How to mount an insert

1. Be sure to remove dust and chips from the insert mounting pocket.
2. Apply anti-seize compound on portion of taper and thread of clamp screw.
   (1) Attach the screw (magnetic head) to the front end of the wrench.
   (2) While lightly pressing the insert against the pocket walls,
   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.
   (Ref. to Fig. 2.) surface of the insert.
3. When tightening the screw, make sure that the wrench is parallel to the screw.
   For recommended torque, Ref. to E7
4. After tightening the screw, make sure that there is no clearance between the insert seat surface and the pocket floor of the holder or between the insert side surfaces and the pocket walls of the holder.
   If there is any clearance, remove the insert and mount it again according to the above steps.

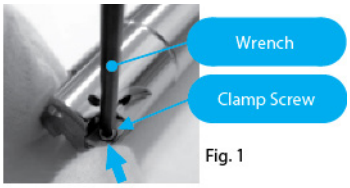


Fig. 1

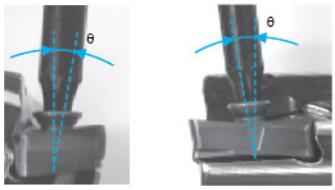


Fig.2

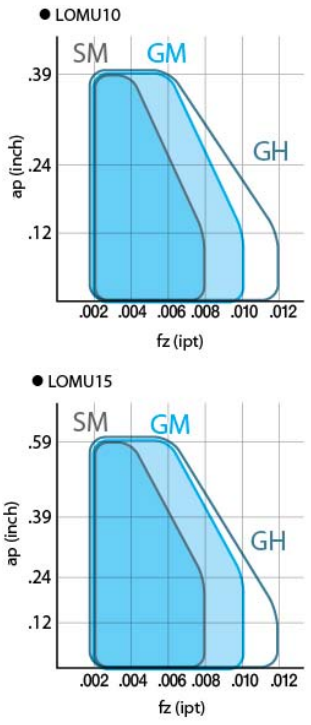
◆Recommended Cutting Conditions

Chipbreaker	Workpiece Material	fz (ipt) Description MEW0625~M0750 MEW16~MEW18	fz (ipt) Description MEW1000~MEW1500 MEW1500R~MEW3000R MEW20~MEW50 MEW032R~MEW080R	Recommended Insert Grades (Cutting Speed:sfm) MEGACOAT NANO PR1525	PR1510
GM	Carbon Steel	0.002~**0.004**~0.008	0.003~**0.006**~0.010	★ 390~**600**~820	-
	Alloy Steel	0.002~**0.004**~0.006	0.003~**0.006**~0.008	★ 325~**530**~720	-
	Mold Steel	0.002~**0.003**~0.005	0.003~**0.005**~0.008	★ 260~**450**~600	-
	Stainless Steel	0.002~**0.003**~0.005	0.003~**0.005**~0.006	☆ 325~**530**~650	-
	Gray Cast Iron	0.002~**0.004**~0.007	0.003~**0.007**~0.010	-	★ 390~**600**~820
	Nodular Cast Iron	0.002~**0.003**~0.005	0.003~**0.006**~0.008	-	★ 325~**500**~650
	Titanium Alloys	0.002~**0.003**~0.005	0.003~**0.006**~0.008	-	★ 100~**160**~225
SM	Carbon Steel	0.002~**0.004**~0.007	0.003~**0.006**~0.008	★ 390~**600**~820	-
	Alloy Steel	0.002~**0.003**~0.005	0.003~**0.005**~0.007	★ 325~**530**~720	-
	Mold Steel	0.002~**0.003**~0.005	0.003~**0.004**~0.006	★ 260~**450**~600	-
	Stainless Steel	0.002~**0.003**~0.005	0.003~**0.004**~0.006	★ 325~**530**~650	-
	Titanium Alloys	0.002~**0.003**~0.005	0.003~**0.005**~0.007	-	★ 100~**160**~225
GH	Carbon Steel	0.002~**0.004**~0.008	0.003~**0.008**~0.012	★ 390~**600**~820	-
	Alloy Steel	0.002~**0.004**~0.006	0.003~**0.008**~0.010	★ 325~**530**~720	-
	Mold Steel	0.002~**0.003**~0.005	0.003~**0.006**~0.009	★ 260~**450**~600	-
	Stainless Steel	0.002~**0.003**~0.005	0.003~**0.005**~0.006	★ 325~**500**~650	-
	Gray Cast Iron	0.002~**0.004**~0.008	0.003~**0.009**~0.012	-	★ 390~**600**~820
	Nodular Cast Iron	0.002~**0.003**~0.006	0.003~**0.007**~0.010	-	★ 325~**500**~650
	Titanium Alloys	0.002~**0.003**~0.005	0.003~**0.006**~0.008	-	★ 100~**160**~225

* Cutting with coolant is recommended for titanium alloys.

★: 1st Recommendation ☆: 2nd Recommendation

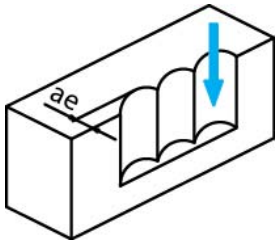
Applicable chipbreaker range (Shouldering)



Ramping, Helical milling and Vertical milling

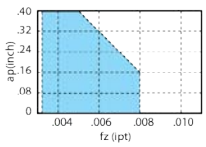
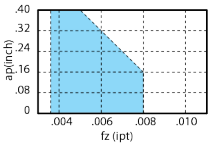
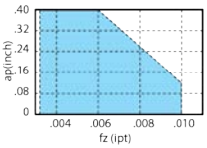
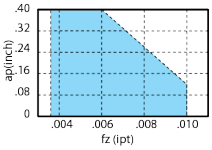
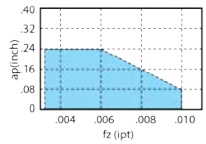
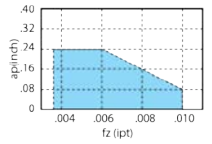
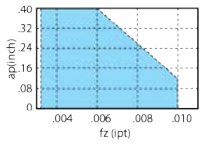
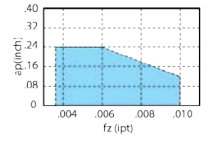
1. Available for vertical milling.
2. NOT available for ramping and helical milling, because interference between workpiece and insert may occur.

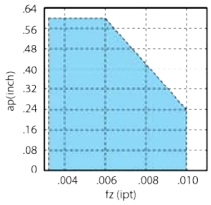
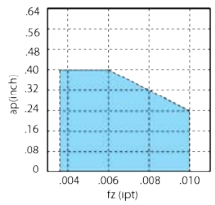
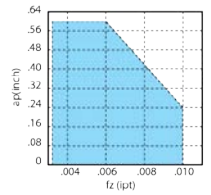
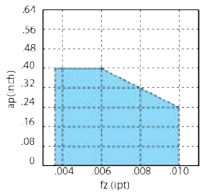
Vertical milling



Insert Description	Max. Width of Cut (ae)
LOMU10	0.197" (5mm)
LOMU15	0.276" (7mm)

Cutting Performance

Description	Shouldering (Cutting width ae = øD/2)	Slotting
MEW0625...-10 MEW0750...-10 MEW16...-10 MEW18...-10		
MEW1000...-10 ~ MEW1500...-10 MEW20...-10 ~ MEW50...-10		
MEW0750...-2T MEW1000...-2T (Long Shank) MEW20-...-2T MEW25-...-2T (Long Shank)		
MEW1500R...-10 ~ MEW2500R...-10 MEW032R...-10 ~ MEW063R...-10		

Description	Shouldering (Cutting width ae = øD/2)	Slotting
MEW1000...-15 ~ MEW1500...-15 MEW25...-15 ~ MEW50...-15		
MEW2000R...-15 ~ MEW3000R...-15 MEW040R...-15 ~ MEW080R...-15		

<Cutting Conditions>
· Vc=600 sfm
· GM Chipbreaker
· Workpiece Material: S50C
· Overhang Length
1. Endmill: Same length as ℓ of the dimension
2. Face mill: H of the dimension + minimum overhang length of the arbor

Case Studies

Structural Steel 1018

· Construction machine part
· Vc=820sfm
· ap×ae=0.158×0.787in
· fz=0.006ipt(Vf=53ipm)
· Wet
· MEW32-S32-10-4T(4 flutes)
· LOMU100408ER-GM(PR1525)

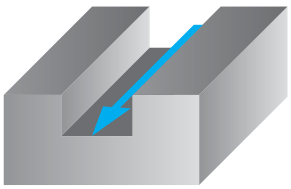
PR1525	Chip Removal=6.59in³/min.
Competitor A (Positive Cutter)	Chip Removal=4.39in³/min.

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

(Customer Evaluation)

Structural Steel 1018

· Machine parts
· Vc=820sfm
· ap×ae=0.128×0.787in (Grooving)
· fz=0.008ipt (Vf=94ipm)
· DRY
· MEW20-S20-10-3T(3 flutes)
· LOMU100408ER-GM(PR1525)



PR1525	Chip Removal =8.79in³/min (Stable milling)
Competitor B (Positive Cutter)	Chip Removal = 6.97in³/min (Unstable)

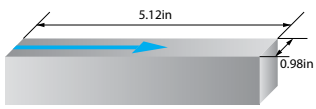
No chattering with MEW, while Competitor B chattered at the same cutting conditions.

No burrs with MEW and excellent surface finish is gained..

(Customer Evaluation)

Stainless Steel 15-5PH(42HRC)

· Aircraft Part
· Vc=590sfm
· ap×ae=0.079×0.984in
· fz=0.004ipt (Vf=28ipm)
· Wet
· MEW32-S32-10-4T(4 flutes)
· LOMU100408ER-GM(PR1525)



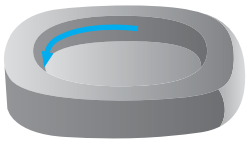
PR1525	Chip Removal = 2.18in³/min (Further Milling Possible)
Competitor C (Positive Cutter)	Chip Removal = 1.64in³/min (Unable to continue cutting)

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.

(Customer Evaluation)

Hot Die Steel SKD61(45HRC)

Mold Part
· Vc=330sfm
· ap×ae=0.138×1.181in
· fz=0.004ipt (Vf=15ipm)
· DRY
· MEW32-S32-10-4T(4 flutes)
· LOMU100408ER-GH(PR1525)

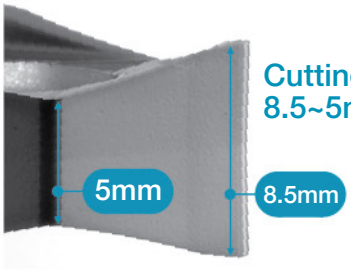


PR1525	Chip Removal = 2.56in³/min (Further Milling Possible)
Competitor D (Positive Cutter)	Chip Removal = 1.28in³/min (Unable to continue cutting)

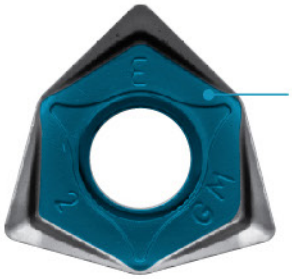
MEW doubled cutting efficiency. Furthermore, MEW inserts have double number of edges (4-edge), which enables a drastic cost reduction.

(Customer Evaluation)

Advantage 3 Superior Fracture Resistance due to Thick Edge Design



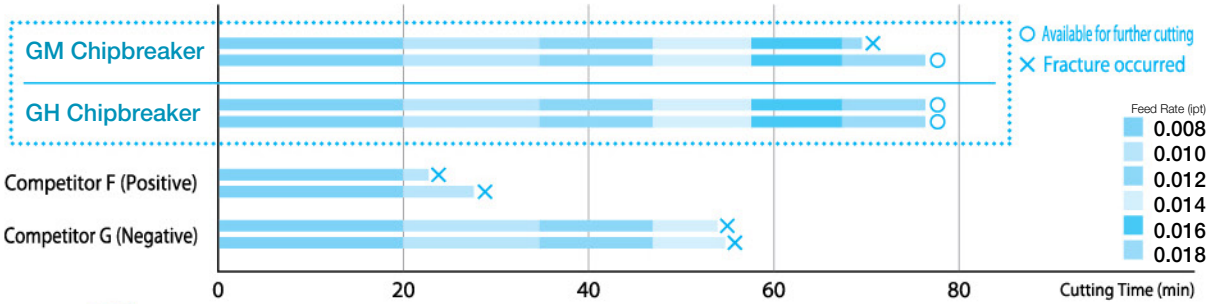
Cutting Edge Thickness: 8.5~5mm



Stable Clamping due to the Unique Insert Face Design

●Fracture Resistance Comparison

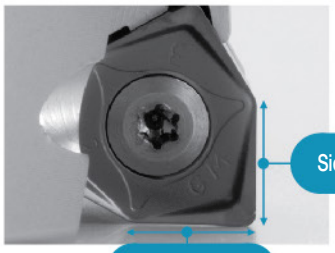
Cutting Condition: Workpiece Material: SCM440H (38~42HS) Vc=328sfm apxae = .080" x 4.000" | Interruption with a slot on the workpiece fz = .008~.018ipt DRY



Advantage 4 Neutral Inserts

Available for Shouldering and Facing

Neutral Insert are applicable to left-hand cutters (custom order).



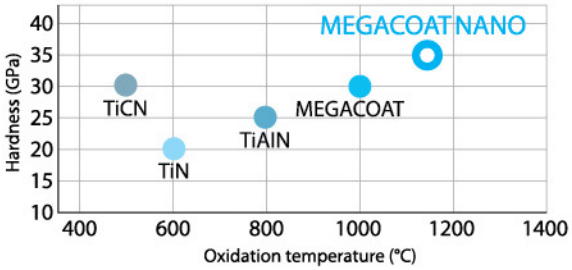
Wide Application Range

Advantage 5

Extended Tool Life by New MEGACOAT NANO Technology

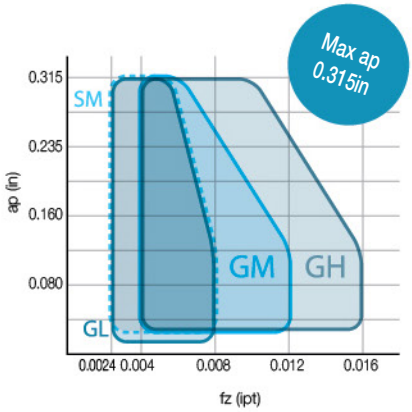
PR1525 for steel and stainless steel
PR1510 for cast iron

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

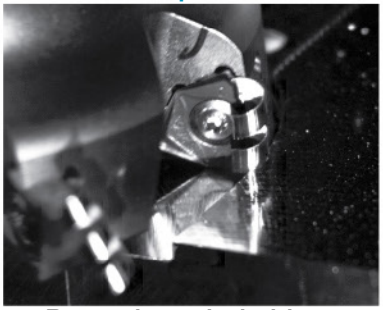


Advantage 6 4 Chipbreakers for Various Applications

Chipbreaker	Applications	Shape
GM	General Purpose	
SM	Low Cutting Force	
GH	Heavy Cutting	
GL	Surface Finish Oriented	



Smooth Chip Evacuation



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

Precautions for use (How to mount the 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 pocket walls, 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 holder for Extra fine pitch is inclined to the pocket floor. (Ref. to Fig. 2 and Fig. 3)
4. Be careful not to tighten the screw with excessive torque. Recommended 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 pocket floor of the holder or between the insert side surfaces and the pocket walls of the holder. 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

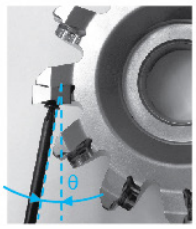


Fig.2

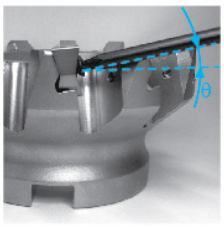


Fig.3

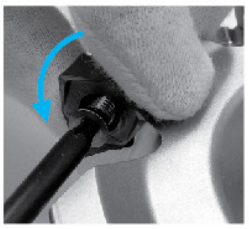


Fig.4

◆Recommended Cutting Conditions

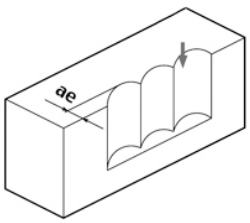
Workpiece Material	Insert Grades	Cutting Speed Vc (sfm)	Chipbreaker	fz (ipt) 0.002	0.004	0.008	0.012	0.016
Carbon Steel	PR1525	400~**600**~800	GM★		0.004	**0.008**	0.012	
			SM ☆	0.002		**0.005**	0.008	
			GH			0.008	**0.012**	0.016
			GL	0.002		**0.005**	0.008	
Alloy Steel	PR1525	320~**520**~720	GM★		0.004	**0.008**	0.012	
			SM ☆	0.002		**0.005**	0.008	
			GH ☆			0.008	**0.012**	0.016
			GL	0.002		**0.005**	0.008	
Mold Steel	PR1525	260~**450**~600	GM★		0.004	**0.006**	0.010	
			SM ☆	0.002	**0.003**			
			GH ☆			0.006	**0.008**	0.012
			GL	0.002	**0.003**	0.006		
Stainless Steel	PR1525	320~**500**~650	GM☆		0.004	**0.006**	0.010	
			SM ★	0.002		**0.005**	0.008	
			GL	0.002		**0.005**	0.008	
Gray Cast Iron	PR1510	390~**600**~820	GM★		0.004	**0.008**	0.012	
			SM	0.002		**0.005**	0.008	
			GH ☆			0.008	**0.012**	0.016
			GL	0.002		**0.005**	0.008	
Nodular Cast Iron	PR1510	325~**500**~650	GM★		0.004	**0.006**	0.010	
			SM	0.002	**0.003**	0.006		
			GH ☆			0.006	**0.008**	0.012
			GL	0.002	**0.003**	0.006		
Titanium Alloys	PR1510	100~**160**~225	SM ★	0.002	**0.003**	0.006		
			GL	0.002	**0.003**	0.006		

Cutter Specification	
	Coarse pitch (with shim)
	Fine pitch (without shim) (For GH Chipbreaker, fz=0.0118ipt is recommended.)
	Extra fine pitch (without shim) (The use of the GH breaker is not recommended.)

* The bold-faced number indicates a center value of recommended condition.

★: 1st Recommendation ☆: 2nd Recommendation

Vertical milling



Cutting Dia.	Max. Width of Cut (ae)
All items	0.315in (8mm)

Recommended Cutting Conditions (MEC Endmill / Face Mill)

·JT Chipbreaker

Workpiece Material	fz (ipt)		Recommended Insert Grades (Cutting Speed: sfm)				
	Holder		Cermet	MEGACOAT		PVD Coated Carbide	
	MEC0500~MEC0750 MEC10~MEC19	MEC1000~MEC1500 MEC20~MEC40 MEC1500R~MEC4000R MEC040R~MEC160R	TN100M	PR1225	PR1210	PR830	PR905
Stainless Steel	0.002~0.003~0.004	0.003~0.005~0.006	-	☆ 325~525~656	-	☆ 325~560~600	-
Carbon Steel	0.002~0.004~0.006	0.003~0.006~0.010	☆ 400~525~656	★ 400~600~820	-	☆ 400~525~656	-
Alloy Steel	0.002~0.004~0.005	0.003~0.006~0.008	☆ 325~560~600	★ 325~525~725	-	☆ 325~560~600	-
Mold Steel	0.002~0.003~0.004	0.003~0.005~0.008	☆ 250~400~492	★ 250~560~600	-	☆ 250~400~492	-
Gray Cast Iron	0.002~0.004~0.006	0.003~0.007~0.010	-	-	★ 400~600~820	-	☆ 325~560~600
Nodular Cast Iron	0.002~0.003~0.004	0.003~0.006~0.008	-	-	★ 325~492~656	-	☆ 250~400~525
Titanium Alloys	0.002~0.003~0.004	0.003~0.006~0.008	-	-	★ 98~164~225	-	☆ 75~115~164

* Cutting with coolant is recommended for Titanium Alloy.

★: 1st Recommendation ☆: 2nd Recommendation

·JS Chipbreaker

Workpiece Material	fz (ipt)		Insert Grades (Cutting Speed: sfm)		
	Holder		MEGACOAT	PVD Coated Carbide	
	MEC0500~MEC0750 MEC10~MEC19	MEC1000~MEC1500 MEC20~MEC40 MEC1500R~MEC4000R MEC040R~MEC160R	PR1225	PR830	PR1025
Stainless Steel	0.002~0.003~0.004	0.003~0.004~0.005	★ 400~600~820	☆ 325~450~600	☆ 325~450~600
Carbon Steel	0.002~0.004~0.005	0.003~0.006~0.007	★ 400~600~820	☆ 400~525~656	☆ 325~400~500
Alloy Steel	0.002~0.003~0.004	0.003~0.005~0.006	★ 325~525~725	☆ 325~450~600	-
Mold Steel	0.002~0.003~0.004	0.003~0.004~0.005	★ 250~450~600	☆ 250~400~500	-

★: 1st Recommendation ☆: 2nd Recommendation

· JA Chipbreaker

Workpiece Material	fz (ipt)	Insert Grades (Cutting Speed: sfm)
		Carbide
		GW25
Aluminium Alloys (Si 13% or below)	0.002~0.012	656~2625
Aluminium Alloys (Si 13% or above)	0.002~0.008	656~984

· PCD

Workpiece Material	fz (ipt)	Insert Grades (Cutting Speed: sfm)
		PCD
		KPD230 (KPD001)
Aluminium Alloys (Si 13% or bellow)	0.002~0.012	1640~4921
Aluminium Alloys (Si 13% or above)	0.002~0.006	984~3280

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

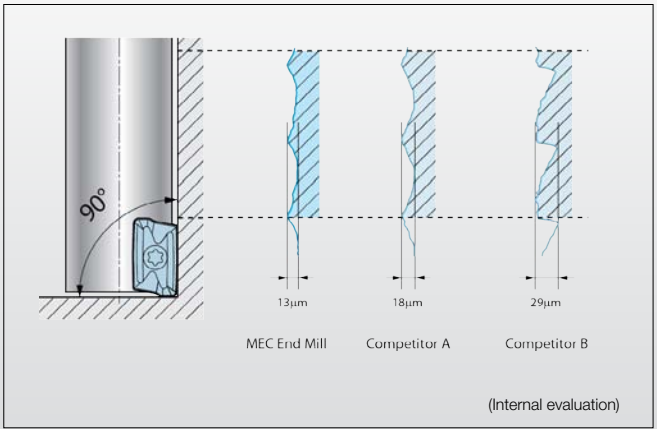
1. When running the endmill and the face mill at revolutions exceeding the maximum revolution limit, the inserts or toolholder may be damaged due to the centrifugal force.
2. For actual practical revolution, please set within recommended cutting condition.
3. When using at a higher revolution (over 10,000min^{-1}),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

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

Features of MEC

Perfect 90° Shoulders

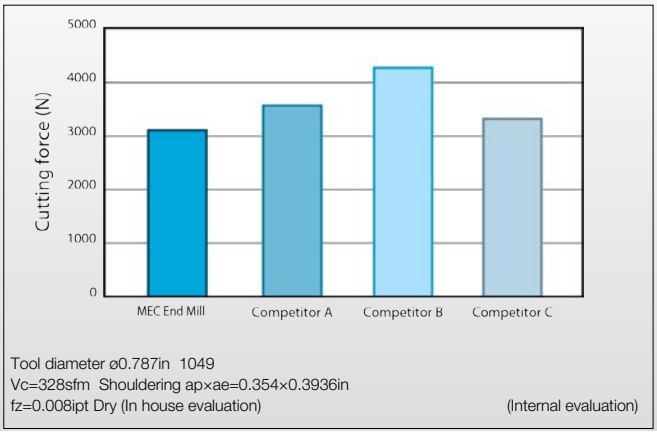
<Cutting Surface Comparison>



(Internal evaluation)

Low cutting force

<Cutting Force Comparison>

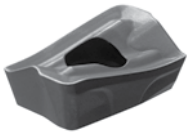


Tool diameter ø0.787in 1049
Vc=328sfm Shouldering ap×ae=0.354×0.3936in
fz=0.008ipt Dry (In house evaluation)

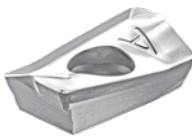
(Internal evaluation)

Chipbreaker

JT Chipbreaker (General Purpose)

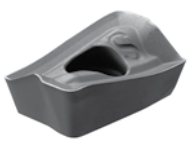


JA Chipbreaker (For Aluminum)



Low cutting force JS chipbreaker

Cutting force 20% lower

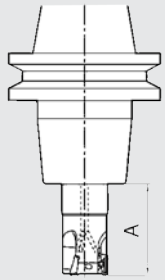


Cutting Performance of MEC Endmill

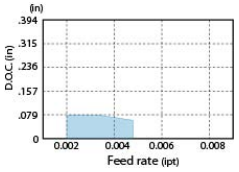
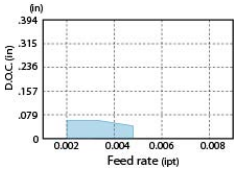
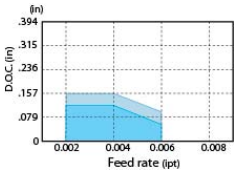
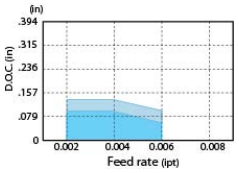
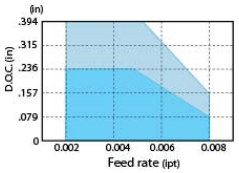
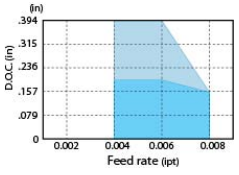
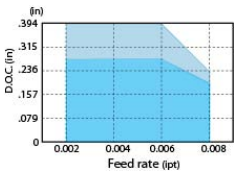
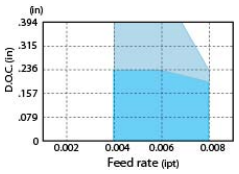
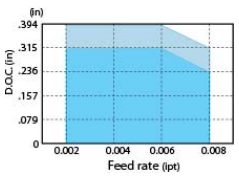
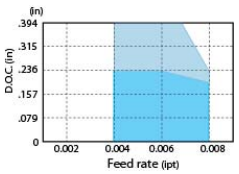
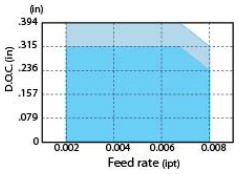
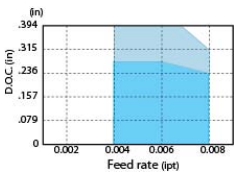
(1) Overhang Length When Using BDMT 11mm-type Insert
(Standard / Straight Shank)

Cutting Dia.	Description (mm / in)	Overhang Length A (in)	
ø8mm	MEC10-S10-11	0.670	-
ø12mm	MEC0500... MEC12-S16-11	0.787	1.180
ø16mm ø0.625in	MEC0625-S625-11T MEC16-S16-11T	1.180	1.790
ø0.750in ø20mm	MEC0750-S750-11T MEC20-S20-11T	1.180	1.790
ø1.000in ø25mm	MEC1000-S100-11T MEC25-S25-11T	1.260	1.890
ø1.250in ø32mm	MEC1250-S125-11T MEC32-S32-11T	1.580	2.360

Shape

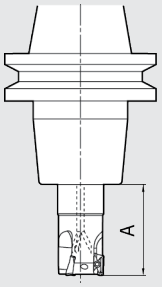


(JT chipbreaker Vc=400 SFM Workpiece :1049)

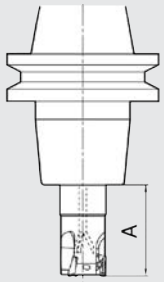
Description	■ Shouldering (Cutting width ae = øD/2)	■ Slotting ■ Ramping and Helical Milling
MEC10-S10-11		
MEC0500... MEC12-S16-11		
MEC0625-S625-11T MEC16-S16-11T		
MEC0750-S750-11T MEC20-S20-11T		
MEC1000-S100-11T MEC25-S25-11T		
MEC1250-S125-11T MEC32-S32-11T		

(2) Overhang Length When Using BDMT 11mm-type Insert

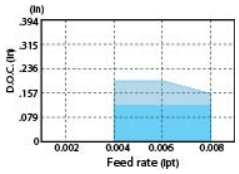
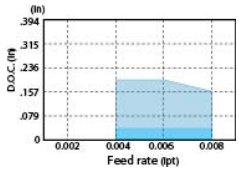
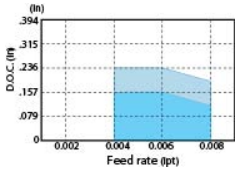
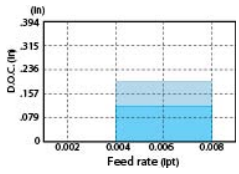
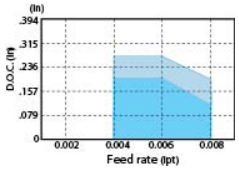
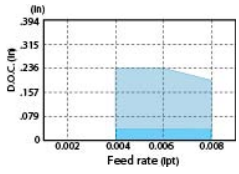
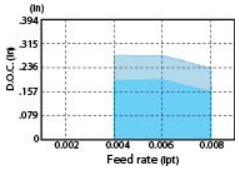
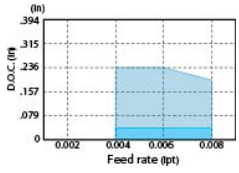
(Long Shank)

Cutting Dia.	Description	Overhang Length A (in)		Shape
ø0.750in ø20mm Long Shank	MEC20-S20-140-11T MEC0750-S750-5.2-11T	2.362	3.543	
ø1.000in ø25mm Long Shank	MEC25-S25-160-11T MEC1000-S100-6.3-11T	2.362	3.957	
ø1.250in ø32mm Long Shank	MEC32-S32-200-11T MEC1250-S125-7.9-11T	3.957	5.118	
ø1.500in ø40mm Long Shank	MEC40-S32-240-11T MEC1500-S125-9.5-11T	3.957	5.119	

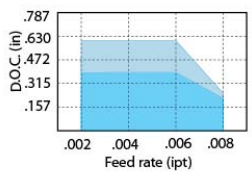
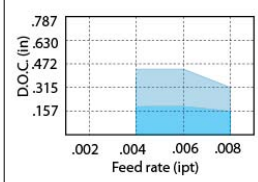
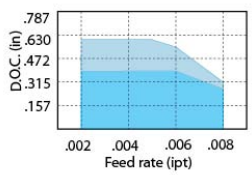
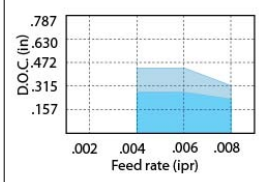
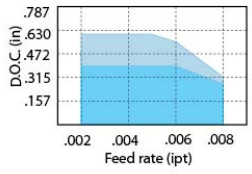
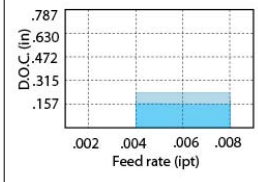
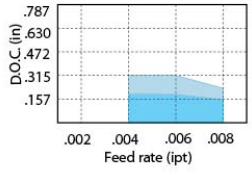
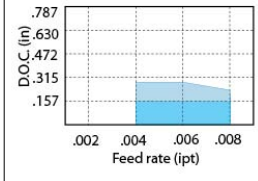
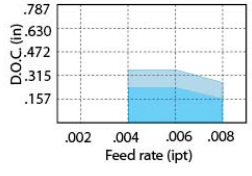
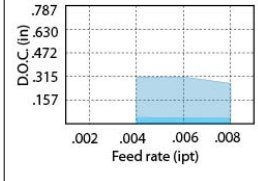
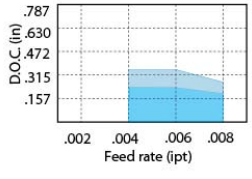
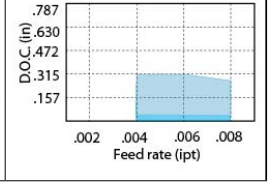
(3) Overhang Length When Using BDMT 17mm-type Insert

Cutting Dia.	Description	Overhang Length A (in)		Shape
ø1.000in ø25mm	MEC1000-S100-17 MEC25-S25-17	1.417	2.126	
ø1.250in ø32mm	MEC1250-S125-17 MEC32-S32-17	1.575	2.362	
ø1.500in ø40mm	MEC1500-S125-17 MEC40-S32-17	1.969	2.953	
ø1.000in ø25mm Long Shank	MEC1000-S100-6.3-17 MEC25-S25-160-17	2.362	3.937	
ø1.250in ø32mm Long Shank	MEC1250-S125-7.9-17 MEC32-S32-200-17	3.937	5.118	
ø1.500in ø40mm Long Shank	MEC1500-S125-9.5-17 MEC40-S32-240-17	3.937	5.118	

(JT chipbreaker Vc=400 SFM Workpiece :1049)

Description	■ Shouldering (Cutting width ae = øD/2)	■ Slotting ■ Ramping and Helical Milling
MEC0750-S750-5.2-11T MEC20-S20-140-11T Long Shank		
MEC1000-S100-6.3-11T MEC25-S25-160-11T Long Shank		
MEC1250-S125-7.9-11T MEC32-S32-200-11T Long Shank		
MEC1500-S125-9.5-11T MEC40-S32-240-11T Long Shank		

(JT chipbreaker Vc=400 SFM Workpiece :1049)

Description	■ Shouldering (Cutting width ae = øD/2)	■ Slotting ■ Ramping and Helical Milling
MEC1000-S100-17 MEC250S25-17		
MEC1250-S125-17 MEC32-S32-17		
MEC1500-S125-17 MEC40-S32-17		
MEC1000-S100-6.3-17 MEC25-S25-160-17		
MEC1250-S125-7.9-17 MEC32-S32-200-17		
MEC1500-S125-9.5-17 MEC40-S32-240-17		

E

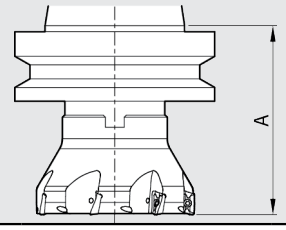
0° Lead Angle

Cutting Performance of MEC Milling Cutter

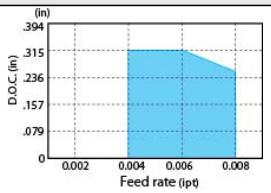
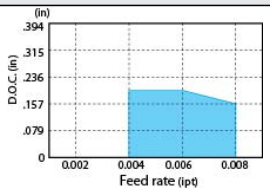
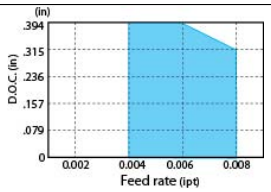
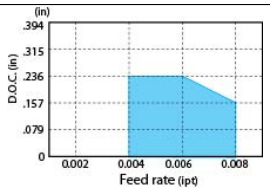
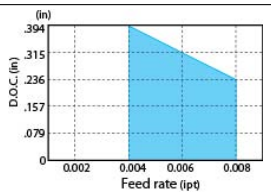
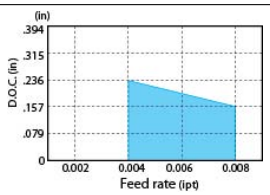
Overhang Length When Using BDMT 11mm-type Insert

Cutting Dia.	Description	Overhang Length A (in)
ø40mm ø1.500in	MEC1500R-11T-5T MEC040R-11-5T-M	4.528
ø50mm ø2.000in	MEC2000R-11T-5T MEC050R-11-OT-M	3.937
ø63mm ø2.500in	MEC2500R-11T-6T MEC063R-11-OT(-M)	3.740
	MEC063R-11-OT-M	
ø80mm ø3.000in	MEC3000R-11T-7T MEC080R-11-OT(-M)	3.740
ø100mm ø4.000in	MEC4000R-11-9TN MEC100R-11-9TN	4.252
ø125	MEC125R-11-11T(-M)	
ø160	MEC160R-11-14T(-M)	

Shape



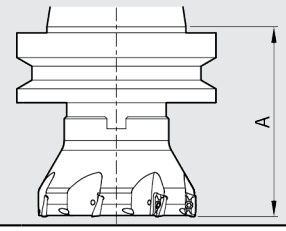
(JT chipbreaker Vc=400 SFM Workpiece :1049)

Description	■ Shouldering (Cutting width ae = øD/2)	■ Slotting
MEC1500R-11T-5T MEC040R-11-5T-M		
MEC2000R-○T-○T ~ MEC4000R-○T-○T MEC050R-11-○T-M ~ MEC100R-11-9TN MEC100R-11-9T-MN		
MEC125R-11-11T(-M) MEC160R-11-14T(-M)		

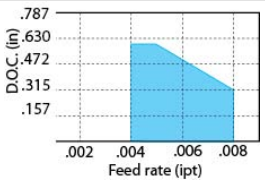
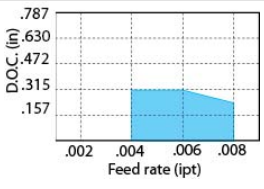
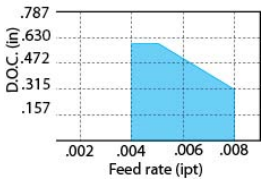
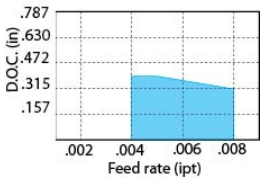
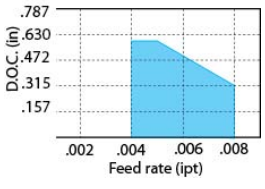
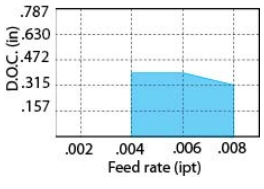
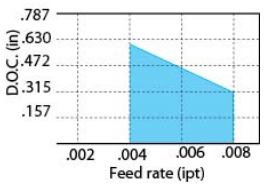
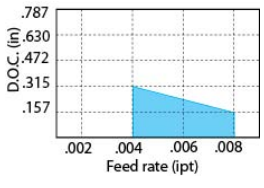
Overhang Length When Using BDMT 17mm-type Insert

Cutting Dia.	Description	Overhang Length A (mm)
ø40mm	MEC040R-17-4T-M	4.528
ø50mm ø2.000in	MEC2000R-17-4T MEC050R-17-OT-M	3.937
ø63mm ø2.500in	MEC2500R-17-4T MEC063R-17-OT	3.740
	MEC3000R-17-6T MEC063R-17-OT-M	
ø80mm ø3.000in	MEC4000R-17-7T MEC080R-17-OT	3.740
ø100mm ø4.000in	MEC100R-17-OTN	4.252
ø125mm	MEC125R-17-9T(-M)	
ø160mm	MEC160R-17-12T(-M)	

Shape



(JT chipbreaker Vc=400 SFM Workpiece :1049)

Description	■ Shouldering (Cutting width ae = øD/2)	■ Slotting
MEC040R-17-4T-M		
MEC2000R-17-4T MEC050R-17-○T-M		
MEC2500R-17-○T ~ MEC4000R-17-○TN MEC063R-17-○T(-M) ~ MEC100R-17-○TN MEC100R-17-7T-MN		
MEC125R-17-9T(-M) MEC160R-17-12T(-M)		

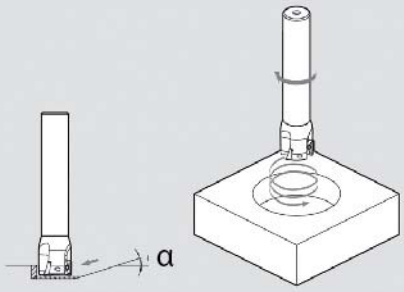
E

0° Lead Angle

Ramping, Helical milling and Vertical milling

Ramping, Helical Milling

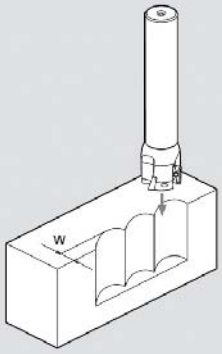
• Ramping angle should be under α °



Cutting diameter	Applicable Insert	Max. ramping angle (α°)
.625	BDMT 11T3	3°
.750		5°
1.00		2.5°
1.25		1.5°
1.50		.7°
1.00	BDMT 1704	8°
1.25		5°
1.50		2.5°

BDMT 1103 insert not recommended for slant or helical milling

Vertical Milling



Cutting diameter	Applicable Insert	Max. D.O.C. (W)
.625"	BDMT 11T3	.060
.750 / 4.00"	BDMT 11T3	.197
.250 / 4.00"	BDMT 1704	.315

BDMT 1103 insert not recommended for vertical milling

◆Recommended Cutting Conditions

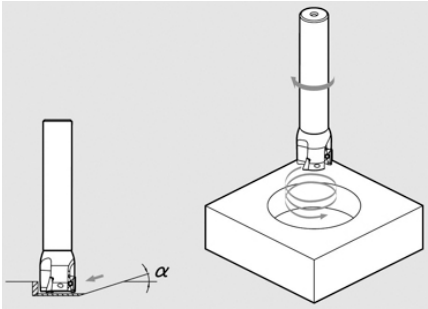
Workpiece Material	fz (ipt)		Recommended Insert Grades (Cutting Speed Vc: sfm)				
	JS Chipbreaker	JT Chipbreaker	MEGACOAT		PVD Coated Carbide		
			PR1225	**PR1210**	**PR830**	**PR1025**	**PR905**
Stainless Steel	0.0012~0.0016~0.0020	0.0020~0.0024~0.0028	★ 400~600~820	-	-	☆ 325~525~656	-
Carbon Steel	0.0016~0.0031~0.0039	0.0024~0.0039~0.0047	★ 400~600~820	-	☆ 400~500~600	-	-
Alloy Steel	0.0016~0.0024~0.0031	0.0024~0.0031~0.0039	★ 325~525~725	-	☆ 325~450~600	-	-
Mold Steel	0.0016~0.0024~0.0031	0.0024~0.0031~0.0039	★ 250~450~600	-	☆ 250~400~500	-	-
Gray Cast Iron	0.0016~0.0031~0.0039	0.0031~0.0039~0.0059	-	★ 400~600~820	-	-	☆ 325~450~600
Nodular Cast Iron	0.0016~0.0024~0.0031	0.0031~0.0039~0.0047	-	★ 325~500~656	-	-	☆ 250~400~525
Titanium Alloys	0.0016~0.0024~0.0031	0.0031~0.0039~0.0047	-	★ 98~164~225	-	-	☆ 75~115~164

* Cutting with coolant is recommended for titanium alloys.

★: 1st Recommendation ☆: 2nd Recommendation

Slant Milling / Helical Milling

For the plunge depth per revolution when helical milling, refer to the cutting performance data for each tool. Use compressed air during machining.

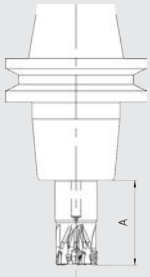


Cutting Dia. (in)	Applicable Insert	Max.Ramping Angle (α°)
ø.315	BDMT0703	Not Recommended
ø.400		1.5°
ø.472,ø.551		2°
ø.630		3°
ø.669,ø.709		1.5°
ø.787		2°
ø.827		1.8°
ø1.00		1.3°
ø1.02		1.2°
ø1.26		0.8°
ø1.30		0.5°

Cutting Performance of MECX Endmill

Cutting Dia.	Description	Overhang Length A (in)	
ø8mm	**MECX08-S10-07-1T**	0.630	-
ø0.375in ø10mm	**MECX0375-S375-07-1T MECX10-S10-07-1T**	0.670	-
ø0.500in ø12mm	**MECX0500-S500-07-2T MECX12-S12-07-2T**	0.709	1.18
ø0.625in ø16mm	**MECX0625-S625-07-4T MECX16-S16-07-3T**	0.787	1.57
ø0.750in ø20mm	**MECX0750-S750-07-4T MECX20-S20-07-4T**	0.787	1.57
ø1.000in ø25mm	**MECX1000-S100-07-5T MECX25-S25-07-5T**	1.000	1.97
ø1.250in ø32mm	**MECX1250-S125-07-6T MECX32-S32-07-6T**	1.180	1.97

Shape



* Machining with extended overhang length is not recommended for ø0.315in and ø0.394in.

* 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**

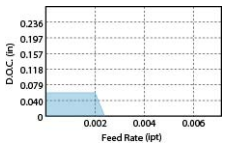
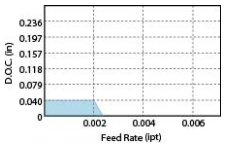
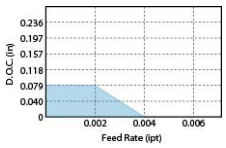
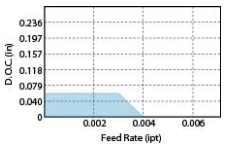
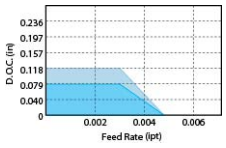
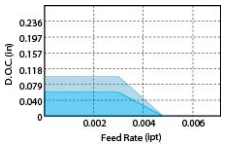
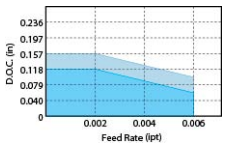
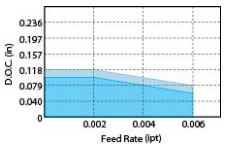
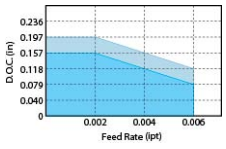
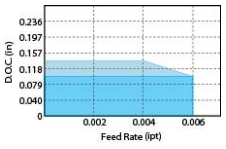
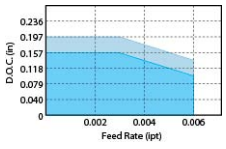
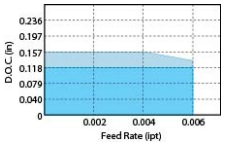
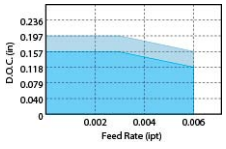
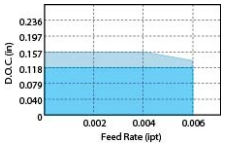
(1) For MECX0375~MECX0500 / MECX08~MECX12

Decrease the feed rate by 25% according to cutting capability list.

(2) For MECX 0625 / MECX16 and over

Decrease the feed rate and ap by 30% according to cutting capability list.

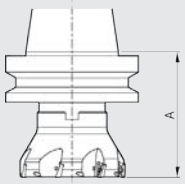
(JT chipbreaker Vc=400 SFM Workpiece :1049)

Description	■ Shouldering (Cutting width ae = øD/2)	■ Slotting ■ Ramping and Helical Milling
MECX08-S10-07-1T		
MECX0375-S375-07-1T MECX10-S10-07-1T		
MECX0500-S500-07-2T MECX12-S12-07-2T		
MECX0625-S625-07-4T MECX16-S16-07-3T		
MECX0750-S750-07-4T MECX20-S20-07-4T		
MECX1000-S100-07-5T MECX25-S25-07-5T		
MECX1250-S125-07-6T MECX32-S32-07-6T		

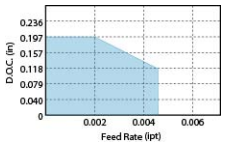
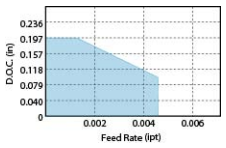
Cutting Performance of MECX Face Mill

Cutting Dia.	Description	Overhang Length A (in)
ø1.250in ø32mm	**MECX1250R-07-8T MECX032R-07-8T-M**	3.937
ø1.500in ø40mm	**MECX1500R-07-10T MECX040R-07-10T-M**	
ø2.000in ø50mm	**MECX2000R-07-12T MECX050R-07-12T-M**	
ø2.500in ø63mm	**MECX2500R-07-14T MECX063R-07-14T-M**	

Shape



(JT chipbreaker Vc=400 SFM Workpiece :1049)

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

* Not Recommended for Slotting.

Recommended Cutting Conditions (When using a notched insert)

Workpiece Material	fz (ipt)	Recommended Insert Grades (Cutting Speed: sfm)				
		MEGACOAT			PVD Coated Carbide	
		PR1225	PR1230	PR1210	PR830	PR905
Carbon Steel	0.003~0.004~0.006	☆ 400~600~875	★ 400~600~725	-	☆ 325~450~600	-
Alloy Steel	0.003~0.004~0.006	☆ 325~525~725	★ 325~525~650	-	☆ 325~450~600	-
Mold Steel	0.003~0.004~0.006	☆ 250~450~600	★ 250~450~525	-	☆ 325~400~500	-
Gray Cast Iron	0.003~0.006~0.007	-	-	★ 400~600~875	-	☆ 325~450~600
Nodular Cast Iron	0.003~0.006~0.007	-	-	★ 325~500~725	-	☆ 325~400~500
Titanium Alloys	0.003~0.004~0.006	-	-	★ 325~175~225	-	☆ 75~125~175

* Cutting with coolant is recommended for titanium alloy.

★: 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.

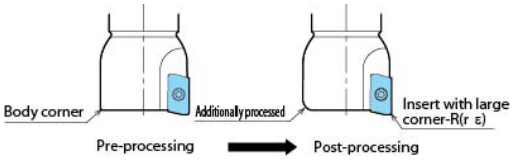
· JA Chipbreaker

Workpiece Material	fz (ipt)	Recommended Insert Grades (Cutting Speed Vc : sfm)
		Carbide
		GW25
Aluminum Alloy (Si 13% or less)	0.002~0.012	656~2625
Aluminum Alloy (Si 13% or less)	0.002~0.008	656~984

■ 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 is 1.2mm or less.)

Insert Corner-R(rε)	Additional Processing Dimension to Body Corner
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.

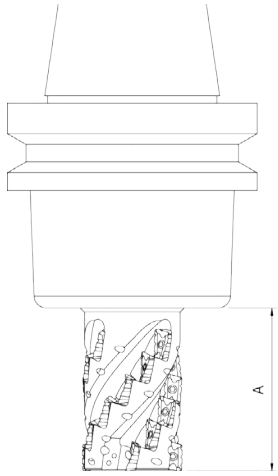


Cutting Performance (Used Machine: Machining center equivalent to AC15 / 18.5kW)

●MECH Endmill Type

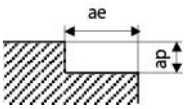
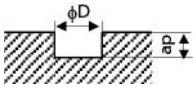
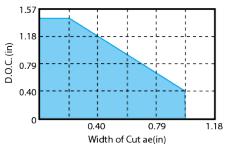
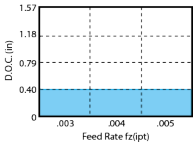
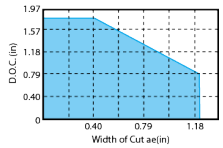
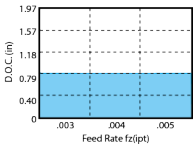
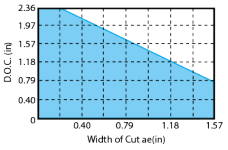
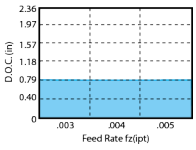
Cutting Dia.	Description	Overhang Length A (in)
ø1.00in ø25mm	MECH1000-W1000-11-4-2T MECH025-S25-11-4-2T	1.89
ø1.25in ø32mm	MECH1250-W1250-11-5-2T MECH032-S32-11-5-2T	2.24
	MECH1250-W1250-11-5-4T MECH032-S32-11-5-4T	
ø1.50in ø40mm	MECH1500-W1250-11-6-4T MECH040-S32-11-6-4T	2.56
	MECH1500-W1500-11-6-4T MECH040-S42-11-6-4T	
ø2.00in ø50mm	MECH2000-W1500-11-7-4T MECH050-S42-11-7-4T	2.99
	MECH2000-W1500-11-7-6T MECH050-S42-11-7-6T	
ø1.50in ø40mm	MECH1500-W1250-17-4-2T MECH040-S32-17-4-2T	2.91
	MECH1500-W1500-17-4-2T MECH040-S42-17-4-2T	
ø2.00in ø50mm	MECH2000-W1500-17-5-4T MECH050-S42-17-5-4T	3.50

Shape

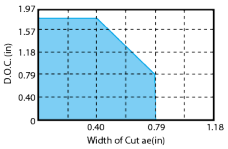
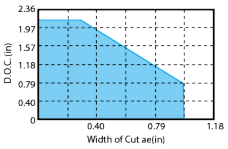
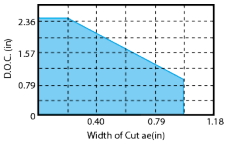
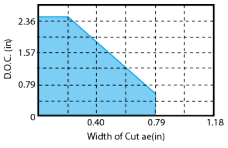
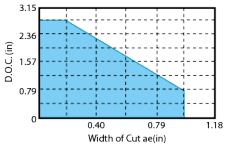


2 Flute Type

(Workpiece Material:1049)

Description	■ Shouldering	■ Slotting
		
	Cutting Speed: Vc=325~590sfm Feed: fz=0.003~0.006 ipt	Cutting speed: Vc=325~400sfm Feed: fz=0.003~0.005 ipt
MECH1000-W1000-11-4-2T MECH025-S25-11-4-2T		
MECH1250-W1250-11-5-2T MECH032-S32-11-5-2T		
MECH1500-W1250-17-4-2T MECH1500-W1500-17-4-2T MECH040-S32-17-4-2T MECH040-S42-17-4-2T		

4 Flute / 6 Flute Type

MECH1250-W1250-11-5-4T MECH032-S32-11-5-4T	
MECH1500-W1250-11-6-4T MECH1500-W1500-11-6-4T MECH040-S32-11-6-4T MECH040-S42-11-6-4T	
MECH1200-W1500-11-7-4T MECH050-S42-11-7-4T	
MECH1200-W1500-11-7-6T MECH050-S42-11-7-6T	
MECH1200-W150017-5-4T MECH050-S42-17-5-4T	

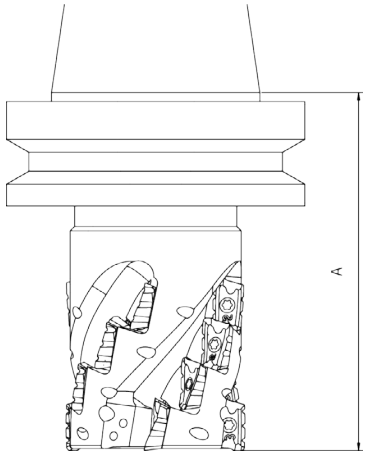
4 Flute / 6 Flute Type are not recommended for Slotting.

●MECH Shell Mill Type

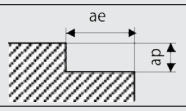
(Workpiece Material: 1049)

Cutting Dia.	Description	Overhang Length A (in)
ø1.58in ø40mm	MECH040R-11-4-4T-M	4.92
ø2.00in ø50mm	MECH2000R-11-5-6T MECH050R-11-5-6T-M	4.84
	MECH2000R-17-2-4T MECH050R-17-2-4T-M	4.41
	MECH2000R-17-4-4T MECH050R-17-4-4T-M	5.43
ø2.48in ø63mm	MECH063R-17-3-4T-O	4.53
ø3.15in ø80mm	MECH080R-17-4-6T-O	5.12
ø3.94in ø100mm	MECH100R-17-4-6T-O	5.12

Shape

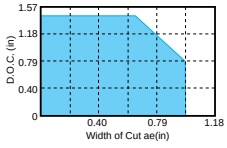


■ Shouldering

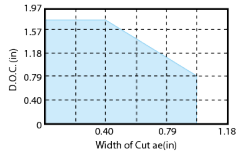


Cutting speed: Vc=325~600sfm
Feed: fz=0.003~0.006ipt

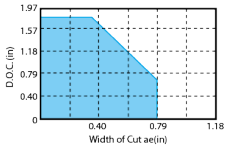
MECH040R -11-4-4T-M



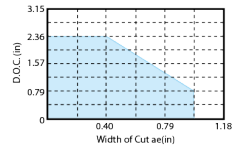
MECH063R -17-3-4T-O



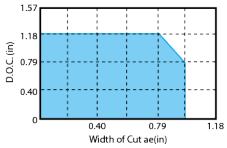
MECH2000R -11-5-6T
MECH050R -11-5-6T-M



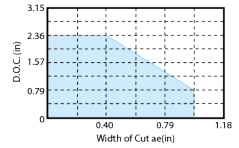
MECH080R -17-4-6T-O



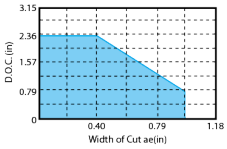
MECH2000R -17-2-4T
MECH050R -17-2-4T-M



MECH100R -17-4-6T-O



MECH2000R -17-4-4T
MECH050R -17-4-4T-M



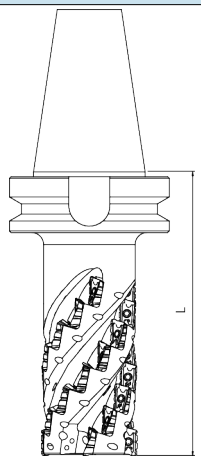
Slotting is not recommended.

●MECH-BT50 (Integral Arbor type)
MECH-BT50SA (Replaceable Head type / Integral Arbor type)

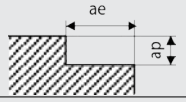
(Workpiece Material: 1049)

Cutting Dia.	Description	Overhang Length L (in)
ø50mm	MECH050R11-8-4T-BT50 MECH050R11-4T-BT50SA	143
	MECH050R17-7-4T-BT50	173
ø63mm	MECH063R17-7-4T-BT50 MECH063R17-4T-BT50SA	
ø80mm	MECH080R17-7-4T-BT50 MECH080R17-4T-BT50SA	
ø100mm	MECH100R17-7-6T-BT50 MECH100R17-6T-BT50SA	

Shape

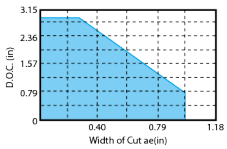


■ Shouldering

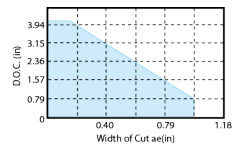


Cutting speed: Vc=325~600sfm
Feed: fz=0.003~0.006ipt

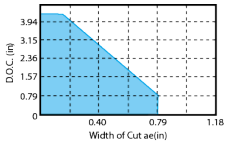
MECH050R11 -8-4T-BT50
MECH050R11 -4T-BT50SA



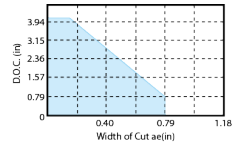
MECH080R17 -7-4T-BT50
MECH080R17 -4T-BT50SA



MECH050R17 -7-4T-BT50

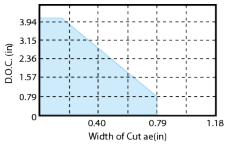


MECH100R17 -7-6T-BT50
MECH100R17 -6T-BT50SA



Slotting is not recommended.

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



◆Recommended Cutting Conditions

Workpiece Material	fz (ipt)		Recommended Insert Grades (Cutting Speed: sfm)				
	Low Cutting Force	General Purpose	MEGACOAT		PVD Coated Carbide		
	NB3P+NB4P	NB3+NB4	PR1230	PR1210	PR660	PR830	PR905
Cast Iron	0.006	0.008	-	★ 325~500~650	-	-	☆ 325~450~600
Carbon Steel	0.006	0.008	★ 325~500~650	-	☆ 325~450~600	☆ 325~500~600	-
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 protruding length of toolholder is small, ➡ set the cutting speed to slightly higher than the recommended cutting conditions.
- When the protruding length of toolholder is large, ➡ set the cutting speed to slightly lower than the recommended cutting conditions.

■ Cutting Conditions

1) Shouldering

●When using MSR100R-1

Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in3/min)
		Cutting speed	fz		
Cast Iron	Less than 3.94in	Vc=590sfm	fz=0.008ipt	0.79×3.15	67.13
	3.94~7.87in	Vc=590sfm	fz=0.008ipt	0.79×1.57	33.56
	7.91in and over	Vc=400sfm	fz=0.008ipt	0.79×1.18	16.84
Carbon Steel	Less than 3.94in	Vc=500sfm	fz=0.008ipt	0.79×3.15	56.14
	3.94~7.87in	Vc=500sfm	fz=0.008ipt	0.79×1.57	28.07
	7.91in and over	Vc=325sfm	fz=0.008ipt	0.79×1.18	13.91

●When using MSR100R-2

Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in3/min)
		Cutting speed	fz		
Cast Iron	Less than 5.12in	Vc=590sfm	fz=0.008ipt	1.57×1.57	67.13
	5.12~9.06in	Vc=590sfm	fz=0.008ipt	1.57×0.79	33.56
	9.09in and over	Vc=400sfm	fz=0.008ipt	1.57×0.79	22.46
Carbon Steel	Less than 5.12in	Vc=500sfm	fz=0.008ipt	1.57×1.57	56.14
	5.12~9.06in	Vc=500sfm	fz=0.008ipt	1.57×0.79	28.07
	9.09in and over	Vc=325sfm	fz=0.008ipt	1.57×0.79	18.55

●When using MSR100R-4

Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in3/min)
		Cutting speed	fz		
Cast Iron	Less than 7.09 in	Vc=590sfm	fz=0.008ipt	2.95×0.79	63.16
	7.09~11.02in	Vc=590sfm	fz=0.008ipt	2.95×0.39	31.61
	11.06in and over	Vc=400sfm	fz=0.008ipt	2.95×0.39	21.05
Carbon Steel	Less than 7.09 in	Vc=500sfm	fz=0.008ipt	2.95×0.79	52.66
	7.09~11.02in	Vc=500sfm	fz=0.008ipt	2.95×0.39	26.30
	11.06in and over	Vc=325sfm	fz=0.008ipt	2.95×0.39	17.39

2) Slotting

●When using MSR100R-1

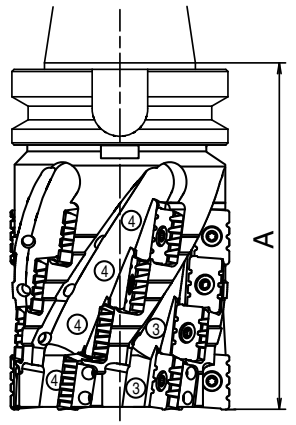
Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in3/min)
		Cutting speed	fz		
Cast Iron	Less than 3.94in	Vc=590sfm	fz=0.008ipt	0.55×3.94	58.95
	3.94~7.87in	Vc=500sfm	fz=0.008ipt	0.28×3.94	24.59
	7.91in and over	Vc=400sfm	fz=0.008ipt	0.16×3.94	11.23
Carbon Steel	Less than 3.94in	Vc=500sfm	fz=0.008ipt	0.28×3.94	24.59
	3.94~7.87in	Vc=400sfm	fz=0.008ipt	0.16×3.94	11.23
	7.91in and over	Vc=325sfm	fz=0.008ipt	0.12×3.94	6.96

●When using MSR100R-2

Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in3/min)
		Cutting speed	fz		
Cast Iron	Less than 5.12in	Vc=590sfm	fz=0.008ipt	0.55×3.94	58.95
	5.12~9.06in	Vc=500sfm	fz=0.008ipt	0.28×3.94	24.59
	9.09in and over	Vc=400sfm	fz=0.008ipt	0.16×3.94	11.23
Carbon Steel	Less than 5.12in	Vc=500sfm	fz=0.008ipt	0.28×3.94	24.59
	5.12~9.06in	Vc=400sfm	fz=0.008ipt	0.16×3.94	11.23
	9.09in and over	Vc=325sfm	fz=0.008ipt	0.12×3.94	6.96

*Slotting is not recommended for 4 stage cutters

Overhang Length A (in)



2) Slotting

●When using MSR160R-1

Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in³/min)
		Cutting speed	fz		
Cast Iron	Less than 3.94in	Vc=600sfm	fz=0.008ipt	0.39×6.30	56.63
	3.94~7.87in	Vc=500sfm	fz=0.008ipt	0.20×6.30	28.32
	7.91in and over	Vc=400sfm	fz=0.008ipt	0.16×6.30	14.83
Carbon Steel	Less than 3.94in	Vc=500sfm	fz=0.008ipt	0.20×6.30	23.43
	3.94in~7.87in	Vc=400sfm	fz=0.008ipt	0.12×6.30	14.04
	7.91in and over	Vc=325sfm	fz=0.008ipt	0.08×6.30	6.22

●When using MSR160R-2

Workpiece Material	Overhang Length A (in)	Cutting Conditions		ap×ae (in)	Chip Removal Rate (in³/min)
		Cutting speed	fz		
Cast Iron	Less than 5.12in	Vc=600sfm	fz=0.008ipt	0.39×6.30	56.63
	5.12~9.06in	Vc=500sfm	fz=0.008ipt	0.20×6.30	23.43
	9.09in and over	Vc=400sfm	fz=0.008ipt	0.16×6.30	14.83
Carbon Steel	Less than 5.12in	Vc=500sfm	fz=0.008ipt	0.20×6.30	23.43
	5.12~9.06in	Vc=400sfm	fz=0.008ipt	0.12×6.30	11.11
	9.09in and over	Vc=325sfm	fz=0.008ipt	0.08×6.30	6.22

*Slotting is not recommended for 4 stage cutters

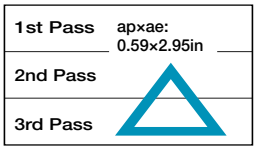
Q&A

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

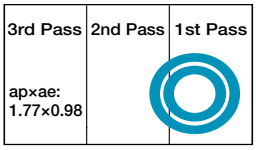
A-1 Vc=500sfm, fz=0.008ipt, larger cutting depth and smaller cutting width

In case of MSR100R-2

e.g.) Load meter 120%



e.g.) Load meter 90%



Q-2 What is the required equipment for MSR?

A-2 Maximum spindle revolution should be lower than 4000RPM. BT50 or larger.
* The reason it is not recommended for high RPM spindle machines is due to their lower torque value.
* Although MSR works with BT40 shank, maximum available fz is about 0.004ipt.

Q-3 What are the points to remember when using a lower horsepower machine?

A-3 Do not use large size cutters. ➡Ø2.5" or Ø3.0" are 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.
In conditions of Vc=500sfm, insufficient torque was amiable due to being in high gear.
In this case, use Vc which can exert enough torque, such as Vc=400sfm.
* Machine torque curve is a priority.

Q-4 How do I deal with an unstable workpiece?

A-4 Decrease feed rate during the initial cut.

* Vibration and workpiece movement are most likely to occur upon the cutters initial entry entry into the cut.

• Effective combinations for maintaining cycle time while reducing the feedrate.
Vc=500sfm, fz=0.008ipt
↓
Vc=650sfm, fz=0.006ipt

Q-5 What tool life can I expect?

A-5 Example:
Chip weight: 700kg/Corner (Result by PR660)
Cutting time: 90min. (calculated value)
Cutting distance: 65m (calculated value)
Metal Removal Rate? ➡ 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) x 717mm/min (Table feed ratio per 1min)=65m
* Cutting Vc=150m/min, apxae: 20x70mm, Vf=717mm/min.
* Tool: MSR100R-2 (6 Flutes)

Q-6 How do I reduce chattering?

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

In case of Steel
· Vc=250sfm
· fz=0.010ipt

In case of Cast Iron
· Vc=250sfm
· fz=0.014ipt