) A1	Dimension (mm) a	Dimension (mm) φd1	Drawing	Applicable Toolholders	
 Fig.1	 Fig.2	 Fig.3	**DR16-32A**	●	16	32	8	4.1	3	Fig.2	**MSTA**	**63N16-5T** **63N22-7T**
			DR16-32B	●					4	Fig.1	**MSTA**	**63N30-4T** **63N40-4T**
			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**

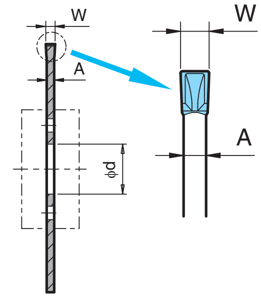
● : Std. Item

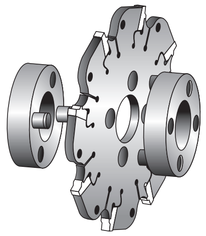
Wrenches and drive rings are sold in 1 piece per 1 box.

MSTA (inch spec)









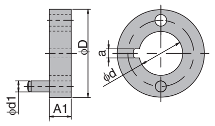
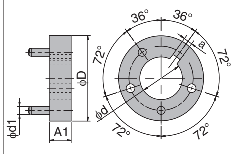
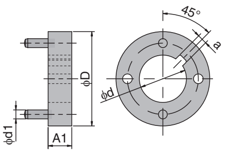
Drive Ring (sold separately)
Assembly Example

Toolholder Dimensions

Description		Std.	Edge Width	Slot Depth	No. of Inserts	Dimension (inch)			Weight (kg)	Applicable Inserts ➡ **M144**	Max. Revolution (min⁻¹)	Spare Parts	Recommended Cutting Conditions	Applicable Arbor
			W (inch)	T (inch)		ϕD	ϕd (H7)	A				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 →**M145**	**M145**	**M165**
	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 singulary.
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	Std.	Dimension (inch)					Drawing	Applicable Toolholders
			ϕd	ϕD	A1	a	ϕd1		
 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 per 1 box.

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

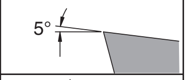
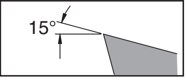
(3) Corner-R (rε)

Symbol	Corner-R (rε)
15	0.15mm
20	0.2mm

(4) Edge Preparation

Symbol	Edge Preparation
S	Chamfered + R-honed

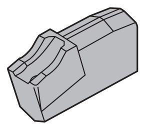
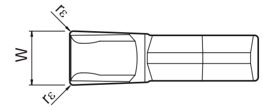
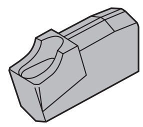
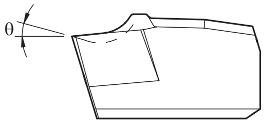
(5) Chipbreaker Symbol

Symbol	Rake Angle
KB	
KD	

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		

Insert		Description	Dimension (mm)		Rake Angle	CVD Coated Carbide	PVD Coated Carbide	Ref. to Page for Applicable Toolholders
			W	rε	θ	**CA0835**	**PR0735**	
		**SLT 16-15SKB**	1.6 $^{+0}_{-0.1}$	0.15	5°	●	●	**M142** **M143**
		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.

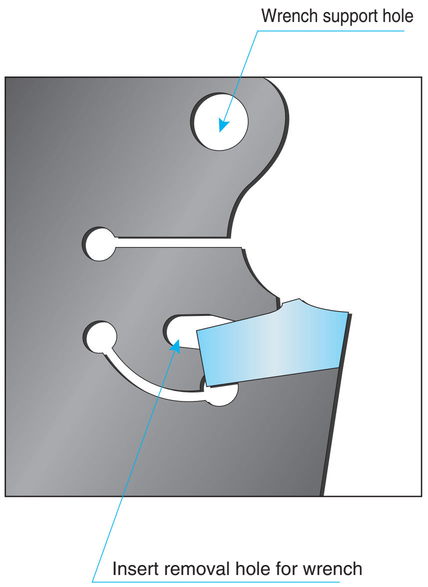
PR0735

- TiN base PVD Coated Carbide
- For Stainless Steel, Heat-resistant Alloys, etc
- For low to middle speed machining

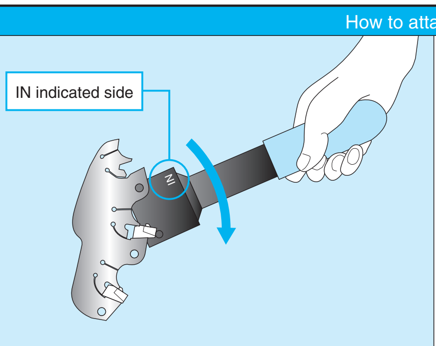
● : Std. Item

Inserts are sold in 10 piece boxes

Set up

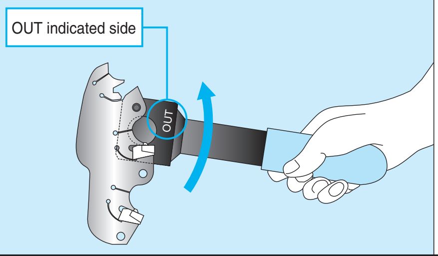


How to attach inserts



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



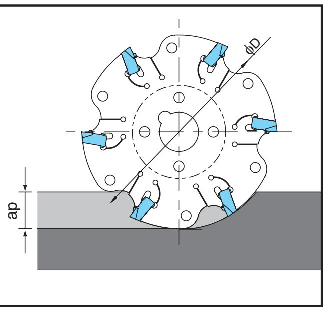
1. Insert one of the pins on the wrench (on **OUT** indicated side) into the wrench support hole, and insert other pin into the insert releasing hole.
2. Insert can be uninstalled by rotating the wrench counterclockwise. (A magnet is installed on **OUT** indicated side.)

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	SCM, SCr, etc. (Annealed)	180	140〜180	110〜150	0.03〜0.12	0.04〜0.14	0.06〜0.18	0.08〜0.20	
	SCM, SCr, etc. (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	SUS304, SUS316, SUH310, etc.	220	150〜190	80〜120	0.03〜0.10	0.04〜0.12	0.06〜0.16	0.08〜0.18	
	SUS403, SUS410, SUH430F, etc.	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 under 1/10 of Cutter Dia.(ϕD), it is possible to increase feed per tooth fz) 40%.



Slot Mill MSTB

Slotting Slotting Cut-Off

M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

Identification System

MSTB Slot Mill

Metric

MSTB ○○○ A N ○○○○ - ○ T

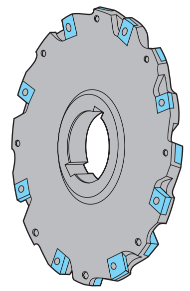
- MSTB: Slot Mill with Up-right Insert
- ○○○: Cutting Dia. (mm)
- A: Without Boss / S: With Boss
- N: Neutral
- ○○○○: Edge Width (mm)
- ○: No. of Flutes

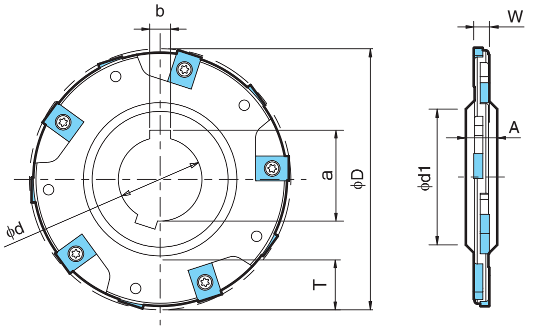
Inch spec

MSTB ○○○○ A N ○○○ - ○ T

- MSTB: Slot Mill with Up-right Insert
- ○○○○: Cutting Dia (inch)
- A: Without Boss
- N: Neutral
- ○○○: Min. Edge Width (inch)
- ○: 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)

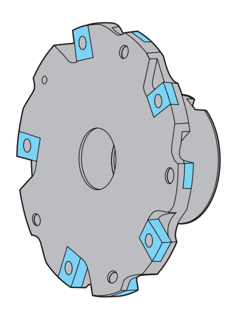
Description	Std.	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)						Weight (kg)	Max. Revolution (min^{-1})
		W (min.)	W (max.)	T (mm)			ϕD	ϕd (H7)	ϕd1	A	a	b		
MSTB 80AN0607-4T	●	6	7	15	8	4	80	27	44	12	29.8	7	0.3	9,240
100AN0607-5T	●			21	10	5	100	32	52		34.8	8	0.4	8,270
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

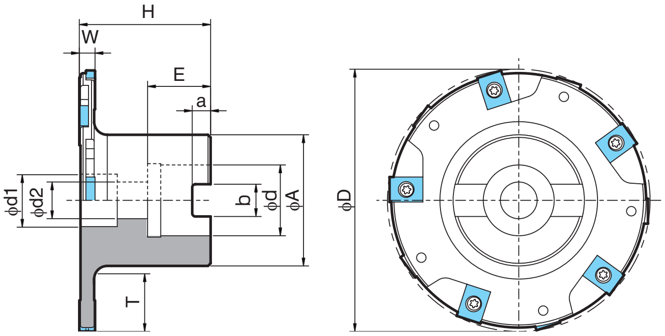
Toolholder Dimensions (inch spec)

Description	Std.	Edge Width (inch)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (inch)						Weight (kg)	Max. Revolution (min^{-1})
		W (min.)	W (max.)	T (inch)			ϕD	ϕd (H7)	ϕd1	A	a	b		
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		Std.	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)									Weight (kg)	Max. Revolution (min^{-1})
			W (min.)	W (max.)	T (mm)			φD	φd (H7)	φA	H (min.)	E	a	b	φd1	φd2		
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) H (min.) dimension shows in case of minimum of edge width.

Spare Parts and Applicable Inserts

Spare Parts

Description				Spare Parts				Applicable Inserts	Recommended Cutting Conditions	Applicable Arbor
				Clamp Screw	Wrench	Anti-seize Compound	Mounting bolt			
Metric	Without Boss	**MSTB**	**○○○AN0607-○T**	SE-40050TRN	TT-15L	MP-1	-	**LN12... M148,M149**	**M150**	**M165**
			○○○AN0809-○T	SE-40068TR						
			○○○AN1011-○T							
			160AN1213-5T	SE-40090TR						
	With Boss	**MSTB**	**80SN0607-4T**	SE-40050TRN	TT-15L	MP-1	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-15L	MP-1	-			
			○○○○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 type Insert

Inserts Identification System

LNEU	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 (rε)

Symbol	Corner-R (rε)
03	0.3mm
04	0.4mm

(5) Edge Preparation

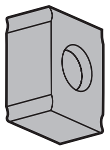
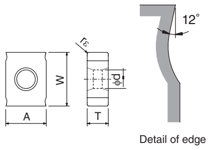
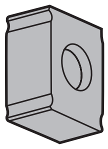
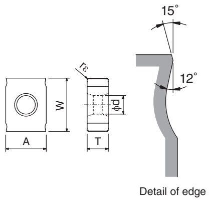
Symbol	Edge Preparation
S	Chamfered + R-honed

LN

(mm)

Description	W	A
LNEU12	12.7	9.52

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	○

Insert		Description	Usable edges	Dimension (mm)			PVD Coated Carbide	Applicable Clamp Screw	Ref. to Page for Applicable Toolholders	Ref. to Page for Recommended Cutting Conditions
				T	ϕd	rε	PR0725			
 Honed		**LNEU 1235-03-4**	4	3.5	4.4	0.3	●	**SE-40050TRN**	**M146 M147**	**M150**
		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. Ref. to page **M149** 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

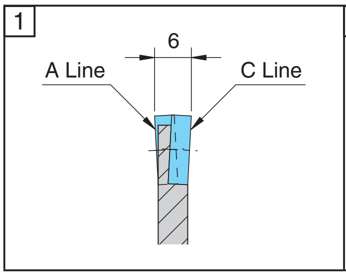
Combination of Applicable Inserts

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**	SE-40050TRN	6	-	LNEU1235..	SE-40050TRN	-	-	LNEU1235..	SE-40050TRN	TT-15L	3
			6.5						LNEU1240..	SE-40055TR		
	○○○SN0607-○T		7		LNEU1240..	SE-40055TR						
	MSTB ○○○AN0809-○T	SE-40068TR	8	-	LNEU1245..	SE-40068TR	-	-	LNEU1245..	SE-40068TR		
			8.5						LNEU1250..	SE-40080TR		
	○○○SN0809-○T		9		LNEU1250..	SE-40080TR						
	MSTB ○○○AN1011-○T	SE-40068TR	10	-	LNEU1245..	SE-40068TR	LNEU1245..	SE-40068TR	LNEU1245..	SE-40068TR		
			10.5						LNEU1250..	SE-40080TR		
	○○○SN1011-○T		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

1



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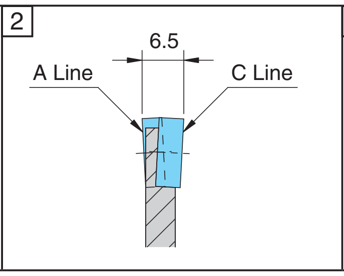

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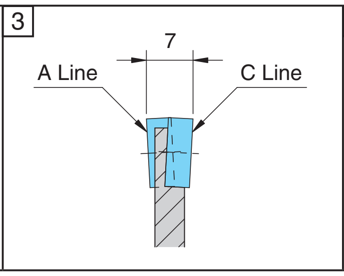

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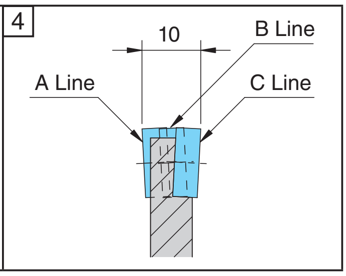


- **The slot width (edge width) of MSTB slot mills is adjustable by a maximum of 1mm (.039'') with the combination of inserts.**

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.

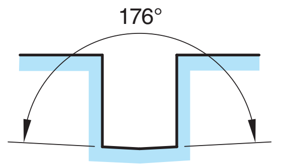


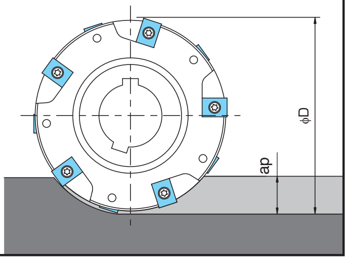
Fig.1 Convex bottom shape

Slot Mill MSTB

◆ 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	SCM,SCr, etc. (Annealed)	180	90~120	0.07~0.20	0.10~0.22	
	SCM,SCr, etc. (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	SUS304,SUS316,SUH310, etc.	220	110~140	0.05~0.18	0.08~0.20	Coolant
	SUS403,SUS410,SUH430F, etc.	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 under 1/10 of Cutter Dia.(ϕD), it is possible to increase feed per tooth (fz) 40%.



Slot Mill MSTC

Identification System

MSTC Slot Mill

Metric

MSTC ○○○ A N ○○○○ - ○○ - ○○ T

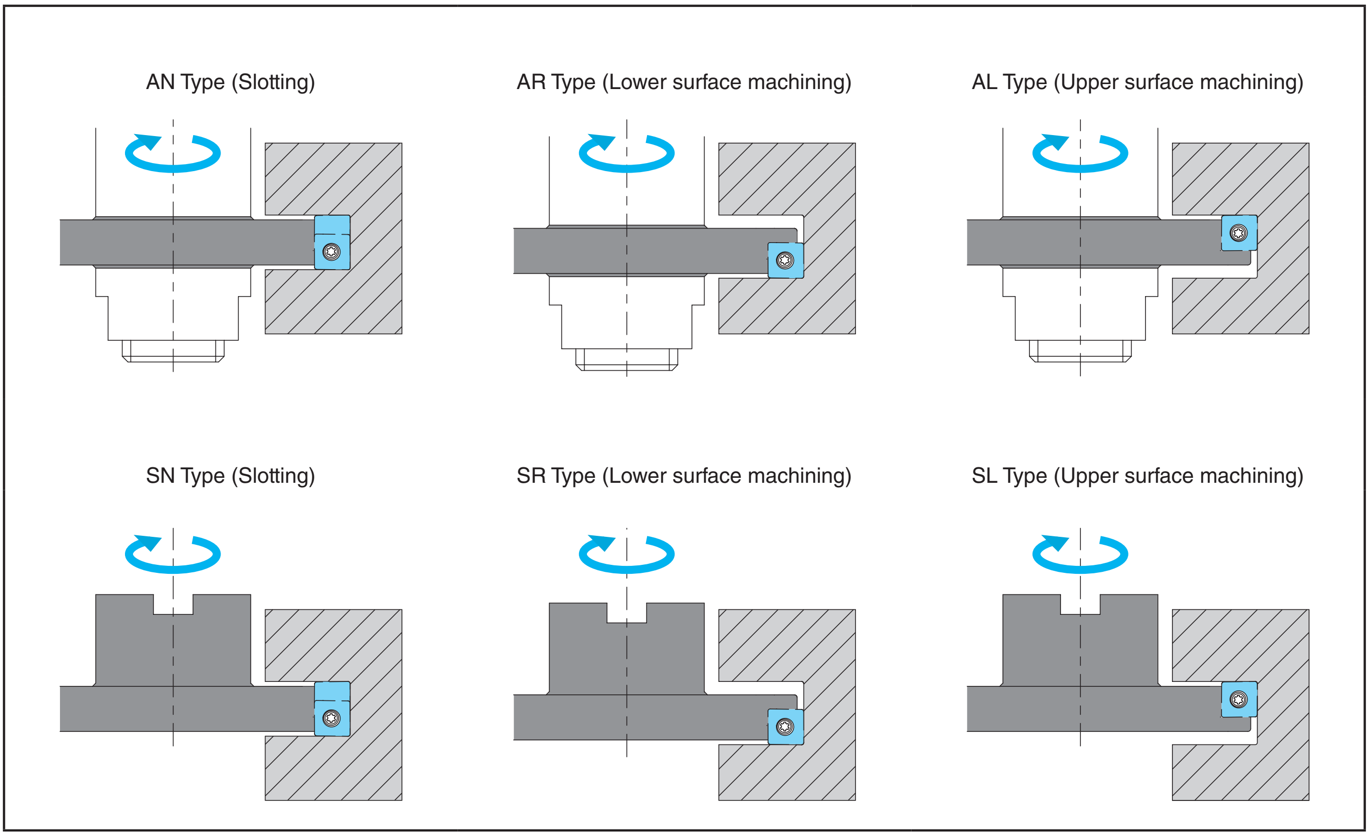
- MSTC: Slot Mill with Lay-down type
- ○○○: Cutting Dia. (mm)
- A: Without Boss
S: With Boss
- N: Neutral
R: Right-hand
L : Left-hand
- ○○○○: Edge Width (mm)
- ○○: Applicable Inserts
10 : SP..10T3..
12 : SD..1204..
- ○○: No. of Inserts

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)

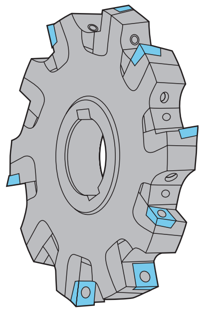
SR Type (Lower surface machining)

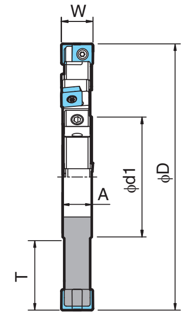
SL Type (Upper surface machining)

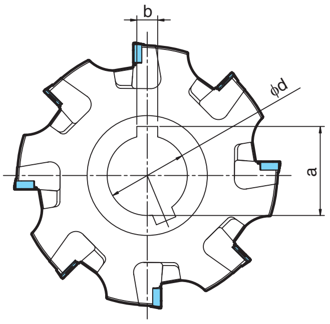
Slot Mill

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)

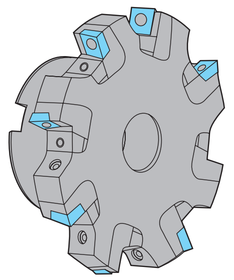
Description	Std.	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)						Weight (kg)	Max. Revolution (min^{-1})
		W (min.)	W (max.)	T (mm)			ϕD	ϕd (H7)	ϕd1	A	a	b		
MSTC 100AN1416-10-3T	●	14	16	25.9	6	3	100	32	46.8	13.9	34.8	8	0.5	17,250
125AN1416-10-4T	●			34.4	8	4	125	40	54.8		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	20.7	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	●	21	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	Std.	Edge Width (inch)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (inch)						Weight (kg)	Max. Revolution (min^{-1})
		W (min.)	W (max.)	T (inch)			ϕD	ϕd (H7)	ϕd1	A	a	b		
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 (23.2mm)	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



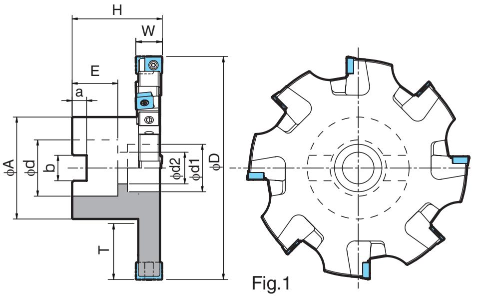


Fig.1

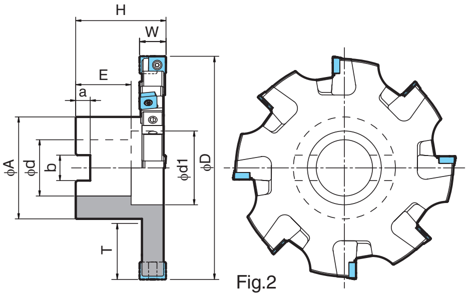


Fig.2

Toolholder Dimensions (Metric)

Description	Std.	Edge Width (mm)		Slot Depth	No. of Inserts	No. of Edge Lines	Dimension (mm)									Drawing	Weight (kg)	Max. Revolution (min^{-1})
		W (min.)	W (max.)	T (mm)			φD	φd (H7)	φA	H (min.)	E	a	b	φd1	φd2			
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	20.7	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	●	20.7	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

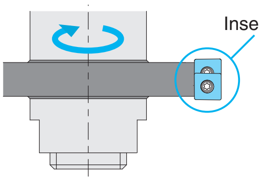
Note) H (min.) dimension shows in case of minimum of edge width.

Recommended Cutting Conditions ➔ **M162**

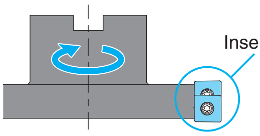
Applicable Insert Installation Method (common to Metric / Inch spec)

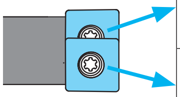
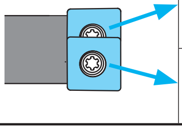
When installing handed inserts, it is necessary to equip same number of right-hand and left-hand inserts as shown in "No. of Edge Lines" respectively. Please Install as show in the figure below.

MSTC...AN... (Without Boss)



MSTC...SN... (With Boss)



Description	Insert Location Indication	Applicable Inserts ➔ **M160-M161**	
		Handed Inserts	Neutral inserts
MSTC...AN...10.. MSTC...SN...10..		**SP..10T3...L...**	**SP..10T3...N...**
		SP..10T3...R...	
MSTC...AN...12.. MSTC...SN...12..		**SD..1204...L...**	**SD..1204...N...**
		SD..1204...R...	

Spare Parts (common to Metric / Inch spec)

- For spare parts, ref. to page **M158**

Slot width (edge width) adjustment

- Ref. to page **M162~M164**

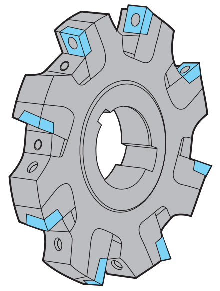
Applicable Arbor

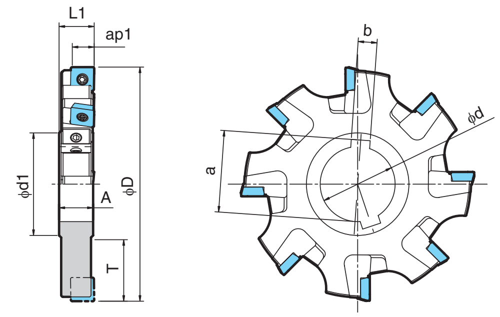
- Ref. to page **M165**

● : 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)

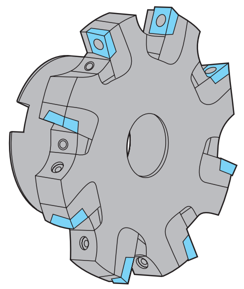
Description	Std.	No. of Inserts	Dimension (mm)										Weight (kg)	Max. Revolution (min^{-1})
			ϕD	ϕd (H7)	ϕd1	A	L1 (min.)	L1 (max.)	T	ap1 (max.)	a	b		
MSTC 100AR1416-10-6T	○	6	100	32	46.8	13.9	13.9	14.9	25.9	9.1	34.8	8	0.5	17,250
125AR1416-10-8T	○	8	125	40	54.8				34.4		43.5	10	0.8	15,450
160AR1416-10-10T	○	10	160						51.9				1.5	13,650
MSTC 125AR1618-10-8T	○	8	125			15.9	15.2	16.2	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

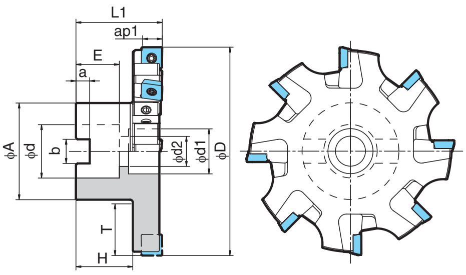
Toolholder Dimensions (inch spec)

Description	Std.	No. of Inserts	Dimension (inch)										Weight (kg)	Max. Revolution (min^{-1})
			ϕD	ϕd (H7)	ϕd1	A	L1 (min.)	L1 (max.)	T	ap1 (max.)	a	b		
MSTC 400AR551-630-10	○	6	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.75mm)	.545 (13.84mm)	.548 (13.92mm)	.588 (14.94mm)	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 (15.93mm)	.667 (16.94mm)	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 (22.04mm)	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

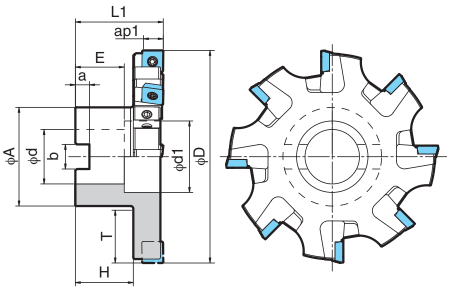


Fig.2

Toolholder Dimensions (Metric)

Description	Std.	No. of Inserts	Dimension (mm)													Drawing	Weight (kg)	Max. Revolution (min^{-1})
			φD	φd (H7)	φA	H	L1 (min.)	L1 (max.)	T	ap1 (max.)	E	a	b	φd1	φd2			
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)

Description	Applicable Inserts ➡ **M160-M161**	
	Handed Inserts	Neutral inserts
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 ➡ **M162**

Spare Parts (common to Metric / Inch spec)

・For spare parts, ref. to page **M159**

Slot width (edge width) adjustment

・Ref. to page **M162~M164**

Applicable Arbor

・Ref. to page **M165**

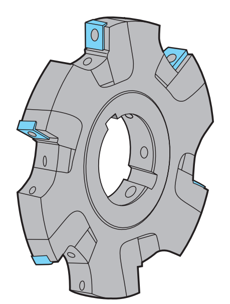
○ : Check Availability

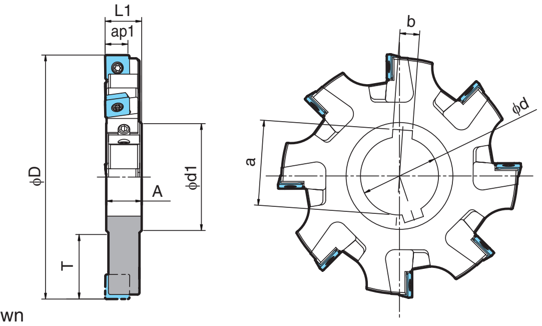
Half Side Slot Mill

Shoulderning

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)

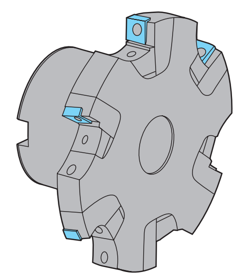
Description		Std.	No. of Inserts	Dimension (mm)										Weight (kg)	Max. Revolution (min^{-1})
				φD	φd (H7)	φd1	A	L1 (min.)	L1 (max.)	T	ap1 (max.)	a	b		
MSTC	**100AL1416-10-6T**	○	6	100	32	46.8	13.9	13.9	14.9	25.9	9.1	34.8	8	0.5	17,250
	125AL1416-10-8T	○	8	125	40	54.8				34.4		43.5	10	0.8	15,450
	160AL1416-10-10T	○	10	160						51.9				1.5	13,650
MSTC	**125AL1618-10-8T**	○	8	125			15.9	15.2	16.2	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

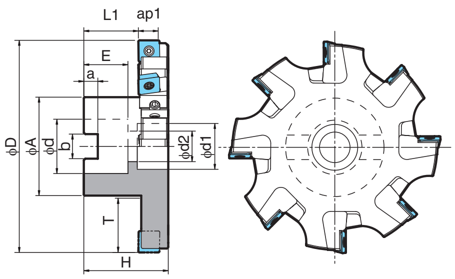
Toolholder Dimensions (inch spec)

Description		Std.	No. of Inserts	Dimension (inch)										Weight (kg)	Max. Revolution (min^{-1})
				φD	φd (H7)	φd1	A	L1 (min.)	L1 (max.)	T	ap1 (max.)	a	b		
MSTC	**400AL551-630-10**	○	6	4.000 (101.6mm)	1.250 (31.75mm)	1.880 (47.75mm)	.545 (13.84mm)	.548 (13.92mm)	.588 (14.94mm)	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 (15.93mm)	.667 (16.94mm)	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 (22.04mm)	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

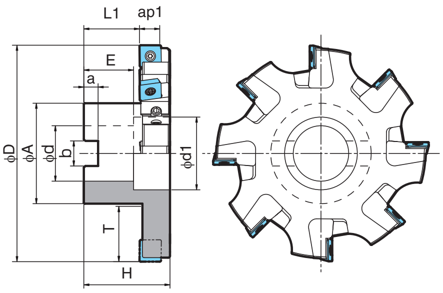


Fig.2

Toolholder Dimensions (Metric)

Description		Std.	No. of Inserts	Dimension (mm)													Drawing	Weight (kg)	Max. Revolution (min^{-1})
				φD	φd (H7)	φA	H	L1		T	ap1 (max.)	E	a	b	φd1	φd2			
								(min.)	(max.)										
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)

Description	Applicable Inserts ➡ **M160-M161**	
	Handed Inserts	Neutral inserts
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 ➡ **M162**

Spare Parts (common to Metric / Inch spec)

- For spare parts, ref. to page **M159**

Slot width (edge width) adjustment

- Ref. to page **M162~M164**

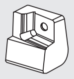
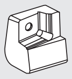
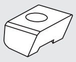
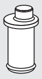
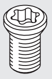
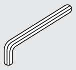
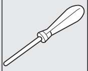
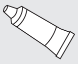
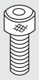
Applicable Arbor

- Ref. to page **M165**

○ : Check Availability

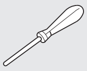
Slot Mill

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	MP-1	-
		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	MP-1	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	MP-1	HH16X35
		160SN1820-12-5T											-
		MSTC 125SN2123-12-4T	C90SD2023-12R	C90SD2023-12L	WC-20								HH16X35
		160SN2123-12-5T											-

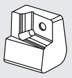
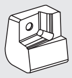
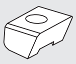
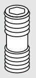
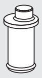
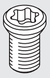
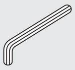
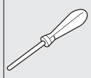
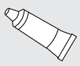

Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

Tightening Torque

Wrench	TH-3L	DTP-9	DTP-15
			
Tightening Torque (N･m)	5~6	1.5	4

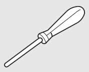
Half Side Slot Mill

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**	**100AR1416-10-6T**	C90SP1416-10R	-	WC-14	W6X18	AP-1416	SE-3070TRP	TH-3L	LW-2.5	DTP-9	MP-1	-
			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	MP-1	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

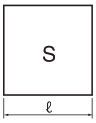
Wrench	TH-3L	DTP-9	DTP-15
			
Tightening Torque (N·m)	5~6	1.5	4

Slot Mill MSTC

Inserts Identification System

Symbol	Shape
S	Square
(1) Shape	

Symbol	Tolerance		
	Corner Height	Thickness	I.C. Size
C	±0.013mm	±0.025mm	±0.025mm
E	±0.025mm		
(3) Tolerance			



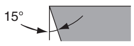
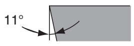
(5) Edge Length

Symbol	Corner-R(rε)
16	1.6mm
12	1.2mm
08	0.8mm
(7) Corner-R(rε)	

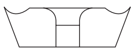
Symbol	Hand of Tool
N	Neutral
L	Left-hand
R	Right-hand
(9) Hand of Tool	

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	 15°
P	 11°

(4) Hole / Chipbreaker

Symbol	Shape
T	 Single-sided chipbreaker, with hole

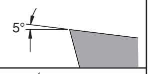
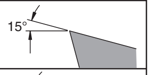
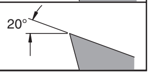
(6) Thickness

Symbol	Thickness
T3	3.97mm
04	4.76mm

(8) Edge Preparation

Symbol	Edge Preparation
E	Honed
F	Sharp Edge
S	Chamfered + R-honed

(10) Chipbreaker Symbol

Symbol	Rake Angle
SB	 5°
SD	 15°
SE	 20°

SP..10T3

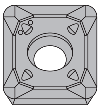
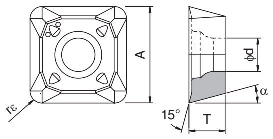
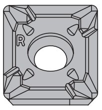
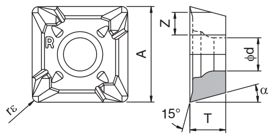
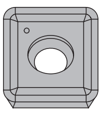
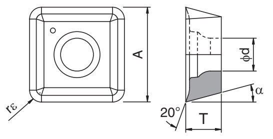
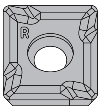
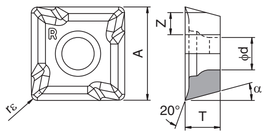
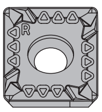
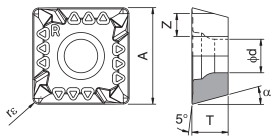
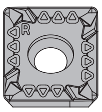
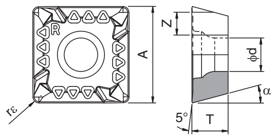
Applicable Inserts

(mm)

Description	A	T	ϕd	α
SP..10T3	10.0	3.97	3.4	11°

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	
				rε	Z (Wiper Edge)	CA0835	PR0725	PR0110
		**SPCT 10T316EN-SD**	4	1.6	-		●	
 With Wiper Edge		**SPCT 10T308ER/L-SD**		0.8	2.5		●	
		10T312ER/L-SD		1.2	1.8		●	
 Sharp Edge		**SPCT 10T316FN-SE**		1.6	-			●
 Sharp Edge / With Wiper Edge		**SPCT 10T308FR/L-SE**		0.8	2.7			●
		10T312FR/L-SE		1.2	2.2			●
 With Wiper Edge		**SPET 10T308ER/L-SB**		0.8	2.7	●	●	
 Tough Edge / With Wiper Edge		**SPET 10T308SR/L-SB**		0.8	2.7	●	●	

● : Std. Item

Inserts are sold in 10 piece boxes

SD..1204

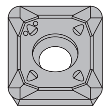
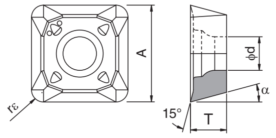
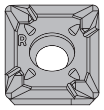
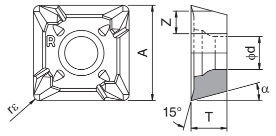
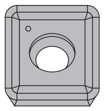
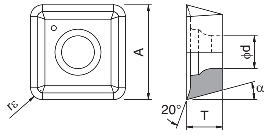
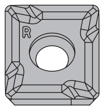
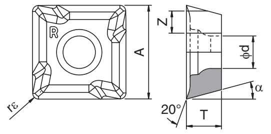
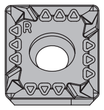
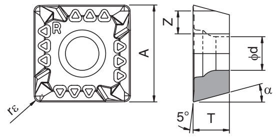
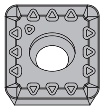
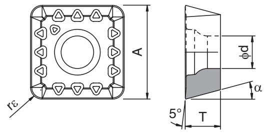
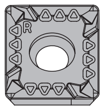
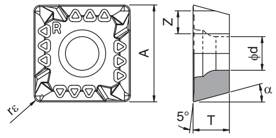
Applicable Inserts

(mm)

Description	A	T	ϕd	α
SD..1204	12.7	4.76	4.4	15°

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		●	
S	Titanium Alloys		●	○

Insert		Description	Usable edges	Dimension (mm)		CVD Coated Carbide	PVD Coated Carbide	
Handed Insert shows Right-hand				rε	Z (Wiper Edge)	CA0835	PR0725	PR0110
		**SDCT 120416EN-SD**	4	1.6	-		●	
 With Wiper Edge		**SDCT 120408ER/L-SD**		0.8	2.5		●	
		120412ER/L-SD		1.2	1.8		●	
 Sharp Edge		**SDCT 120416FN-SE**		1.6	-			●
 Sharp Edge / With Wiper Edge		**SDCT 120408FR/L-SE**		0.8	2.7			●
		120412FR/L-SE		1.2	1.9			●
 With Wiper Edge		**SDET 120408ER/L-SB**		0.8	2.5	●	●	
		120412ER/L-SB		1.2	1.8	●	●	
		**SDET 120416SN-SB**		1.6	-	●	●	
 Tough Edge / With Wiper Edge		**SDET 120408SR/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

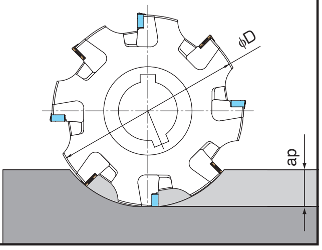
Inserts are sold in 10 piece boxes

Slot Mill MSTC

◆ Recommended Cutting Conditions

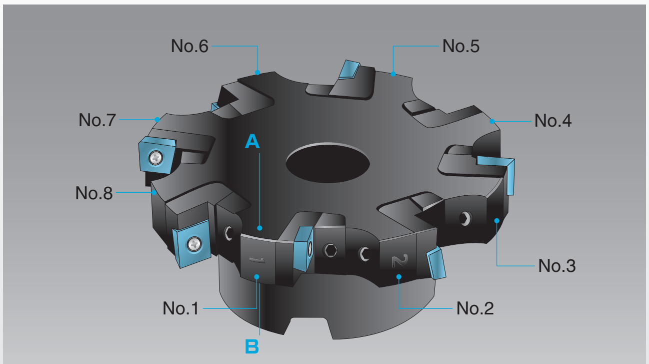
Workpiece Material		Hardness (HB)	Recommended Insert Grades (Cutting Speed Vc: m/min)			fz (mm/t)				Remarks
			CVD Coated Carbide	PVD Coated Carbide		Chipbreaker				
			CA0835	**PR0725**	**PR0110**	EN-SD ER-SD EL-SD	ER-SB EL-SB	SN-SB SR-SB SL-SB	FN-SE FR-SE FL-SE	
Low Carbon Steel	SS400 S10C～S25C	125	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	SCM,SCr, etc. (Annealed)	180	140～180	90～120	-	0.07～0.20	0.10～0.22	0.15～0.3	-	
	SCM,SCr, etc. (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 under 1/10 of Cutter Dia.(ϕD), it is possible to increase feed per tooth (fz) 40%.

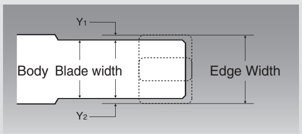


Slot width (edge width) adjustment of MSTC Slot Mill

Slot Width (Edge Width) Measurement and Adjustment



"No.1-No8" 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.

$$\text{Edge Width} = \text{Blade Width} + Y_1 + Y_2$$

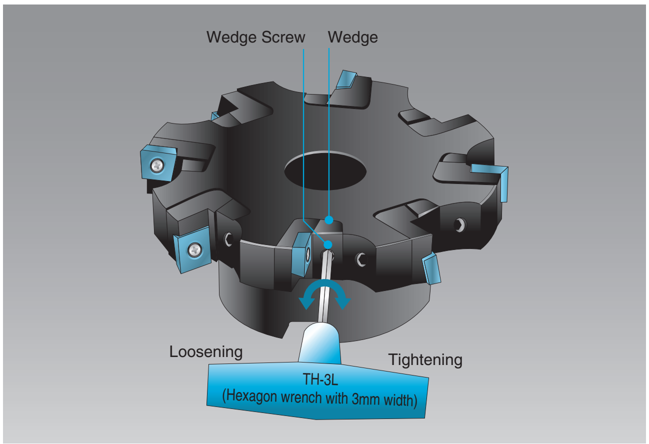
(6) Place the point A of the slot mill body near the position No.1 to "0 (zero)" of the length measuring equipment.

(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)

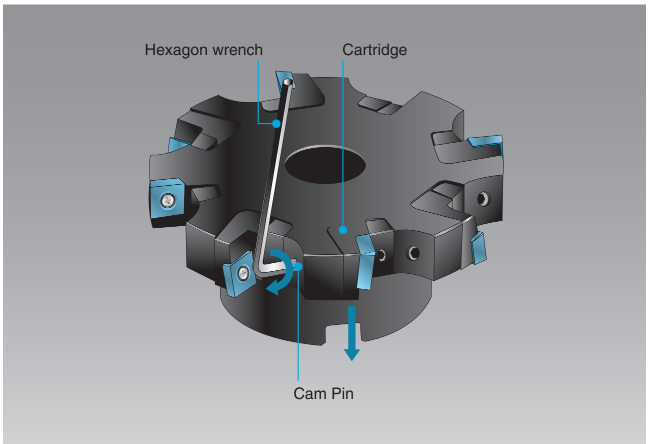


(1) Set up the slot mill on length measuring equipment such as tool presetters.

(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.

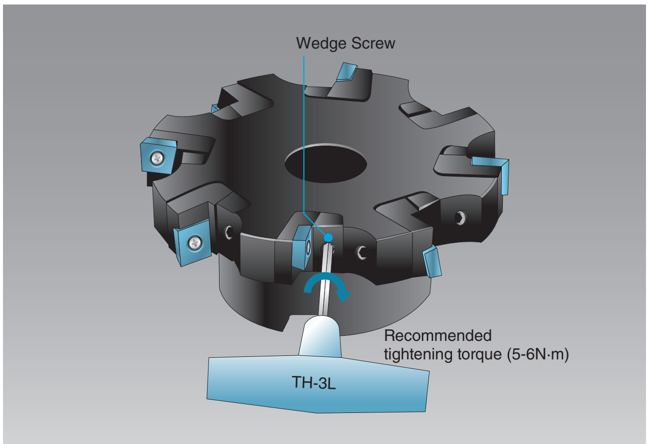


(5) Insert a Hexagon wrench (LW-2.5 or LW-3) into the Cam Pin on the back of the cartridge.

(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.

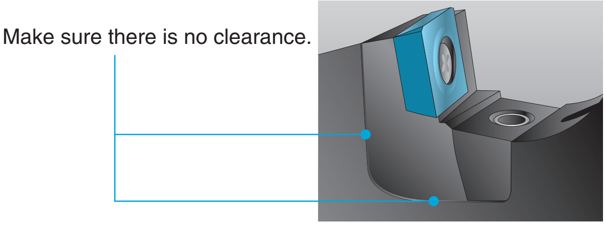
(8) Remove the Hexagon wrench from the Cam Pin.



(9) Insert TH-3L into the Wedge Screw.

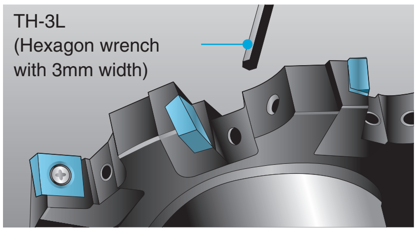
(10) Tighten the Wedge Screw by the torque of 5-6N·m.
(Use a torque wrench to get the correct torque.)

(11) Make sure there is no clearance between the Cartridge and the Slot Mill body.

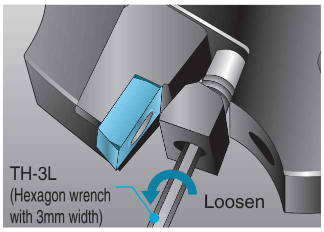


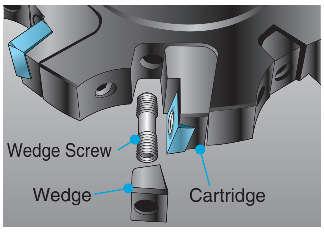
Replacement of the Cartridge

Follow the instruction below to replace the Cartridge.



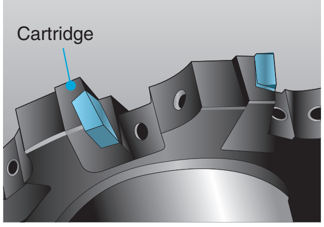
(1) Insert Hexagon wrench with 3mm width (TH-3L) into the Wedge Screw.

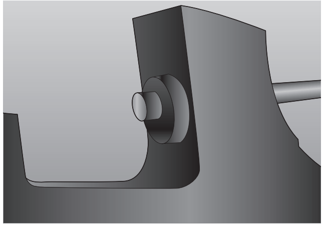




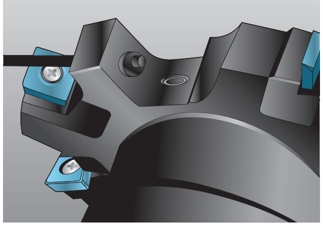
(2) Loosen the Wedge Screw.

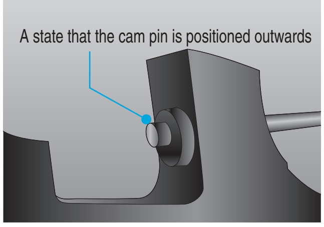
(3) Remove the Wedge Screw and Wedge.



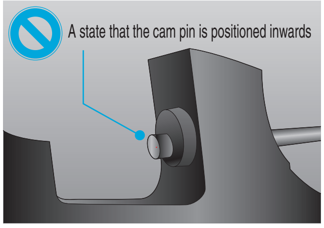


(4) Remove the Cartridge.

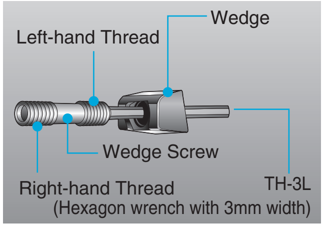


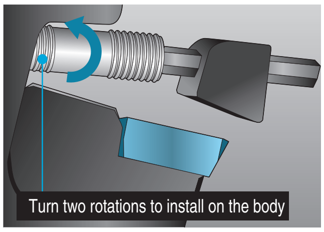


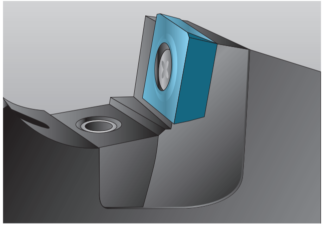
(5) Before replacing the Cartridge, make sure that the Cam Pin is positioned radially-outwards.



(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).

Slot Mill Applicable Arbor

BT Arbor

Type	Ref. to Page	Description		Bore Dia. (ϕd)	BT Arbor				
					BIG	MST	NIKKEN	SHOWA	NT TOOL
Without Boss	M142	**MSTA**	**63N..**	16			BT○○-SCA16..		BT○○-SCA16..
			80N..	16			BT○○-SCA16..		BT○○-SCA16..
			100N..	22			BT○○-SCA22..		BT○○-SCA22..
			125N..	32			BT○○-SCA32..		BT○○-SCA32..
			160N..	40			BT○○-SCA40..		BT○○-SCA40..
	M143	**MSTA**	**02N..**	.625 (15.875)			BT○○-SCA15.875..	BT○○-SCA15.875..	BT○○-SCA15.875..
			03N..	.625 (15.875)			BT○○-SCA15.875..	BT○○-SCA15.875..	BT○○-SCA15.875..
			04N..	1.000 (25.4)	BT○○-SCA25.4..	BT○○-SCA25.4..	BT○○-SCA25.4..	BT○○-SCA25.4..	BT○○-SCA25.4..
			05N..	1.250 (31.75)	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..
			06N..	1.250 (31.75)	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..
	M146	**MSTB**	**80AN..**	27			BT○○-SCA27..		BT○○-SCA27..
			100AN..	32			BT○○-SCA32..		BT○○-SCA32..
			125AN..	40			BT○○-SCA40..		BT○○-SCA40..
			160AN..	40			BT○○-SCA40..		BT○○-SCA40..
		MSTB	**3000AN..**	1.000 (25.4)	BT○○-SCA25.4..	BT○○-SCA25.4..	BT○○-SCA25.4..	BT○○-SCA25.4..	BT○○-SCA25.4..
			4000AN..	1.250 (31.75)	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..
			5000AN..	1.250 (31.75)	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..
			6000AN..	1.500 (38.1)	BT○○-SCA38.1..		BT○○-SCA38.1..	BT○○-SCA38.1..	BT○○-SCA38.1..
	M152 M154 M156	**MSTC**	**100A○..**	32			BT○○-SCA32..		BT○○-SCA32..
			125A○..	40			BT○○-SCA40..		BT○○-SCA40..
			160A○..	40			BT○○-SCA40..		BT○○-SCA40..
		MSTC	**400A○..**	1.250 (31.75)	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..	BT○○-SCA31.75..
			500A○..	1.500 (38.1)	BT○○-SCA38.1..		BT○○-SCA38.1..	BT○○-SCA38.1..	BT○○-SCA38.1..
			600A○..	1.500 (38.1)	BT○○-SCA38.1..		BT○○-SCA38.1..	BT○○-SCA38.1..	BT○○-SCA38.1..
With Boss	M147	**MSTB**	**80SN..**	22	BBT○○-FMC22..		BT○○-FMC22..	BT○○-FMC22..	BT○○-FMC22..
			100SN..	27	BBT○○-FMC27..		BT○○-FMC27..	BT○○-FMC27..	BT○○-FMC27..
			125SN..	40	BBT○○-FMB40..		BT○○-FMB40..	BT○○-FMB40..	BT○○-FMB40..
			160SN..	40	BBT○○-FMB40..		BT○○-FMB40..	BT○○-FMB40..	BT○○-FMB40..
	M153 M155 M157	**MSTC**	**100S○..**	27	BBT○○-FMC27..		BT○○-FMC27..	BT○○-FMC27..	BT○○-FMC27..
			125S○..	32	BBT○○-FMC32..		BT○○-FMC32..	BT○○-FMC32..	BT○○-FMC32..
			160S○..	40	BBT○○-FMB40..		BT○○-FMB40..	BT○○-FMB40..	BT○○-FMB40..

Straight Shank

Type	Ref. to Page	Description		Bore Dia. (ϕd)	Straight Shank				
					BIG	MST	NIKKEN	SHOWA	NT TOOL
Without Boss	M142	**MSTA**	**63N..**	16					
			80N..	16					
			100N..	22					
			125N..	32					
			160N..	40					
	M143	**MSTA**	**02N..**	.625 (15.875)				ST○○-SCA15.875..	
			03N..	.625 (15.875)				ST○○-SCA15.875..	
			04N..	1.000 (25.4)		S○○-SCA25.4..	K○○-SCA25.4..	ST○○-SCA25.4..	
			05N..	1.250 (31.75)				ST○○-SCA31.75..	
			06N..	1.250 (31.75)				ST○○-SCA31.75..	
	M146	**MSTB**	**80AN..**	27					
			100AN..	32					
			125AN..	40					
			160AN..	40					
		MSTB	**3000AN..**	1.000 (25.4)		S○○-SCA25.4..	K○○-SCA25.4..	ST○○-SCA25.4..	
			4000AN..	1.250 (31.75)				ST○○-SCA31.75..	
			5000AN..	1.250 (31.75)				ST○○-SCA31.75..	
			6000AN..	1.500 (38.1)				ST○○-SCA38.1..	
	M152 M154 M156	**MSTC**	**100A○..**	32					
			125A○..	40					
			160A○..	40					
		MSTC	**400A○..**	1.250 (31.75)				ST○○-SCA31.75..	
			500A○..	1.500 (38.1)				ST○○-SCA38.1..	
			600A○..	1.500 (38.1)				ST○○-SCA38.1..	

This table is created, based on companies' catalogues and publications, and not officially approved by those companies.

Ball-nose End Mill


Finishing
Contouring / Profiling


Finishing
Pocketing

MRF / MRFW (Carbide Shank)


MRF Standard Neck

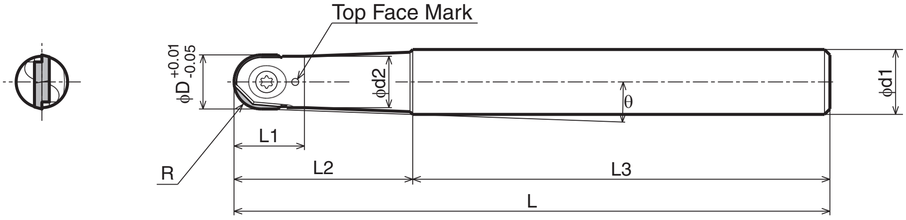


Fig.1


MRF Long Neck

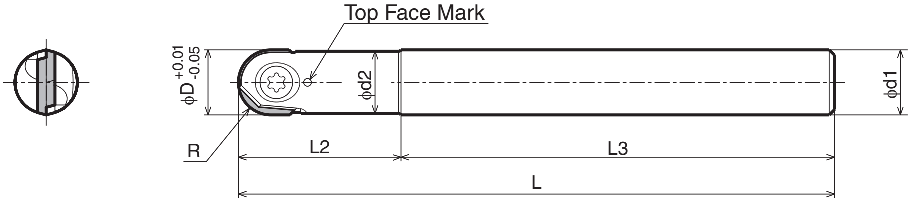
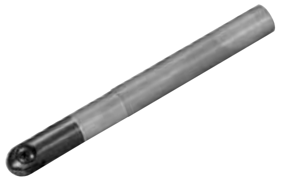


Fig.2


MRFW Carbide Standard Neck

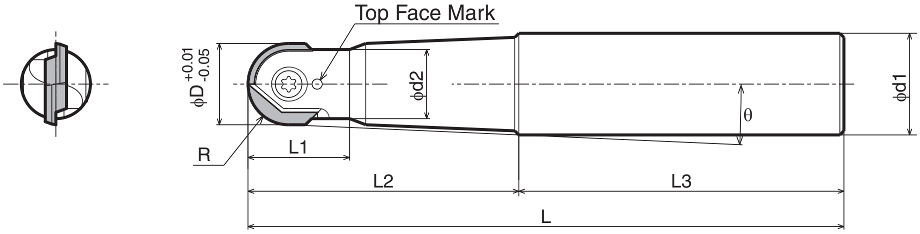


Fig.3


MRFW Carbide Long Neck

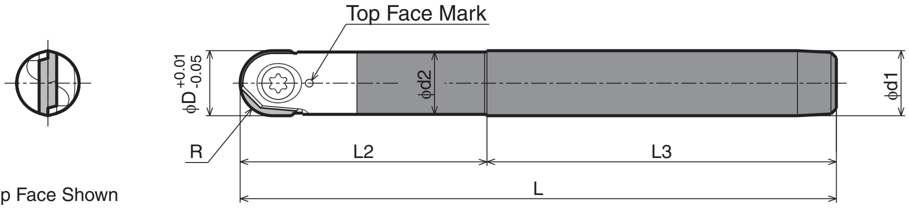
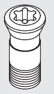
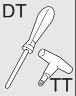
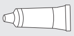


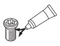
Fig.4
(Carbide Shank)

● Top Face Shown

Toolholder Dimensions

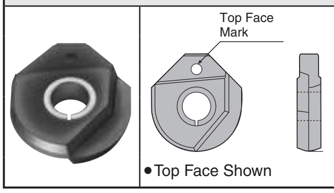
Description			Std.	No. of Inserts	Dimension (mm)									Drawing	Spare Parts			Applicable Inserts ➡ M21
					R	φD	φd1	φd2	L	L1	L2	L3	θ		Clamp Screw 	Wrench DT TT 	Anti-seize Compound 	
Standard Neck	MRF	08-S12	●	1	4	8	12	7.5	100	10	22	78	6˚20'	Fig.1	SC-30067	DT-8	MP-1	RDFG08FR
		10-S12	●		5	10		9.5		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	MP-1	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	MP-1	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	MP-1	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

・θ (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.

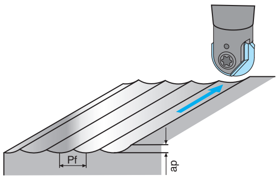
● : Std. Item

Applicable Inserts

Insert	Description
 ●Top Face Shown	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) ap	Depth of Cut (mm) Pf	Applications
Standard Neck	MRF08-S12	0.2 (Max.0.3)	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 (Max.0.3)	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 (Max.0.3)	0.8	
	MRFW10-S10	0.2	1	
	MRFW12-S12	0.5	1.2	
Carbide Long Neck	MRFW08-S08-130	0.2 (Max.0.3)	0.8	
	MRFW10-S10-140	0.2	1	
	MRFW12-S12-150	0.5	1.2	

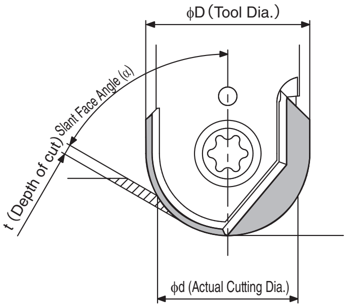
For ϕ8, Holder may be broken because of over load if ap exceeds 0.3mm.

Recommended Cutting Conditions (At Cutting Dia. ϕD)

Workpiece Material	Insert Grades	Vc (m/min)	fz (mm/t)	ϕ8		ϕ10		ϕ12	
				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)	ϕ16		ϕ20		ϕ25	
				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. (ϕD)		ϕ8		ϕ10		ϕ12	
	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. (ϕD)		ϕ16		ϕ20		ϕ25	
	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/mim at the biggest diameter, Vd can be obtained as Vd=150÷4.48=33.5m/min

M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

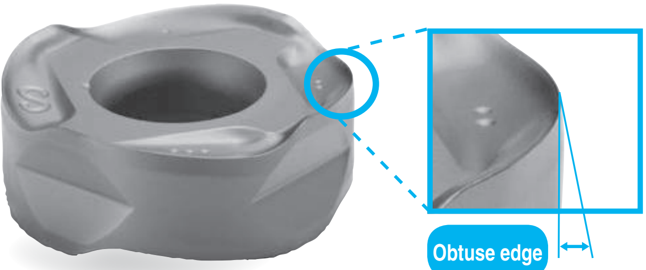
MRW

Economical and high efficiency
New radius cutter with double-sided insert for various types of workpieces

POINT.1 **Economical** Double-sided 8-edge Insert

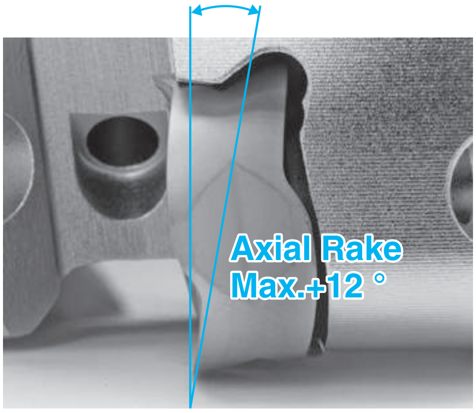
POINT.2 **Combine** sharpness and cutting edge strength

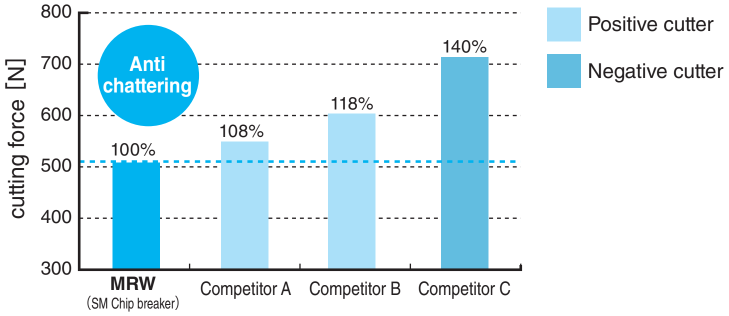
Obtuse edge increases cutting edge toughness



Low cutting force chipbreaker

POINT.3 Helical cutting edge design with **maximum axial rake 12°** reduced low cutting force equivalent to positive inserts

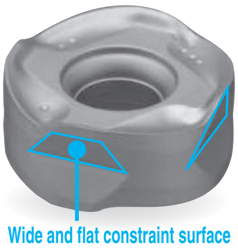




<Cutting Conditions>
Vc=120m/min, apxae=1×40mm, fz=0.2mm/t
SUS304, cutter ϕ50

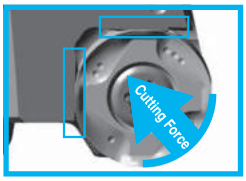
POINT.4 Flat Lock Structure to hold insert firmly.

Prevent insert rotation
during machining and
realizes **stable machining**



Flat Lock Structure

Wide flat constraint surface
·Receives even cutting forces
·Controls insert rotation

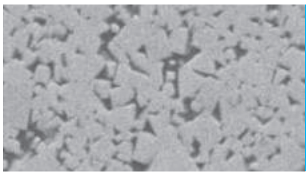


Long tool life by wide lineup with 4 grades and 3 chipbreakers, available for steel, stainless steel and heat-resistant alloys

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

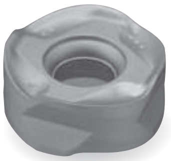
For Chipbreaker Selection and Recommended Cutting Conditions ➡ **M172**

POINT.5 New insert grade for difficult-to-cut material



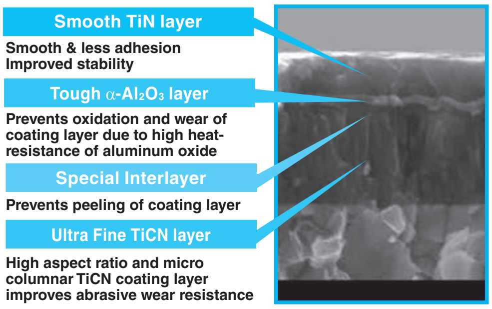
New Development High Toughness Substrate

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 due to thin layer coating technology

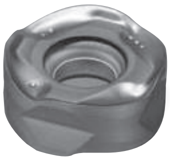


Smooth TiN layer
Smooth & less adhesion
Improved stability

Tough α-Al_2O_3 layer
Prevents oxidation and wear of coating layer due to high heat-resistance of aluminum oxide

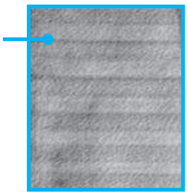
Special Interlayer
Prevents peeling of coating layer

Ultra Fine TiCN layer
High aspect ratio and micro columnar TiCN coating layer improves abrasive wear resistance



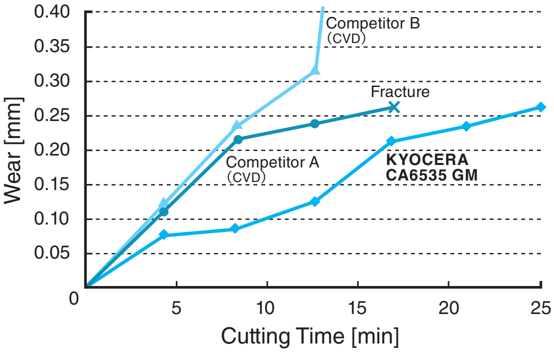
PR1535

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



Tool Life Comparison

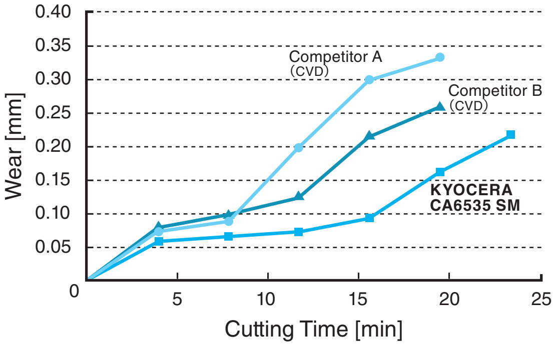
• Ni-base heat-resistant alloys



<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 NEW

MRW Face Mill

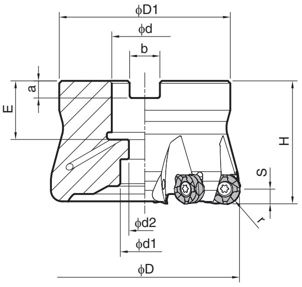


Fig.1

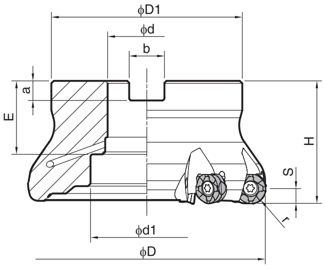


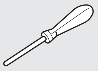
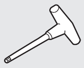
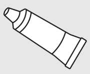
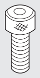
Fig.2

Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)											Rake Angle		Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min^{-1})
				r	ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	S	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**
  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.
- S is Maximum ap. For more details ref. to page ➔ **M172** below.

Spare Parts and Applicable Inserts

Description	Spare Parts					Applicable Inserts ➔ **M16**		
	Clamp Screw	Wrench		Anti-seize Compound	Mounting bolt	 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)
		DTPM-15 	TTP-20 					
MRW 050R-12...	SB-4085TRP	DTPM-15 for Insert Clamp Recommended tightening torque 3.5N·m		MP-1	HH10X30	ROMU1204M0ER-GM	ROMU1204M0ER-SM	ROMU1204M0ER-GH
063R-12...								
080R-12...					HH12X35			
100R-12...					-			
MRW 063R-16...	SB-50140TRP	TTP-20 for Insert Clamp Recommended tightening torque 4.5N·m		MP-1	HH10X30	ROMU1605M0ER-GM	ROMU1605M0ER-SM	ROMU1605M0ER-GH
080R-16...					HH12X35			
100R-16...					-			
125R-16...								

Recommended Cutting Conditions ➔ **M172**

● : Std. Item

MRW End Mill

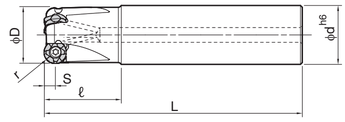


Fig.1

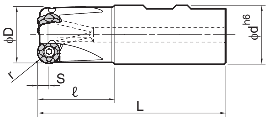


Fig.3

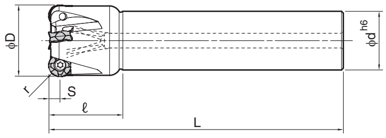


Fig.2

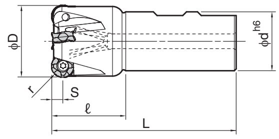


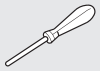
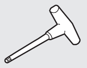
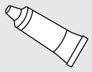
Fig.4

Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)						Rake Angle		Coolant Hole	Drawing	Max. Revolution (min^{-1})
				r	φD	φd	L	ℓ	S	A.R. (MAX.)	R.R.			
Straight Shank	**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**
  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.
- S is Maximum ap. For more details ref. to page ➡ **M172** below.

Spare Parts and Applicable Inserts

Description	Spare Parts				Applicable Inserts ➡ **M16**		
	Clamp Screw	Wrench		Anti-seize Compound			
		DTPM-15 	TTP-20 		 General purpose	 Low cutting force	 Tough Edge (For Heavy Milling)
MRW ···-12...	SB-4085TRP for Insert Clamp Recommended tightening torque 3.5N·m	DTPM-15		MP-1	ROMU1204M0ER-GM	ROMU1204M0ER-SM	ROMU1204M0ER-GH
MRW ···-16...	SB-50140TRP for Insert Clamp Recommended tightening torque 4.5N·m		TTP-20	MP-1	ROMU1605M0ER-GM	ROMU1605M0ER-SM	ROMU1605M0ER-GH

Recommended Cutting Conditions ➡ **M172**

● : 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 r/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)

=

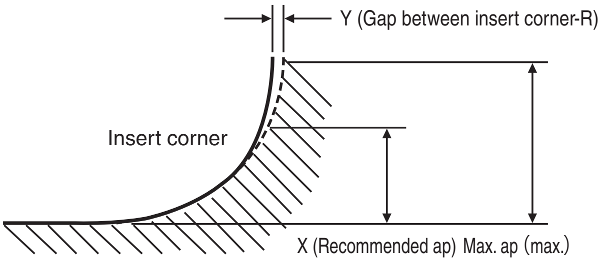
fz=0.3mm/t
(Recommended feed rate)

* 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	Max. ap	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(r).

* The above figure is estimation. There would be ±0.2mm variation depending on the cutting conditions.

M
Milling
Inserts
Lead Angle 45°/20°
Lead Angle 15°
Lead Angle 0°
High Feed
Multi-Function
Slot Mill
Ball-nose Radius
Others

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 **Ref. to page M170・M171**
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

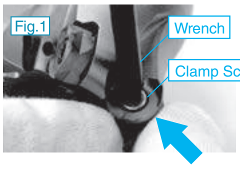
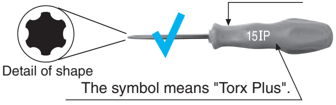
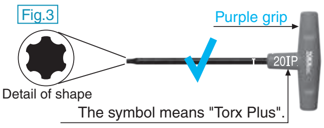


Fig.2



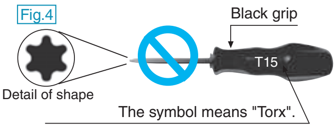
The symbol means "Torx Plus".
Straight grip wrench for MRW-12

Fig.3



The symbol means "Torx Plus".
T-shaped grip wrench for MRW-16

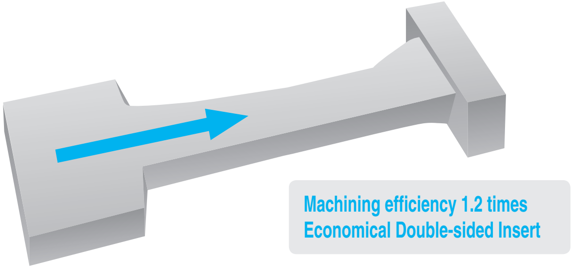
Fig.4



The symbol means "Torx".
Torx Wrench (Do NOT use it for MRW)

Case Studies

12Cr Steel



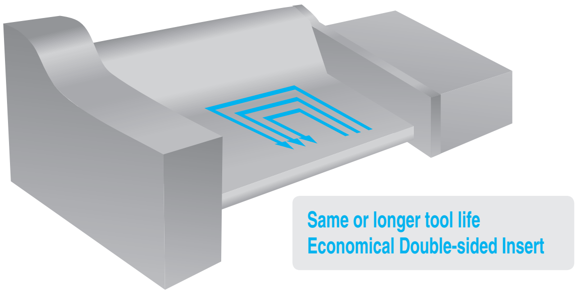
·Turbine Blade ·Vc=270m/min ·fz=0.278mm/t
·ap=0.5~1.0mm ae=max.35mm ·Dry
·MRW050R-12-6T-M (6 inserts) ·ROMU1204M0ER-SM（CA6535）

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.

(Evaluation by the user)

12Cr Steel



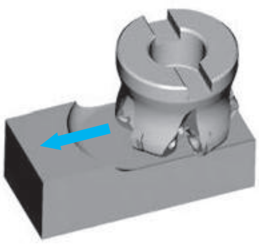
·Turbine Blade ·Vc=250m/min ·fz=0.16mm/t
·ap=2.0mm ae=5~30mm ·Wet
·MRW050R-12-5T-M (5 inserts) ·ROMU1204M0ER-SM（CA6535）

CA6535	**Stable, available for further machining**
Competitor B (Positive Cutter)	**Unstable machining with large noise**

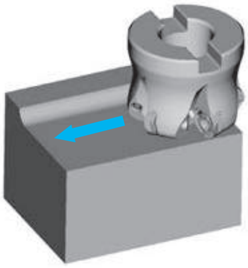
MRW showed less damage on the cutting edge and reduced machining noise.
MRW has equal or longer tool life and cost advantage due to double sided inserts.

(Evaluation by the user)

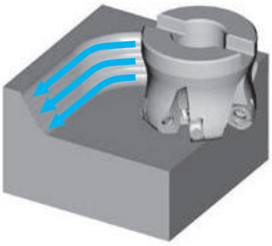
Applications



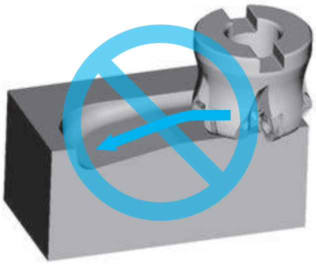
Facing



Shouldering



Contouring



Plunging / Profiling

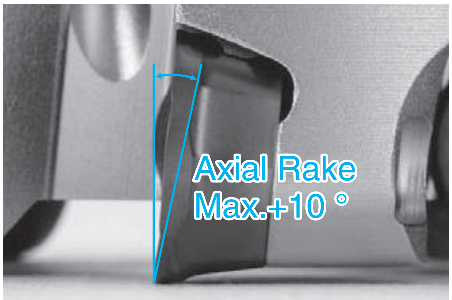
* MRW type is not available for 3D machining such as Plunging and Profiling.

MRX

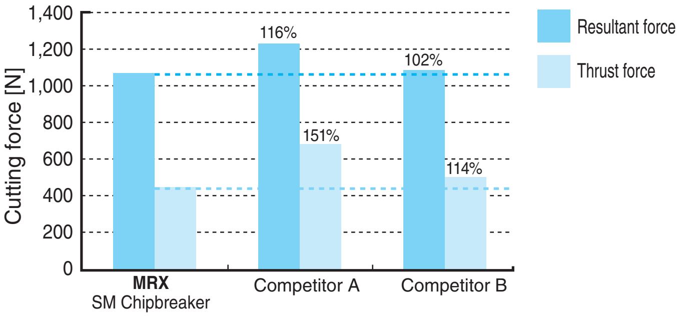
Excellent cutting performance due to low cutting force design

High efficiency radius cutter

POINT.1 Low cutting force due to helical cutting-edge design



● Cutting Force Comparison



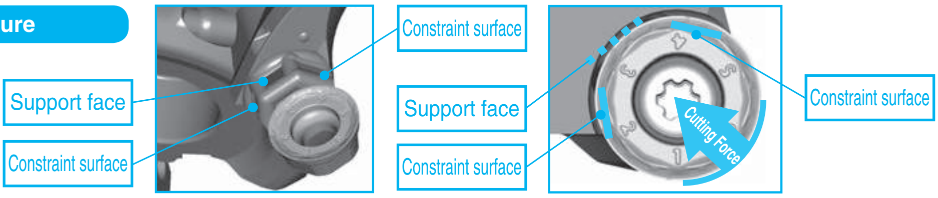
<Cutting Conditions>
Vc=120m/min, ap×ae=2×25mm, fz=0.2mm/t, SUS304, Cutter ϕ50

POINT.2 Flat Lock Structure to hold insert firmly.

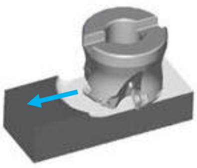
Prevent insert rotation during machining and realizes **stable machining**

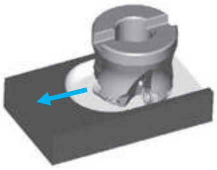
Flat Lock Structure

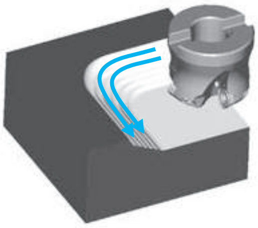
Wide flat constraint surface
·Receives even cutting forces
·Controls insert rotation

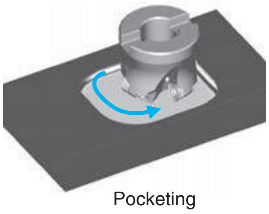


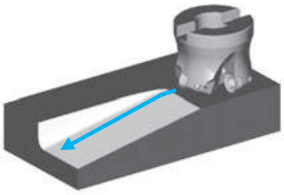
POINT.3 Various applications


Facing


Slotting


Shouldering


Pocketing


Plunging / Profiling

POINT.4

New 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

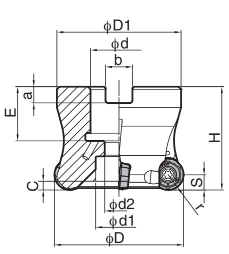


Fig.1

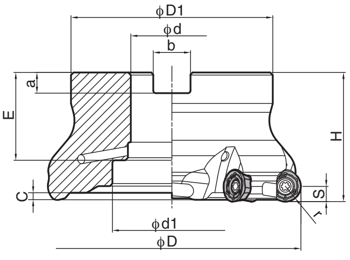
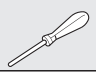
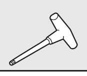
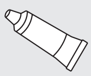
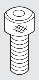


Fig.2

Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)												Rake Angle		Coolant Hole	Drawing	Weight (kg)	Max. Revolution (min⁻¹)
				r	ϕD	ϕD1	ϕd	ϕd1	ϕd2	H	E	a	b	C	S	A.R.	R.R.				
Metric	MRX 040R-10-5T-M	●	5	5	40	38	16	15	9	40	19	5.6	8.4	2.9	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	3.4	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	4.4	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	3.4	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	4.4	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 ➔ M16
	Clamp Screw	Wrench		Anti-seize Compound	Mounting bolt	
		DTPM	TTP			
						
MRX 040R-10...	SB-3070TRP	DTPM-10		MP-1	HH8X25	RPMT10T3M0ER-GM RPGT10T3M0ER-GM RPGT10T3M0ER-SM RPMT10T3M0EN-GH *1
050R-10...		for Insert Clamp Recommended tightening torque 2.0N·m			HH10X30	
063R-10...						
MRX 040R-12...	SB-4090TRPN	DTPM-15		MP-1	HH8X25	RPMT1204M0ER-GM RPGT1204M0ER-GM RPGT1204M0ER-SM RPMT1204M0EN-GH *2
050R-12...					HH10X30	
063R-12...						
080R-12...		for Insert Clamp Recommended tightening torque 3.5N·m			HH12X35	
100R-12...					-	
MRX 063R-16...	SB-50120TRP		TTP-20	MP-1	HH10X30	RPMT1605M0ER-GM RPGT1605M0ER-GM RPGT1605M0ER-SM RPMT1605M0EN-GH *3
080R-16...					HH12X35	
100R-16...		for Insert Clamp Recommended tightening torque 4.5N·m			-	
125R-16...						

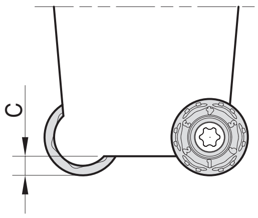
- Max. Revolution
  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

*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 ➔ **M178**

● : Std. Item

MRX End Mill



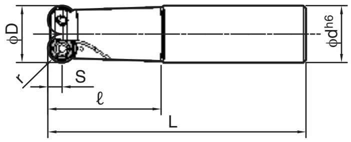


Fig.1

Fig.5

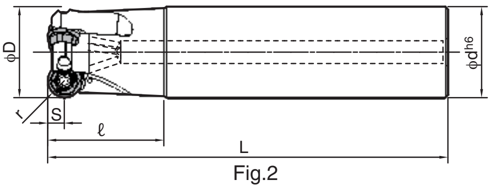


Fig.2

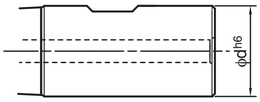


Fig.6

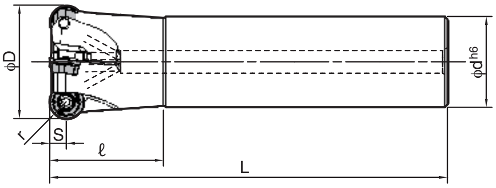


Fig.3

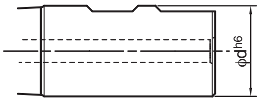


Fig.7

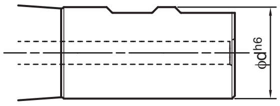


Fig.8

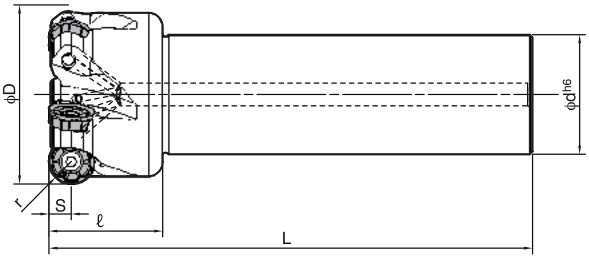


Fig.4

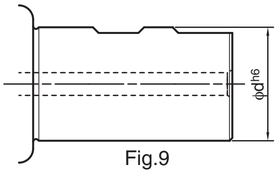


Fig.9

Toolholder Dimensions

	Description	Std.	No. of Inserts	Dimension (mm)							Rake Angle		Coolant Hole	Drawing	Max. Revolution (min^{-1})
				r	φD	φd	L	ℓ	C	S	A.R. (MAX.)	R.R.			
Straight Shank	**MRX 16-S16-08-2T**	●	2	4	16	16	110	40	2.4	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	2.9	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	3.4	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	4.4	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	2.4	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	2.9	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	3.4	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	4.4	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	2.4	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	2.9	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	3.4	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	4.4	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

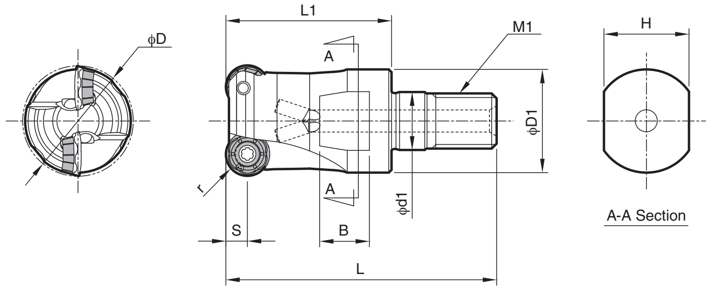
- **Max. Revolution**

  When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force.
- Coat Anti-seize Compound thinly on portion of taper and thread when insert is fixed.

● : Std. Item

MRX Modular type NEW

MRX type Head

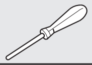
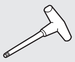
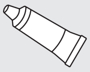


Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)										Rake Angle		Coolant Hole	Applicable Inserts	Max. Revolution (min^{-1})
			r	φD	φD1	φd1	L	L1	M1	H	B	S	A.R. (MAX.)	R.R.			
MRX 16-M08-08-2T	●	2	4	16	14.7	8.5	43	25	M8xP1.25	12	8	4	+3°	-5.5°	No	RDMT08 RDGT08	38,000
20-M10-08-2T	●	2		20	18.7	10.5	49	30	M10xP1.5	15	9		+10°		Yes		32,000
25-M12-08-4T	●	4		25	23	12.5	57	35	M12xP1.75	19	10						28,000
MRX 20-M10-10-2T	●	2	5	20	18.7	10.5	49	30	M10xP1.5	15	9	5	+5°	-8°	No	RPMT10 RPGT10	30,000
25-M12-10-3T	●	3		25	23	12.5	57	35	M12xP1.75	19	10		+10°	-5.5°	Yes		28,000
32-M16-10-4T	●	4		32	30	17	63	40	M16xP2.0	24	12						22,500
MRX 32-M16-12-3T	●	3	6	32	30	17	63	40	M16xP2.0	24	12	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	63	40	M16xP2.0	24	12	8	+10°	-5.5°	Yes	RPMT16 RPGT16	18,000

Ref. to page ➔ **M58** 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 ➔ **M16**
		DTPM 	TTP 		
MRX ····-08···	SB-2555TRP	DTPM-8 for Insert Clamp Recommended tightening torque 1.2N·m		MP-1	RDMT0803M0ER-GM RDGT0803M0ER-GM RDGT0803M0ER-SM RDMT0803M0EN-GH *1
MRX····-10···	SB-3070TRP	DTPM-10 for Insert Clamp Recommended tightening torque 2.0N·m		MP-1	RPMT10T3M0ER-GM RPGT10T3M0ER-GM RPGT10T3M0ER-SM RPMT10T3M0EN-GH *2
MRX····-12···	SB-4090TRPN	DTPM-15 for Insert Clamp Recommended tightening torque 3.5N·m		MP-1	RPMT1204M0ER-GM RPGT1204M0ER-GM RPGT1204M0ER-SM RPMT1204M0EN-GH *3
MRX····-16···	SB-50120TRP	TTP-20 for Insert Clamp Recommended tightening torque 4.5N·m		MP-1	RPMT1605M0ER-GM RPGT1605M0ER-GM RPGT1605M0ER-SM RPMT1605M0EN-GH *4

- **Max. Revolution**
  "When running the end mill and cutter at the maximum revolution, the insert or toolholder may be damaged by centrifugal force."

- 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 ➔ **M178**

● : 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 r/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
RD**08 type (GM/SM/GH chipbreaker)	4mm	1.7	1.3	1.1	1 (Standard)	0.9	0.8	0.8	–	–	–
RP**10 type (GM/SM/GH chipbreaker)	5mm	1.9	1.4	1.2	1	1 (Standard)	0.9	0.8	0.8	–	–
RP**12 type (GM/SM/GH chipbreaker)	6mm	2.1	1.5	1.3	1.1	1	1 (Standard)	0.9	0.8	0.8	–
RP**16 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			Helical Milling		
Insert	Tool Dia.	ap	Max. Cutting Depth Pd	Min. cutting length X for flat bottom surface	Max. ramping angle α_{max}(°)	tan α_{max}	Max. Cutting Length L at Max. Ramping Angle	Min. Cutting Dia. ϕDh1	Min. Cutting Dia. for flat bottom facing ϕDh2	Max. Cutting Dia. ϕDh3
RD**08 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
RP**10 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
RP**12 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
RP**16 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

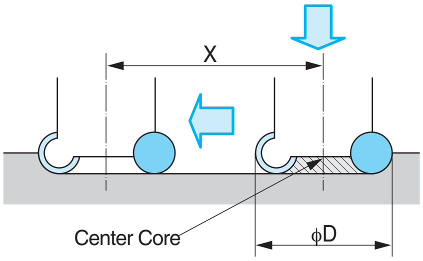
Guide for Drilling

[Depth of Drilling]

Refer to Max. Cutting Depth (Pd) shown in the lower table of **M178**.
(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 **M178**.

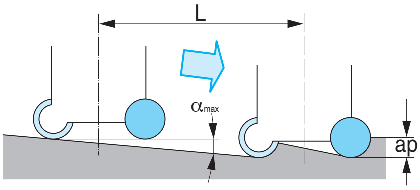


Guide for Ramping (Slant Milling)

- Ramping angle should be under α_{max} (Maximum ramping angle) in the above cutting conditions.
- Feed rate should be under 70% of the above cutting conditions.

Formula of the cutting length "L" at Max. ramping angle

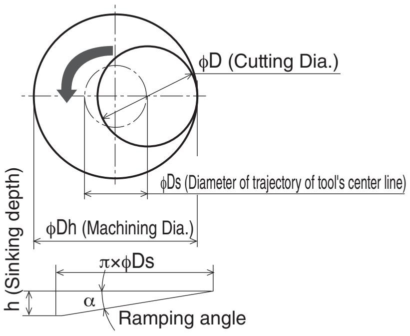
$$L = \frac{ap}{\tan \alpha_{max}}$$



Guide for Helical milling

- Sinking depth (h) at helical milling should be under Max. ap in the above cutting conditions. Ramping angle α (with trajectory of the center line of tool) should be under α_{max} (Maximum ramping angle) in the above cutting conditions.
- Feed rate should be under 70% of the above cutting conditions.
- Down-cut machining is recommended.

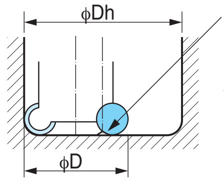
Helical Milling Factors



ϕDs (How to find diameter of trajectory of tool's center line)
$\phi Ds = \phi Dh - \phi D$

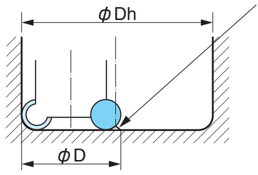
Formula for sinking depth (h)
$h = \pi \times \phi Ds \times \tan\alpha$
(h should be under ap)
(α should be under α_{max})

[When cutting dia. ϕDh1≤ϕDh<ϕDh2]



Center core part remains after machining. (Not removable with the same cutter)

[When cutting dia. ϕDh2≤ϕDh≤ϕDh3]



Center core part remains after machining. (Removable by traversing with the same cutter)

Please refer to M178 the list for ϕDh1~Dh3.

Max. ap and usable edges

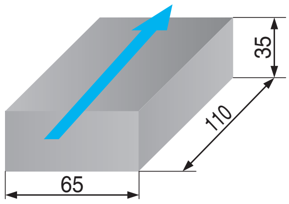
(mm)

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
- fz=0.14mm/t
- ap×ae=1.0×65mm
- Dry
- MRX100R-12-9T-M (9 inserts)
- RPGT1204M0ER-SM (PR1535)



4.5 times longer tool life

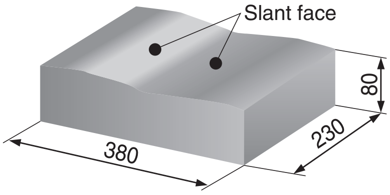
PR1535	450 pcs/edge
Conventional	100 pcs/edge

- High cost efficiency due to 4.5 times longer tool life and 1.5 times more insert edges.
- MRX prevented burr formation and improved surface finish.

(Evaluation by the user)

SKD61（47~49HRC）

- Mold Part
- Vc=125m/min
- fz=0.25mm/t
- ap×ae=1.0～2.0×10mm
- Dry
- MRX20-S20-08-2T (2 inserts)
- 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.

(Evaluation by the user)

MRP-S End Mill

Standard

Long Shank

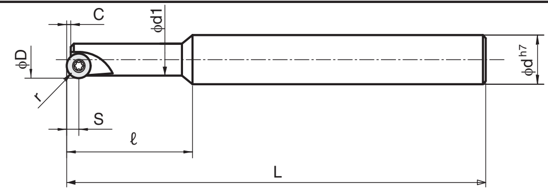


Fig.1

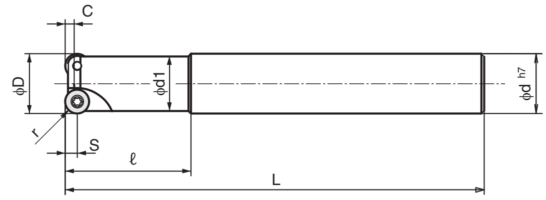


Fig.2

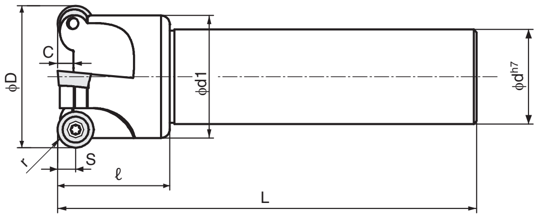


Fig.3

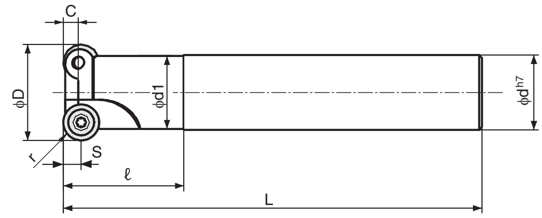


Fig.4

Toolholder Dimensions

	Description	Std.	No. of Inserts	Dimension (mm)									Rake Angle		Drawing	Spare Parts		Applicable Inserts ➡ **M21**
				r	φD	φd	φd1	L	ℓ	C	Pd	S	A.R.	R.R.		Clamp Screw	Wrench	
Standard	**MRP 012-S16-08**	○	1	4	12	16	10.4	110	40	3.0	N/A	4	-8.5°	-5.5°	Fig.1	SB-3060TR	DT-10	RDMT08T2M0-H
	016-S16-08	○	2		16		14.4				0.5		0°		Fig.2			
	020-S20-08	○			20	20	17	120			2.0		+5°	-4°				
	MRP 025-S25-10-3T	○	3	5	25	25	21	120		3.5	2.5	5	+2°	-6°	Fig.2	SB-3080TR	DT-10	RPMT10T3M0
	032-S32-10-4T	○	4		32	32	28	140										
	MRP 032-S25-12	○	2	6	32	25	24.4	140		5.0	4.0	6	+5°	-4°	Fig.3	SB-4085TR	DT-15	RPMT1204M0-H RPMT1204M0
	040-S32-12	○	3		40	32	31.4	160						-5°				
	040-S32-12-4T	○	4					140		4.5	3.5							
	050-S42-12	○			50	42	41.4	170		5.0	4.0					SB-40115TR		
	MRP 040-S32-16	○	2	8	40	32	31.4	160		7.0	6.0	8		-3°	Fig.3	SB-50120TR	DT-20	RPMT1606M0-H
	050-S42-16	○	3		50	42	41.4	170										
	063-S42-16	○	4		63		54.4		50						Fig.4			
Long Shank	**MRP 012-S16-08-160**	○	1	4	12	16	10.4	160	40	3.0	N/A	4	-8.5°	-5.5°	Fig.1	SB-3060TR	DT-10	RDMT08T2M0-H
	016-S16-08-160	○	2		16		14.4				0.5		0°		Fig.2			
	020-S20-08-180	○			20	20	17	180			2.0		+5°	-4°				
	MRP 025-S25-10-3T-180	○	3	5	25	25	21	180		3.5	2.5	5	+2°	-6°	Fig.2	SB-3080TR	DT-10	RPMT10T3M0
	032-S32-10-4T-200	○	4		32	32	28	200										
	MRP 032-S25-12-300	○	2	6	32	25	24.4	300		5.0	4.0	6	+5°	-4°	Fig.3	SB-4085TR	DT-15	RPMT1204M0-H RPMT1204M0
	040-S32-12-300	○	3		40	32	31.4							-5°				
	040-S32-12-4T-200	○	4					200		4.5	3.5							
	050-S42-12-300	○			50	42	41.4	300		5.0	4.0					SB-40115TR		
	MRP 040-S32-16-300	○	2	8	40	32	31.4			7.0	6.0	8		-3°	Fig.3	SB-50120TR	DT-20	RPMT1606M0-H
	050-S42-16-300	○	3		50	42	41.4											
	063-S42-16-300	○	4		63		54.4		50						Fig.4			

・ Pd: Max. Plunging Depth

Recommended Cutting Conditions ➡ **M182**

○ : Check Availability

MRP Face Mill

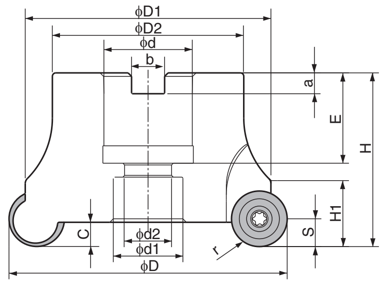


Fig.1

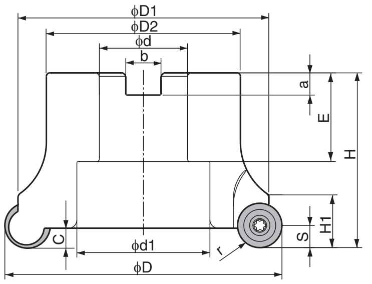


Fig.2

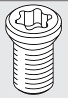
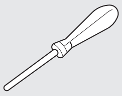
Toolholder Dimensions

Description		Std.	No. of Inserts	Dimension (mm)															Rake Angle		Drawing	Weight (kg)
				r	ϕD	ϕD1	ϕD2	ϕd	ϕd1	ϕd2	H	H1	E	a	b	C	Pd	S	A.R.	R.R.		
MRP	**050R-10-6T**	○	6	5	50	45.0	38	22.0	18	12	50	13	20	6.3	10.4	3.5	2.5	5.0	+5°	-5°	Fig.1	0.4
	063R-10-7T	○	7		63	57.9	50	25.4	20	14			26	6.0	9.5							0.5
MRP	**050R-12**	○	4	6	50	41.4	38	22.0	18	12		15	20	6.3	10.4	5.0	4.0	6.0	+5°	-5°	Fig.1	0.4
	063R-12	○	5		63	54.4	50	25.4	20	14			26	6.0	9.5							0.5
	080R-12	○	6		80	71.4	55													-3°		0.7
	080R-12-7T	○	7			74.4	59									4.5	3.5			-5°		
MRP	**080R-16**	○	5	8	80	70.6	55	25.4	20	14	50	19	26	6.0	9.5	7.0	6.0	8.0	+5°	-3°	Fig.1	0.8
	100R-16	○	6		100	90.5	70	31.75	48	-	63		32	8.0	12.7					-5°	Fig.2	1.0
	100R-16-7T	○	7			93.0										6.0	5.0			-6°		
	125R-16	○	6		125	115.5	80	38.10	58				38	10.0	15.9	7.0	6.0			-5°		1.7
MRP	**080R-20**	○	4	10	80	67.3	55	25.4	20	14	50	23	24	6.0	9.5	8.5	N.A.	10.0	+5°	-3°	Fig.1	0.8
	100R-20	○	5		100	87.3	70	31.75	48	-	63		32	8.0	12.7					-5°	Fig.2	1.0

- Pd: Max. Plunging Depth
- Use BT ○○ -FMC22 (TMT Standard in the market) for MRP050R-10-6T and MRP050R-12.

Recommended Cutting Conditions ➡ **M182**

Spare Parts

Description		Clamp Screw	Wrench	Applicable Inserts ➡ **M21**
				
MRP	**050R-10-6T**	SB-3080TR	DT-10	RPMT10T3M0
	063R-10-7T			
MRP	**050R-12**	SB-40115TR	DT-15	RPMT1204M0-H RPMT1204M0
	063R-12			
	080R-12	SB-4085TR		
	080R-12-7T			
MRP	**080R-16**	SB-50120TR	DT-20	RPMT1606M0-H
	100R-16			
	100R-16-7T			
	125R-16			
	125R-16-8T			
MRP	**080R-20**	SB-60120TR	DT-25	RPMT2006M0-H
	100R-20			

- Mounting bolt (HH10X25) is included for MRP050R.
- Mounting bolt (HH12X35) is included for MRP063R.
- Mounting bolt (HH12X35) is included for MRP080R.

○ : Check Availability

MRP

Applicable Inserts

Description		Applicable Inserts ➡ M21		
		 Tough Edge	 Tough Edge	
MRP	**…-08**	RDMT08T2M0-H	-	-
	…-10	-		RPMT10T3M0
	…-12		RPMT1204M0-H	RPMT1204M0
	…-16		RPMT1606M0-H	-
	…-20		RPMT2006M0-H	

Top surface of insert

Low cutting force and good chip evacuation owing to chipbreaker design.
"-H" type insert has a second cutting edge next to the first cutting adds edge strength.

Ratchet design prevents the insert's movement and holds the insert firmly in the insert pocket even during the heavy milling (Only RPMT)

Bottom Face

Insert Description	Land at Edge	Applications	Remarks
RPMT10T3M0 **RPMT1204M0**	No	Low cutting force	Even if the workpiece clamp is weak, or if the workpiece is thin, sharp cutting performance and less chattering is demonstrated.
RPMT08T2M0-H **RPMT1204M0-H** **RPMT1606M0-H** **RPMT2006M0-H**	Parallel Land 0.2mm Width	Tough Edge	Used for General Roughing.

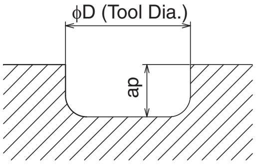
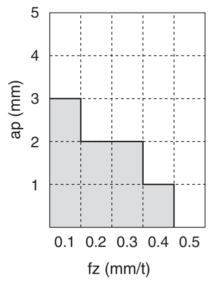
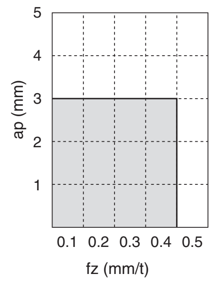
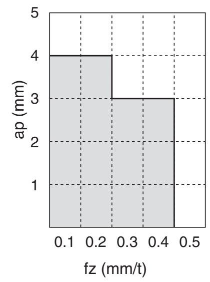
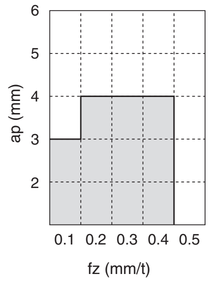
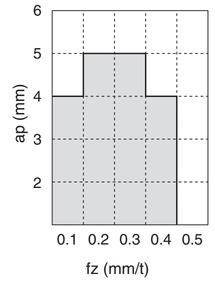
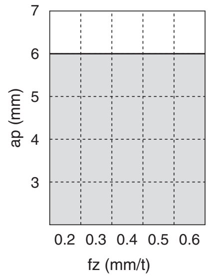
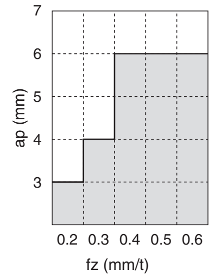
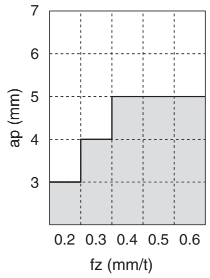
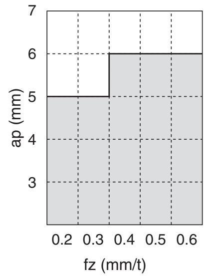
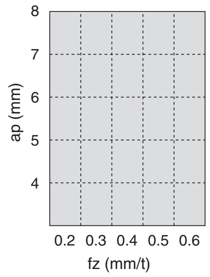
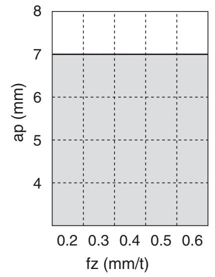
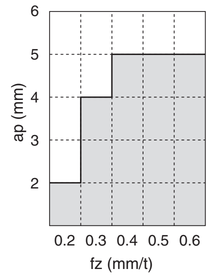
Recommended Cutting Conditions

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)			
		Cermet	MEGACOAT		Carbide
		TN100M	**PR1230**	**PR1210**	**KW10**
Carbon Steel	~0.6	★ 120~200	★ 120~250	-	-
Alloy Steel	~0.6	★ 100~180	★ 100~220	-	-
Mold Steel	~0.5	★ 100~180	★ 80~180	-	-
Stainless Steel	~0.4	☆ 120~200	★ 120~220	-	-
Cast Iron	~0.6	-	-	★ 100~220	☆ 80~150
Non-ferrous Metals	~0.6	-	-	-	★ 100~300

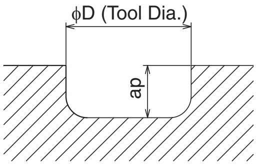
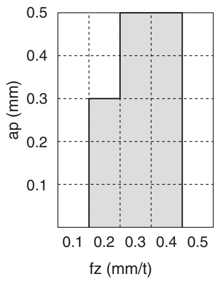
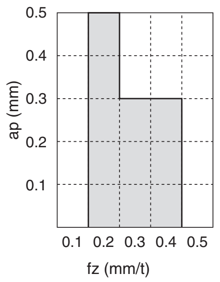
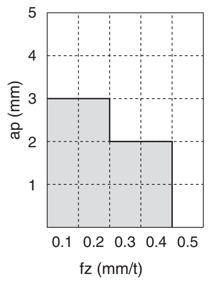
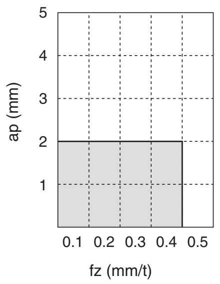
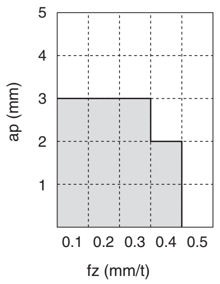
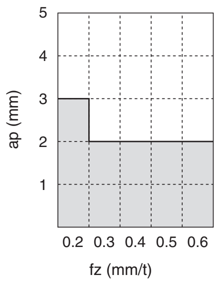
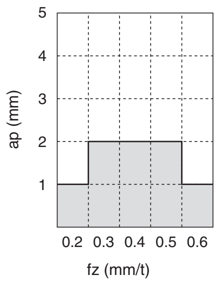
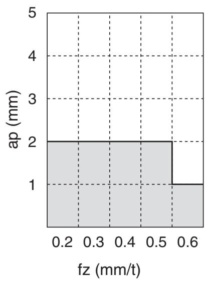
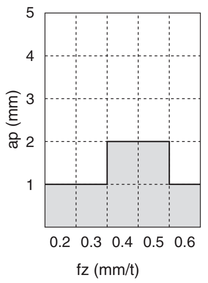
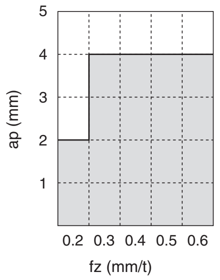
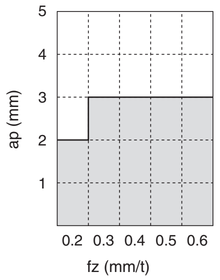
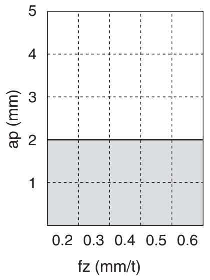
Notes) Reduce the ap by 20-50% when machining with long overhang length or using long shank types.

★ : 1st Recommendation ☆ : 2nd Recommendation

◆ Cutting Performance of Radius Mill (Standard type)

Workpiece Material	Slotting			
S50C		● Cutting Conditions Toolholder: Standard type Vc=120,150 m/min Dry Overhang Length=L$_1$		
Insert Description				
08 type (RDMT08T2M0-H)	MRP012-S16-08 n=3,980min^{-1}(Vc=150m/min) L$_1$=42mm 	MRP016-S16-08 n=2,980min^{-1}(Vc=150m/min) L$_1$=42mm 	MRP020-S20-08 n=2,390min^{-1}(Vc=150m/min) L$_1$=42mm 	
10 type (RPMT10T3M0)	MRP025-S25-10-3T n=1,910min^{-1}(Vc=150m/min) L$_1$=60mm 	MRP032-S32-10-4T n=1,490min^{-1}(Vc=150m/min) L$_1$=80mm 		
12 type (RPMT1204M0-H)	MRP032-S25-12 n=1,490min^{-1}(Vc=150m/min) L$_1$=80mm 	MRP040-S32-12 n=1,195min^{-1}(Vc=150m/min) L$_1$=80mm 	MRP040-S32-12-4T n=1,195min^{-1}(Vc=150m/min) L$_1$=80mm 	MRP050-S42-12 n=765min^{-1}(Vc=120m/min) L$_1$=80mm 
16 type (RPMT1606M0-H)	MRP040-S32-16 n=1,195min^{-1}(Vc=150m/min) L$_1$=90mm 	MRP050-S42-16 n=765min^{-1}(Vc=120m/min) L$_1$=90mm 	MRP063-S42-16 n=605min^{-1}(Vc=120m/min) L$_1$=90mm 	

◆ Cutting Performance of Radius Mill (Long Shank)

Workpiece Material	Slotting			
S50C		● Cutting Conditions Toolholder: Long Shank Vc=120,150 m/min Dry Overhang Length=L$_1$		
Insert Description				
08 type (RDMT08T2M0-H)	MRP012-S16-08-160 n=3,980min^{-1}(Vc=150m/min) L$_1$=80mm 	MRP016-S16-08-160 n=2,980min^{-1}(Vc=150m/min) L$_1$=80mm 	MRP020-S20-08-180 n=2,390min^{-1}(Vc=150m/min) L$_1$=90mm 	
10 type (RPMT10T3M0)	MRP025-S25-10-3T-180 n=1,910min^{-1}(Vc=150m/min) L$_1$=90mm 	MRP032-S32-10-4T-200 n=1,490min^{-1}(Vc=150m/min) L$_1$=100mm 		
12 type (RPMT1204M0-H)	MRP032-S25-12-300 n=1,490min^{-1}(Vc=150m/min) L$_1$=150mm 	MRP040-S32-12-300 n=1,195min^{-1}(Vc=150m/min) L$_1$=150mm 	MRP040-S32-12-4T-200 n=1,195min^{-1}(Vc=150m/min) L$_1$=100mm 	MRP050-S42-12-300 n=765min^{-1}(Vc=120m/min) L$_1$=150mm 
16 type (RPMT1606M0-H)	MRP040-S32-16-300 n=1,195min^{-1}(Vc=150m/min) L$_1$=150mm 	MRP050-S42-16-300 n=765min^{-1}(Vc=120m/min) L$_1$=150mm 	MRP063-S42-16-300 n=605min^{-1}(Vc=120m/min) L$_1$=150mm 	

Guide for Drilling

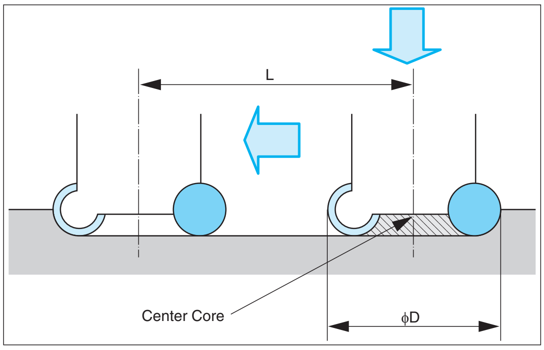
[Depth of Drilling]

・Ref. to Pd value of Toolholder Dimension Table on Page **M180, M181**
(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 “L” for flat bottom surface is as below



Insert Description	L (mm)
RDMT08T2M0-H	ϕD-7
RPMT10T3M0	ϕD-9
RPMT1204M0 **RPMT1204M0-H**	ϕD-11
RPMT1606M0-H	ϕD-15

Guide for Ramping (Slant Milling)

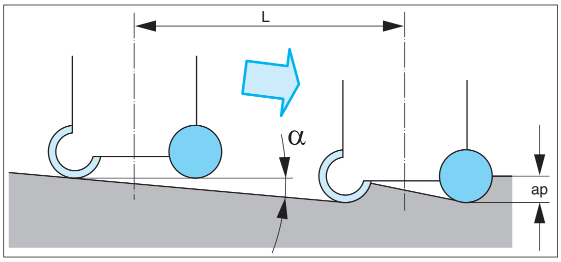
The transfer length “L” at the maximum slant angle α in the ramping operation depends on the ap.

Description		Angle α(°)	tan α
MRP	**012-S16-08(-160)**	Ramping is not available	
	016-S16-08(-160)	4°	0.070
	020-S20-08(-180)	14°	0.249
MRP	**025-S25-10-3T(-180)**	14°	0.249
	032-S32-10-4T(-200)	8°	0.141
MRP	**032-S25-12(-300)**	15°	0.268
	040-S32-12(-300)	10°	0.176
	040-S32-12-4T(-200)	9°	0.158
	050-S42-12(-300)	7°	0.123
MRP	**040-S32-16(-300)**	20°	0.364
	050-S42-16(-300)	13°	0.231
	063-S42-16(-300)	8°	0.141
MRP	**050R-10-6T**	4°	0.070
	063R-10-7T	3°	0.052
MRP	**050R-12**	7°	0.123
	063R-12	5°	0.087
	080R-12	3°	0.052
	080R-12-7T	3°	0.052
MRP	**080R-16**	6°	0.105
	100R-16	4°	0.070
	100R-16-7T	3°	0.052
	125R-16	3°	0.052
	125R-16-8T	2°	0.035
MRP	**080R-20**	8°	0.141
	100R-20	6°	0.105

* Above is the value considering the clearance 1mm between the tool body and the workpiece.

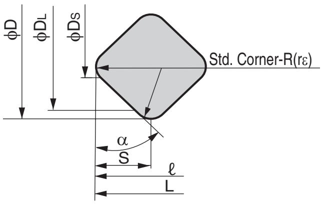
Formula of the cutting length “L” at Max. ramping angle

$$L=\frac{ap}{\tan\alpha}$$



Chamfering End Mill MCSE

MCSE



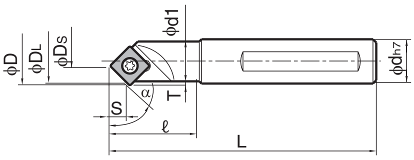


Fig.1

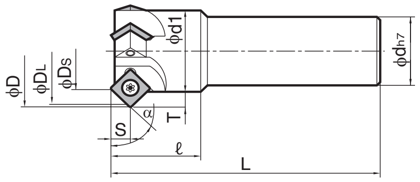


Fig.4

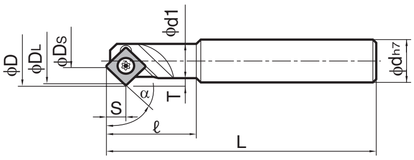


Fig.2

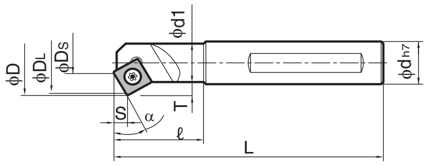


Fig.5

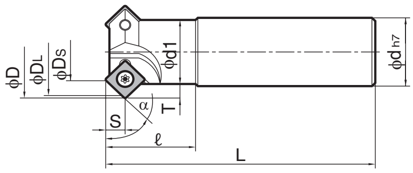


Fig.3

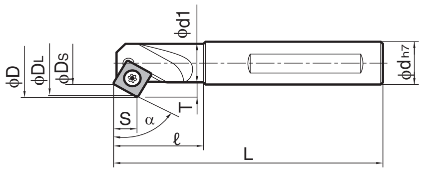


Fig.6

Toolholder Dimensions

Description			Std.	No. of Inserts	Dimension (mm)									Std. Corner-R (rε)	Angle	Rake Angle		Drawing	Spare Parts	
					φD	φDL	φDs	φd	φd1	L	ℓ	S	T		α	A.R.	R.R.		Clamp Screw	Wrench DT LTW
Cylindrical	MCSE	104	●	1	16	15	4	16	15	85	30	6.5	0.5	0.4	45˚	0˚	-4.5˚	Fig.1	SB-3060TR	DT-10
		106	●		22	21	6	20	16	120	40	8.6	3.0	0.8			-1˚	Fig.2	SB-5090TR	LTW-20
		115	●		31	30	15		18				6.5				+5˚			
		227	●	2	43	42	27	32	30				6.5				+8˚	Fig.3		
		336	●	3	52	51	36		38				7.0				+10˚	Fig.4		
	MCSE	104-30D	●	1	19	18	4	16	15	85	30	4.7	2.0	0.4	30˚	0˚	-4˚	Fig.5	SB-3060TR	DT-10
		108-30D	●		28	27	8	20	19	110	40	6.3	4.5	0.8			-2.5˚		SB-5090TR	LTW-20
		110-30D	●		30	28	10		18	120			6.0				0˚			
	MCSE	108-60D	●		19.5	19	8	20	19	110	40	10	0.25	0.8	60˚	0˚	-3.5˚	Fig.6	SB-5070TR	LTW-20
		120-60D	●		31	30	20		18	120			6.5				0˚		SB-5090TR	
Weldon	MCSE	106-W	●	1	22	21	6	20	16	92	40	8.6	3.0	0.8	45°	0°	-1°		SB-5090TR	LTW-20
		115-W	●		31	30	15		18				6.5				+5°			
		227-W	●	2	43	42	27	32	30	120			6.5				+8°			
		336-W	●	3	52	51	36		38	105	45		7.0				+10°			

・Dimension T indicates available back chamfering dimension.

Applicable Inserts

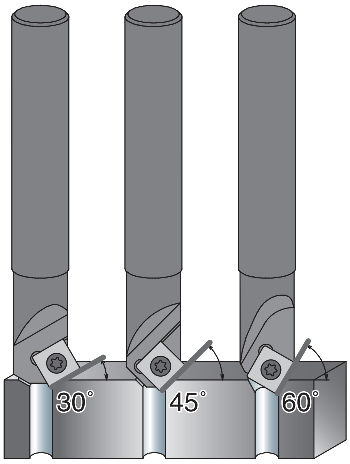
Description	Applicable Inserts ➡ M22		
			
MCSE 104 104-30D	SDKW09T204TN	SDKW09T204FN	SDMT09T204C
MCSE 106 115 227 336 **MCSE** 108-30D 110-30D **MCSE** 108-60D 120-60D	SEKW120304TN 120308TN	SEKW120304FN 120308FN	SEMT120304C

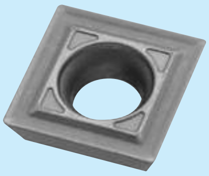
● : Std. Item

◆ Recommended Cutting Conditions

Workpiece Material	fz (mm/t)		Recommended Insert Grades (Cutting Speed Vc: m/min)		
			Cermet	MEGACOAT	Carbide
	ϕDs (ϕ4~ϕ20)	ϕDs (ϕ27~ϕ36)	**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

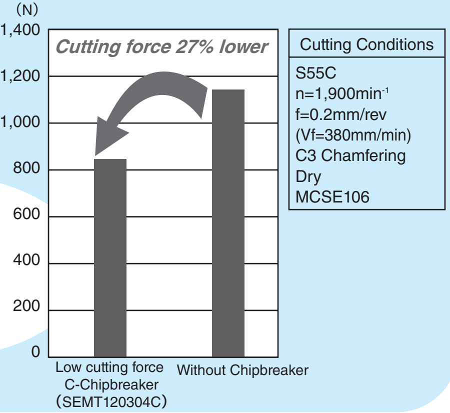
★ : 1st Recommendation ☆ : 2nd Recommendation





Cutting force is reduced 27% by low cutting force C-Chipbreaker

■Cutting Performance of low cutting force C-Chipbreaker

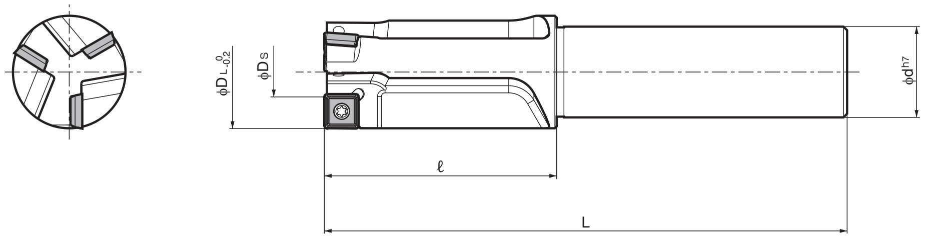


Cutting Conditions
S55C
n=1,900min^{-1}
f=0.2mm/rev
(Vf=380mm/min)
C3 Chamfering
Dry
MCSE106

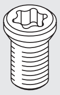
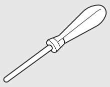
Bolt Countersink End Mill MEF

Bolt Countersinking
Shouldering
Facing

MEF

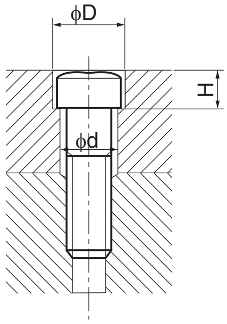


Toolholder Dimensions

Description	Std.	No. of Inserts	Dimension (mm)					Std. Corner-R(rε)	Rake Angle		Objective Bolt Size	Spare Parts		Applicable Inserts ➡ M24
			φDL	φDs	φd	L	ℓ		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(rε) pertains to MEF11-S10, φDs=3.0mm.

Bolt Countersink (Hexagon Socket Head Cap Screw)



Nominal Screw Size	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
φD (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
φd (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.

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.

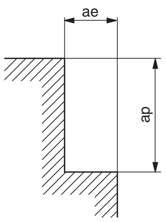
Description	Cutting Speed Vc (m/min)	fz (mm/t)	Step Feed (mm)
MEF11~MEF48	80~150	0.1~0.15	0.5~1.5

(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 ℓ 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. (Ref. to 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. (Ref. to Fig.2)

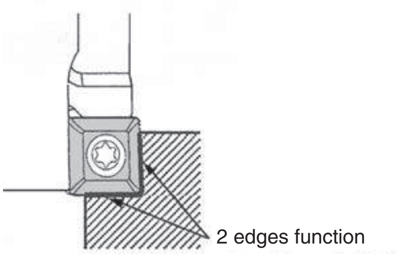


Fig.1

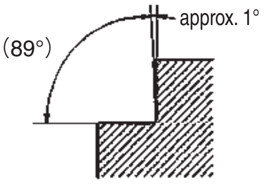
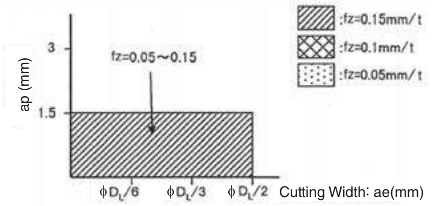
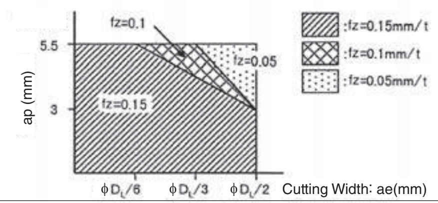
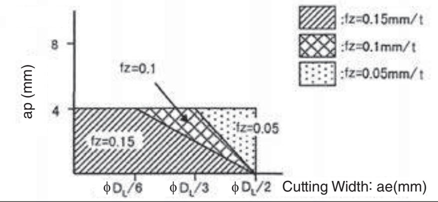
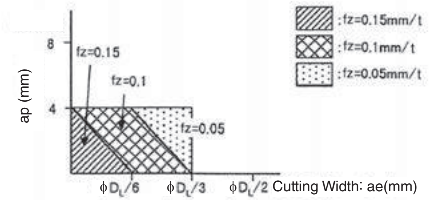


Fig.2

Description	Cutting Range
MEF11-S12 **MEF14-S12** **MEF17-S16** **MEF18-S16**	
MEF20-S16 **MEF22-S20** ≀ **MEF25-S20**	
MEF26-S25 ≀ **MEF32-S25** **MEF35-S32**	
MEF39-S32 **MEF43-S32** **MEF48-S32**	

T-Slot Mill METS

T-Slotting

Back side milling

METS

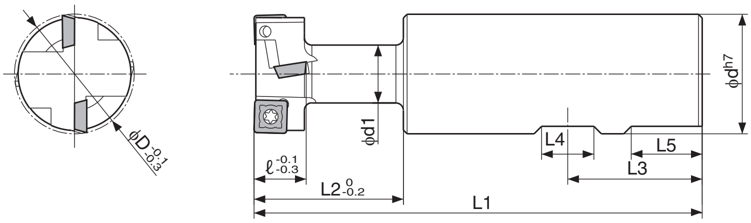


Fig.1

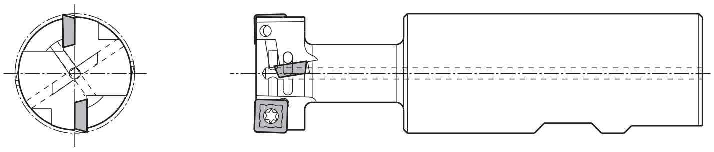
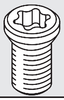
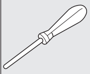


Fig.2

Toolholder Dimensions

Description		Std.	No. of Inserts	No. of Flutes	Dimension (mm)									Rake Angle		Drawing	Spare Parts		Applicable Inserts ➡ **M22**
					φD	φd	φd1	ℓ	L1	L2	L3	L4	L5	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 type has air holes

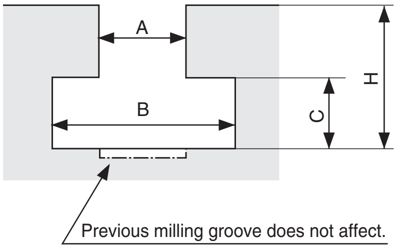
Applicable Inserts

Description		Applicable Inserts ➡ **M22** 
METS	**21-S25** **21-S25-H** **25-S25** **25-S25-H**	SDMT060304E-K
METS	**32-S32** **32-S32-H**	SDMT080308E-K
METS	**40-S32** **40-S32-H** **50-S32** **50-S32-H**	SDMT120408E-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

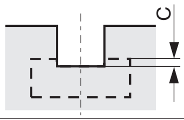
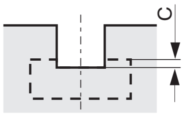
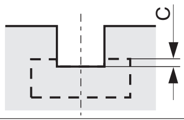
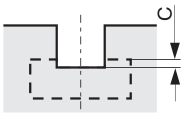
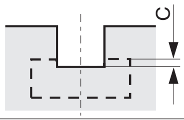
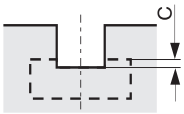
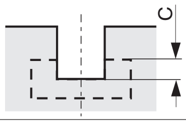
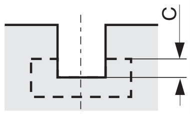
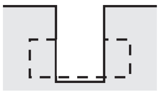


● : Std. Item

◆ 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

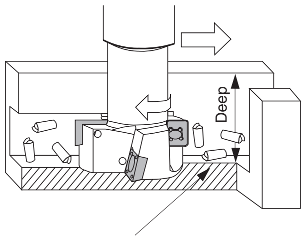
Description (T-Slot Nominal Size)	Steel			Cast Iron		
	Groove Shape at Pre-process	T-Slotting Conditions	Conditions to prevent chattering	Groove Shape at Pre-process	T-Slotting Conditions	Conditions to prevent chattering
METS21-S25(-H) (Nominal Size 12)	C=1~3mm 	Vc=120 fz=0.1 (n=1,820) (Vf=182)	Vc=60 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.
- For cast iron machining, the bigger the C-dimension becomes, the less chattering occurs.

How to prevent damaging chips when steel machining

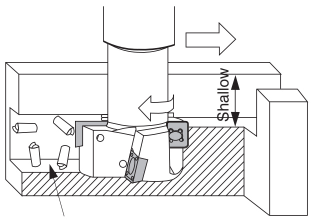
Before Improvement (Deep Groove at Pre-Process)



Chips stay in the pre-process groove.

Improvement of chip biting

After Improvement (Shallow Groove at Pre-Process)

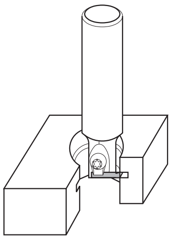


Chips are evacuated backward and chances of damaging chips are less.

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



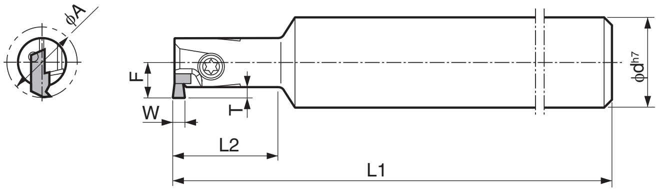


Fig.1

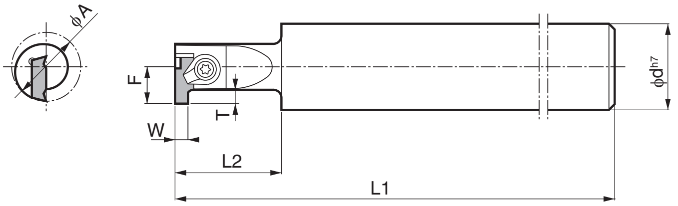
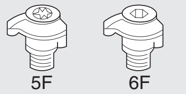
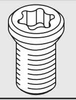
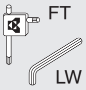


Fig.2

Toolholder Dimensions

Description		Std.	Min. Bore Dia.	Dimension (mm)					Edge Width	Drawing	Spare Parts			Applicable Inserts ➡ **M193**
											Clamp Set	Clamp Screw	Wrench	
			ϕA	ϕd	L1	L2	F	T	W		 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
	4025-1C	●	40			40	20							

・Dimension T 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

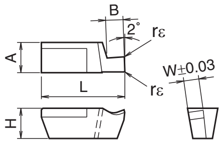
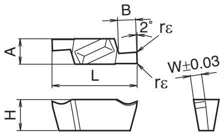
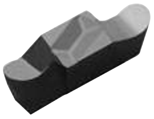
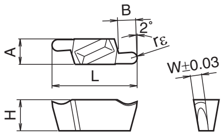
Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)					
		Cermet			MEGA COAT	PVD Coated Carbide	Carbide
		TN90	**TC40N**	**TC60M**	**PR1225**	**PR930**	**KW10**
Carbon Steel	0.05~0.15	★ 120~200	☆ 120~200	☆ 100~180	★ 80~150	☆ 80~150	-
Alloy Steel	0.05~0.15	★ 120~200	☆ 120~200	☆ 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

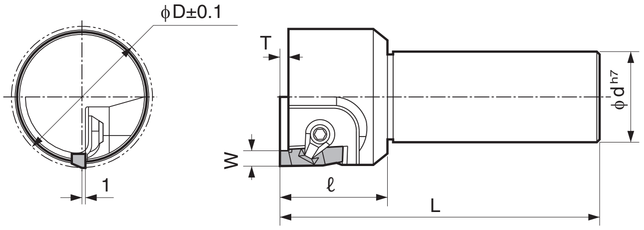
Insert		Description		Dimension (mm)						Insert Grades					
										Cermet			MEGA COAT	PVD Coated Carbide	Carbide
Handed Insert shows Right-hand				W	B	rε	A	L	H	TN90	TC40N	TC60M	PR1225	PR930	KW10
 1-edge		GVR	100-020SS	1.00	2.3	0.2	3.6	9	3.0	●		●	●	●	●
			125-020SS	1.25						●		●	●	●	●
			145-020SS	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				●		●	●	●	●

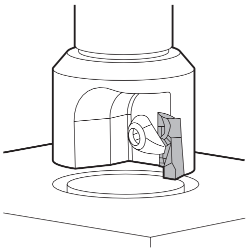
・Only Right-hand insert is applicable.

● : Std. Item

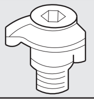
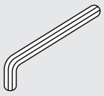
Ring Grooving End Mill MVG

MVG



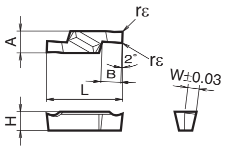


Toolholder Dimensions

Description		Std.	Dimension (mm)					Edge Width	Spare Parts	
									Clamp Set 	Wrench 
			ϕD	ϕd	L	ℓ	T	W		
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							

・Dimension T shows available grooving depth.

Applicable Inserts

Insert Handed Insert shows Right-hand		Description		Dimension (mm)						Insert Grades					
										Cermet			MEGA COAT	PVD Coated Carbide	Carbide
				W	B	rε	A	L	H	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		★ 120~200	☆ 100~180	★ 80~170	☆ 80~150	-
Alloy Steel	0.05~0.15		★ 120~200	☆ 100~180	★ 80~170	☆ 80~150	-
Mold Steel	0.03~0.12		★ 100~180	☆ 80~150	★ 60~150	☆ 60~130	-
Stainless Steel	0.03~0.12		☆ 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

Recommended Cutting Conditions

Cutting Conditions Table

◆ Recommended Cutting Conditions（MSD45 ➡ M43, MSP15 ➡ M51）

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)								
		Cermet			MEGACOAT		CVD Coated Carbide	Carbide	PCD	
		TN60	TN100M	TC60M	PR1225	PR1210	CA420M	KW10	KPD001	KPD010
Carbon Steel	~0.3		★ 120~200		★ 120~250	-	-	-	-	-
Alloy Steel	~0.3		★ 100~180		★ 100~220	-	-	-	-	-
Mold Steel	~0.25		★ 100~180		★ 80~180	-	-	-	-	-
Stainless Steel	~0.25		☆ 120~200		★ 120~220	-	-	-	-	-
Cast Iron	~0.3		-		-	★ 100~220	★ 170~300	☆ 80~150	-	-
Non-ferrous Metals	~0.2		-		-	-	-	★ 100~300	★ 300~800	☆ 300~800

★ : 1st Recommendation ☆ : 2nd Recommendation

◆ Recommended Cutting Conditions（MSO45 ➡ M44）

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)								
		Cermet			MEGACOAT		Carbide		PCD	
		TN60	TN100M	TC60M	PR1225	PR1210	PW30	KW10	KPD230	
Carbon Steel	~0.3		★ 120~200		★ 120~250	-		-	-	
Alloy Steel	~0.3		★ 100~180		★ 100~220	-		-	-	
Mold Steel	~0.25		★ 100~180		★ 80~180	-		-	-	
Stainless Steel	~0.25		☆ 120~200		★ 120~220	-		-	-	
Cast Iron	~0.3		-		-	★ 100~220		☆ 80~150	-	
Non-ferrous Metals	~0.2		-		-	-		★ 100~300	★ 300~800	

★ : 1st Recommendation ☆ : 2nd Recommendation

◆ Recommended Cutting Conditions（MSO45･･－09 ➡ M45）

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)								
		Cermet			MEGACOAT		Carbide		PCD	
		TN60	TN100M	TC60M	PR1225	PR1210	PW30	KW10	KPD001	KPD010
Carbon Steel	~0.3		★ 120~200					-		
Alloy Steel	~0.3		★ 100~180					-		
Mold Steel	~0.25		★ 100~180					-		
Stainless Steel	~0.25		☆ 120~200					-		
Cast Iron	~0.3		-					☆ 80~150		
Non-ferrous Metals	~0.2		-					★ 100~300		

★ : 1st Recommendation ☆ : 2nd Recommendation

◆ Recommended Cutting Conditions（MSE15 ➡ M51）

Workpiece Material	fz (mm/t)	Recommended Insert Grades (Cutting Speed Vc: m/min)								
		Cermet			MEGACOAT		Carbide		PCD	
		TN60	TN100M	TC60M	PR1225	PR1210	PW30	KW10	KPD001	KPD010
Carbon Steel	~0.25		★ 120~200							
Alloy Steel	~0.25		★ 100~180							
Mold Steel	~0.20		★ 100~180							
Stainless Steel	~0.20		☆ 120~200							
Cast Iron	~0.25		-							
Non-ferrous Metals	-		-							

★ : 1st Recommendation ☆ : 2nd Recommendation