



RAD-8

MRW High Efficiency
Radius Cutter

- **Lower Cutting Costs**
with economical 8-edged inserts
- **Lower Cutting Forces**
with Kyocera's helical cutting edge design
- **Higher Stability**
with flat lock structure

WIDE
range of applications
from **steel** to **difficult-to-cut**
materials

NEW **CA6535** (CVD)
Difficult-to-cut Materials

NEW **PR1535** (PVD)
Stainless Steel





RAD-8



The MRW Radius Cutter Lowers Cutting Costs and Increases Efficiency!

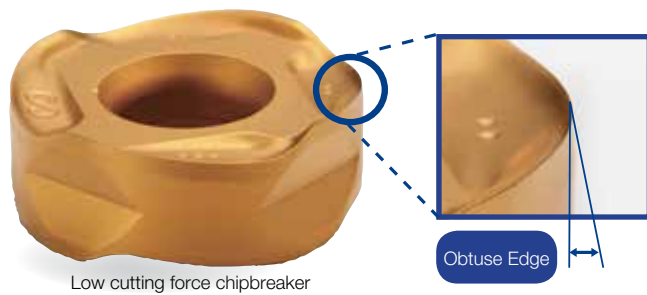
The double-faced inserts improve milling in a wide variety of materials

Advantages

1 Economical 8-edge insert

2 Combined sharpness & cutting edge strength

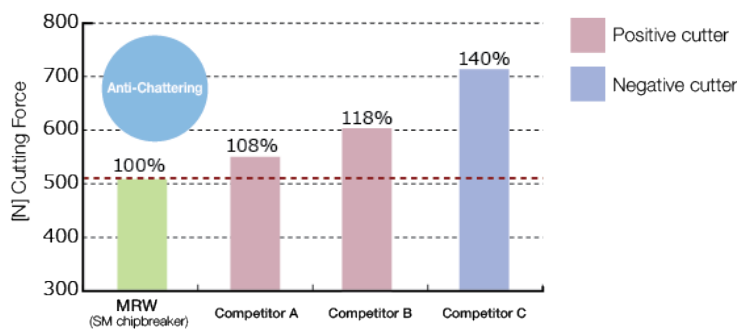
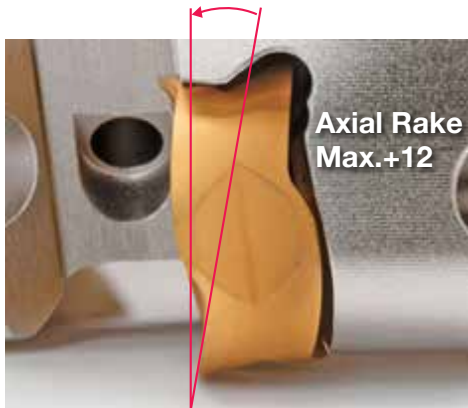
Improved edge strength due to obtuse edge



Low cutting force chipbreaker

3 Helical cutting edge design with maximum axial rake 12°

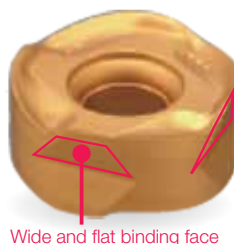
Lower cutting forces equivalent to positive inserts



< Cutting Condition >
 $V_c=400\text{sfm}$, $a_p \times a_e=0.039" \times 1.575"$, $f_z=0.008\text{ipt}$
 304 Steel, Cutter $\phi 50$

4 Flat Lock Structure to hold insert firmly

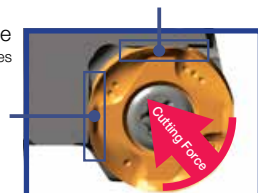
Prevents insert rotation during machining to provide stable cutting



Wide and flat binding face

Flat Lock Structure

- Wide flat binding face
- Receives even cutting forces
- Prevents insert rotation



Longer tool life with a wide lineup including
4 grades and 3 chipbreakers!
Available for steel, stainless steel, and heat resistant alloys

Workpiece		Applicable Insert Grade	Applicable Chipbreaker
P Carbon Steel / Alloy Steel / Die Steel		PR1525	GM/SM/GH Chipbreaker
K Gray Cast Iron / Nodular Cast Iron		PR1510	GH/GM Chipbreaker
S Ni-base Heat Resistant Alloy	M Martensitic Stainless Steel	CA6535	SM/GM Chipbreaker
S Titanium Alloy	M Austenitic Stainless Steel M Precipitation Hardened Stainless Steel	PR1535	SM/GM Chipbreaker

For Chipbreaker Selection and Recommended Cutting Conditions **P10**

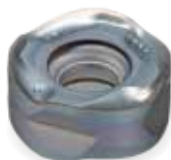
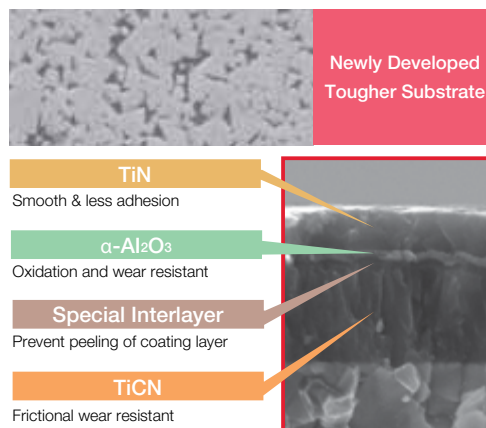
5 New grade for difficult-to-cut material

- Stable cutting prevents insert fracturing
- Good for high efficiency machining



CA6535

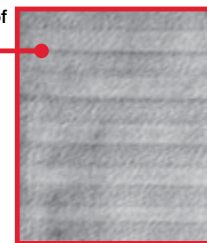
- For Ni-base heat resistant alloy and martensitic stainless steel
- High heat resistance and wear resistance with CVD coating
- Improved stability due to thin film coating technology



PR1535

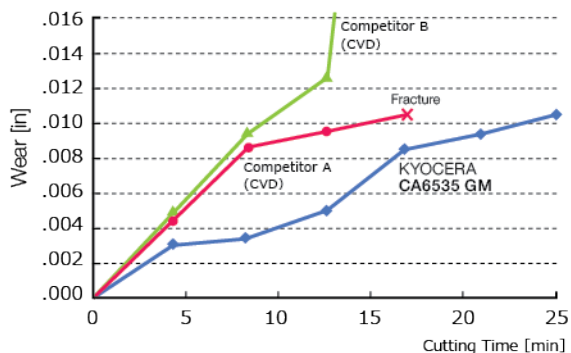
- For titanium alloy and precipitation hardened stainless steel
- Stabilized milling operation and long tool life with Kyocera's MEGACOAT NANO coating technology
- Improved stability due to thin film coating technology

Layer structure of MEGACOAT



Tool Life Comparison

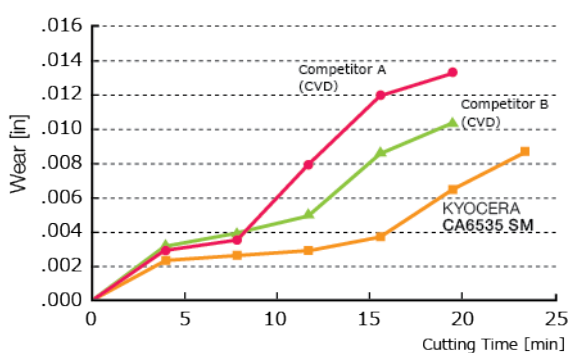
- Ni-base Heat Resistant Alloy



< Cutting Condition > Vc=175sfm, ap=0.039", fz=0.006ipt, WET

1st recommendation GM chipbreaker

- Martensitic Stainless Steel



< Cutting Condition > Vc=975sfm, ap=0.079", fz=0.008ipt, WET

1st recommendation SM chipbreaker

RAD-8 MRW Face Mill (with coolant hole)

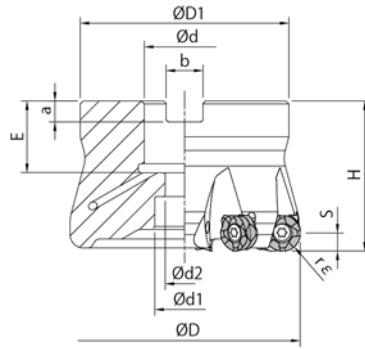


Fig.1

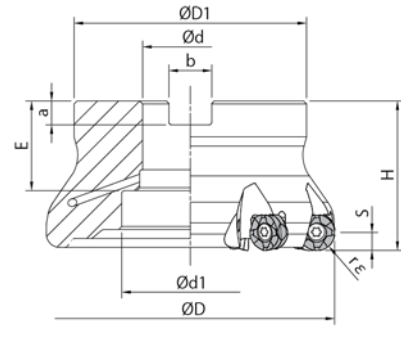


Fig.2

Toolholder Dimensions (Inch-Size)

Description	Stock	No. of Inserts	Dimension (in)											Rake Angle (°)		Coolant Hole	Drawing	Weight (Kg)	Max. Revolution (min ⁻¹)
			rε	ØD	ØD1	Ød	Ød1	Ød2	H	E	a	b	S	A.R.	R.R.				
Inch MRW 2000R-12-5T 2000R-12-6T 2500R-12-6T 2500R-12-7T 3000R-12-6T 3000R-12-8T 4000R-12-7T 4000R-12-9T	●	5	0.236 (6mm)	2.00	1.75	0.75	0.748	0.433	1.575	0.750	0.187	0.312	0.236 (6mm)	+12°	-15.5°	Yes	Fig.1	0.3	16,000
	△	6		0.6															
	●	6		0.6															
	△	7		1.1															
	●	6		1.1															
	△	8		1.1															
	△	7		1.5	Fig.2	1.4													
	△	9		1.4															
	△	9		1.5															
MRW 2500R-16-5T 2500R-16-6T 3000R-16-6T 3000R-16-7T 4000R-16-6T 4000R-16-8T 5000R-16-8T 5000R-16-10T	●	5	0.315 (8mm)	2.50	1.75	0.75	0.748	0.433	1.575	0.750	0.187	0.312	0.315 (8mm)	+11°	-16.5°	Yes	Fig.1	0.5	12,800
	△	6		0.5															
	●	6		1.1															
	△	7		1.0	Fig.2	1.4													
	△	6		1.3															
	△	8		2.6															
	△	8		2.5															
△	10	5.0	3.54	1.50	2.047	-	2.480	1.496	0.393	0.625							8,560		

● Stock Standard | ○ World Express | △ Made to Order

Spare Parts & Applicable Inserts

Description	Clamp Screw	Wrench		Anti-seize Compound	Arbor Bolt	Applicable Inserts
		DTPM-15 	TTP-20 	MP-1 		
MRW 2000R-12... 2500R-12... 3000R-12... 4000R-12...	SB-4085TRP	DTPM-15		MP-1	HH3/8-1.25 (HH3/8-1.25H)	ROMU12...
Recommended Torque for Insert Clamp 3.5N · m					HH1/2-1.25 (HH1/2-1.25H)	
					-	
					-	
MRW 2500R-16... 3000R-16... 4000R-16... 5000R-16...	SB-50140TRP	TTP-20		MP-1	HH3/8-1.25 (HH3/8-1.25H)	ROMU16...
Recommended Torque for Insert Clamp 4.5N · m					HH1/2-1.25 (HH1/2-1.25H)	
					-	
					-	

● **Caution with Max. Revolution**
When running an endmill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

●
Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

● S is Maximum ap.
For more details, see **Page 10**

Recommended Cutting Conditions **P10**

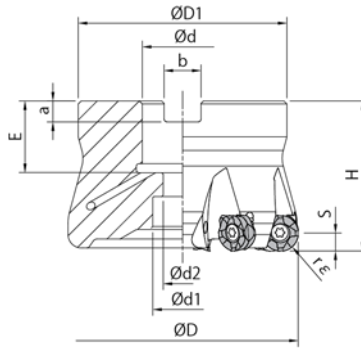


Fig.1

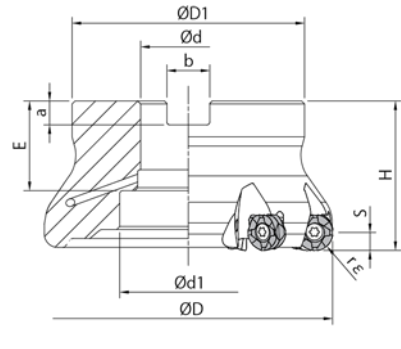


Fig.2

Toolholder Dimensions (Metric-Size)

Description	Stock	No. of Inserts	Dimension (mm)											Rake Angle (°)		Coolant Hole	Drawing	Weight (Kg)	Max. Revolution (min ⁻¹)	
			rε	ØD	ØD1	Ød	Ød1	Ød2	H	E	a	b	S	A.R.	R.R.					
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°	Yes	Fig.1	1.2	12,000	
		8		100	78	31.75	46	-		34	8	12.7						1.1		
		7																Fig.2		1.5
		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°		Yes	Fig.1	1.1	11,000
		7		100	78	31.75	46	-		34	8	12.7							1.1	
		6																	Fig.2	
		8		2.6																
8	2.6																			
Metric spec	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
		6																	0.3	
		6		63	60	19	-	50	24	7	12.4	0.6								
		6										0.6								
		7		80	70	27	20	13	-	30	8	1.1								
		6										1.1								
		8		100	78	32	46	-	30	8	14.4	1.5								
		7										1.4								
	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°		Yes	Fig.1	0.5	12,800
		6																	0.5	
		6		80	70	27	20	13	-	50	24	7							12.4	1.1
		6																		1.0
		7		100	78	32	46	-	30	8	14.4	1.1								
		6										1.4								
		6		1.3																
8		2.6																		
8	2.5																			
10	2.5																			

● Stock Standard | ○ World Express

Spare Parts & Applicable Inserts

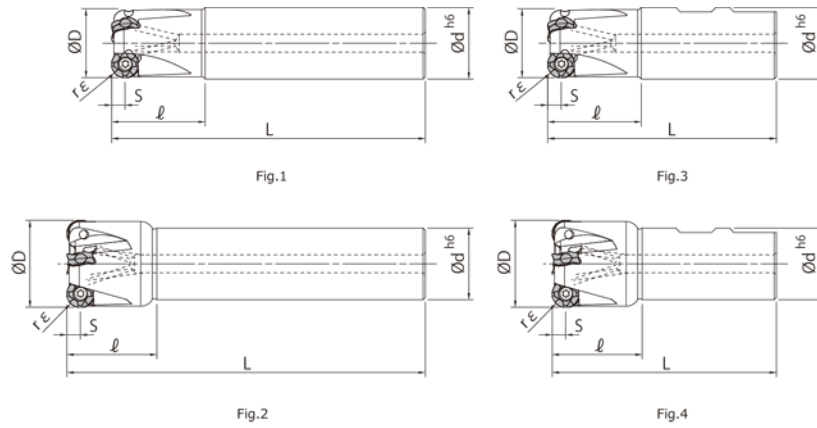
Description	Clamp Screw	Wrench		Anti-seize Compound	Arbor Bolt	Applicable Inserts
		DTPM-15	TTP-20			
MRW 050R-12... 063R-12... 080R-12... 100R-12...	SB-4085TRP	DTPM-15		MP-1	HH10x30	ROMU12...
Recommended Torque for Insert Clamp 3.5N · m					HH12x35	
					-	
					-	
MRW 063R-16... 080R-16... 100R-16... 125R-16...	SB-50140TRP	TTP-20		MP-1	HH10x30	ROMU16...
Recommended Torque for Insert Clamp 4.5N · m					HH12x35	
					-	
					-	

• **Caution with Max. Revolution**
When running an endmill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

•
Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

• S is Maximum ap.
For more details, see **Page 10**

RAD-8 MRW Endmill (with coolant hole)



Toolholder Dimensions (Inch-Size)

Description	Stock	No. of Inserts	Dimension (in)						Rake Angle (°)		Coolant Hole	Drawing	Max. Revolution (min ⁻¹)		
			rε	ØD	Ød	L	l	S	A.R. (MAX)	R.R.					
Standard Shank (Weldon)	MRW 1250-W125-12-3T	●	3	0.236 (6mm)	1.25	1.25	3.921	1.575	0.236 (6mm)	+12°	-20°	Yes	Fig.3	22,000	
	1500-W125-12-4T	●	4		1.50		3.856	1.575			-16.5°				Fig.4
	2000-W150-12-5T	△	5		2.00	1.50	4.266	1.575					-15.5°	16,000	
	MRW 1500-W125-16-2T	●	2	0.315 (8mm)	1.50	1.25	3.856	1.575	0.315 (8mm)	+11°	-18°	Yes	Fig.4	17,200	
	2000-W150-16-4T	△	4		2.00		1.50	4.262			1.575				-16.5°
	2500-W150-16-5T	△	5		2.50	1.50	4.262	1.575			-16.5°				12,800
Long Shank (Cylindrical)	MRW 1250-S125-12-2T-8	●	2	0.236 (6mm)	1.25	1.25	8.0	1.575	0.236 (6mm)	+12°	-20°	Yes	Fig.1	22,000	
	1500-S125-12-3T-8	●	3		1.50		8.0	1.575			-16.5°				Fig.2
	2000-S150-12-4T-12	△	4		2.00	1.50	12.0	1.969					-15.5°	16,000	
	MRW 1500-S125-16-2T-8	●	2	0.315 (8mm)	1.50	1.25	8.0	1.575	0.315 (8mm)	+11°	-18°	Yes	Fig.2	17,200	
	2000-S150-16-3T-8	△	3		2.00		1.50	12.0			1.575				-16.5°
	2500-S150-16-4T-12	△	4		2.50	1.50	12.0	1.969			-16.5°				12,800

Spare Parts & Applicable Inserts

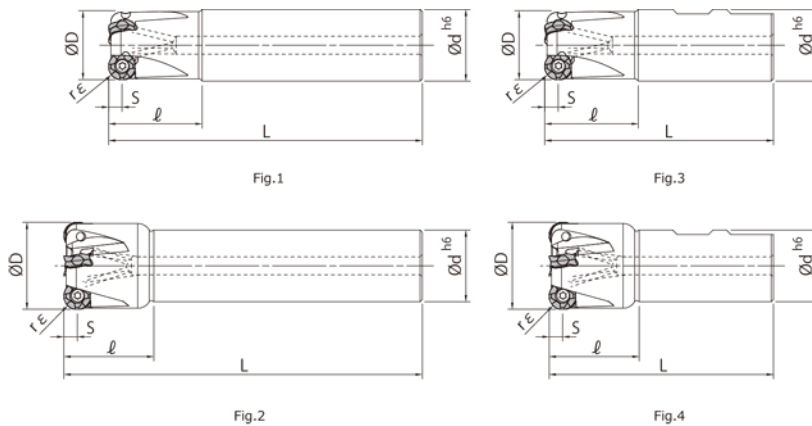
Description	Clamp Screw	Wrench		Anti-seize Compound	Applicable Inserts
		DTPM-15 	TTP-20 	MP-1 	
MRW ...-12...	SB-4085TRP	DTPM-15		MP-1	ROMU12...
	Recommended Torque for Insert Clamp 3.5N · m				
...-16...	SB-50140TRP	TTP-20		MP-1	ROMU16...
	Recommended Torque for Insert Clamp 4.5N · m				

• **Caution with Max. Revolution**
When running an endmill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

• Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

• S is Maximum ap.
For more details, see **Page 10**

Recommended Cutting Conditions **P10**



Toolholder Dimensions (Metric-Size)

Description	Stock	No. of Inserts	Dimension (mm)						Rake Angle (°)		Coolant Hole	Drawing	Max. Revolution (min ⁻¹)	
			re	ØD	Ød	L	ℓ	S	A.R. (MAX)	R.R.				
Standard (Straight)	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	40			-16.5°			18,800
	50-S42-12-5T	○	5		50	42	170	40			-15.5°		16,000	
	MRW 40-S32-16-3T	○	3	8	40	42	160	40	8.0	+11°	-18°	Yes	Fig.2	17,200
	50-S42-16-4T	○	4		50		170	40			-16.5°			14,800
	63-S42-16-5T	○	5		63	170	50	-16.5°			12,800			
Long Shank (Straight)	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		200	40			-16.5°			18,800
	50-S42-12-4T-300	○	4		50	42	300	40			-15.5°		16,000	
	MRW 40-S32-16-2T-200	○	2	8	40	42	200	40	8.0	+11°	-18°	Yes	Fig.2	17,200
	50-S42-16-3T-300	○	3		50		300	40			-16.5°			14,800
	63-S42-16-4T-300	○	4		63	300	50	-16.5°			12,800			
Standard (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	40			-16.5°			18,800
	50-W40-12-5T	○	5		50	40	110	40			-15.5°		16,000	
	MRW 40-W32-16-3T	○	3	8	40	40	100	40	8.0	+11°	-18°	Yes	Fig.4	17,200
	50-W40-16-4T	○	4		50		110	40			-16.5°			14,800
	63-W40-16-5T	○	5		63	120	50	-16.5°			12,800			

● Stock Standard | ○ World Express

Spare Parts & Applicable Inserts


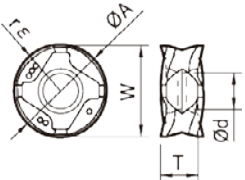


Description	Clamp Screw	Wrench		Anti-seize Compound	Applicable Inserts
		DTPM-15 	TTP-20 		
MRW ...-12...	SB-4085TRP	DTPM-15 Recommended Torque for Insert Clamp 3.5N · m		MP-1	ROMU12...
...-16...	SB-50140TRP	TTP-20 Recommended Torque for Insert Clamp 4.5N · m		MP-1	ROMU16...

• **Caution with Max. Revolution**
When running an endmill or a cutter at the maximum revolution, the insert or cutter may be damaged by centrifugal force.

•
Coat Anti-seize Compound (MP-1) thinly on portion of taper and thread when insert is fixed

• S is Maximum ap.
For more details, see **Page 10**

Milling Inserts (with hole)

Classification of usage		P	Carbon Steel / Alloy Steel					★			
			Die Steel					★			
★ Roughing / 1st Choice ☆ Roughing / 2nd Choice ■ Finishing / 1st Choice □ Finishing / 2nd Choice In case hardness is under 45 HRC		M	Austenitic Stainless Steel					★	☆		
			Martensitic Stainless Steel					☆		★	
			Precipitation Hardened Stainless Steel					★			
		K	Gray Cast Iron							★	
			Nodular Cast Iron							★	
		S	Heat Resistant Alloy (Ni-base Heat Resistant Alloy)					☆			
Titanium Alloy					★		☆				
H		Hard Materials						☆			
Insert		Description	Dimension (mm)					MEGACOAT NANO			CVD coating
			ØA	T	Ød	W	rε	PR1535	PR1525	PR1510	CA6535
 General Purpose		ROMU 1204M0ER-GM	12	4.75	4.6	11.8	6	●	●	●	●
		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 (Heavy Milling)		ROMU 1204M0ER-GH	12	4.75	4.6	11.8	6		●	●	
		1605M0ER-GH	16	5.48	6.2	15.8	8		●	●	

Applicable holder reference page

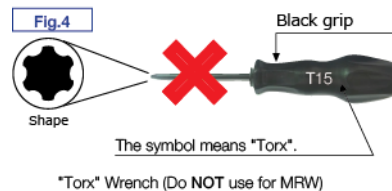
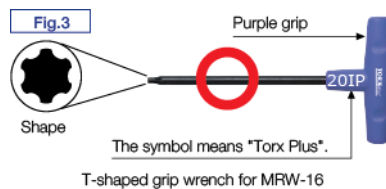
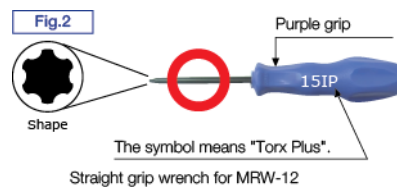
P4-7

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 to the front end of the wrench
 - ② While lightly pressing the insert against the constraint surfaces, put the screw into the hole of the insert and tighten. (See **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)
 Use a "Torx Plus" Wrench for tightening clamp 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.
For recommended torque, see **pages 4-7**.
5. After tightening the screw, make sure that there is no clearance between the insert seat surface and the bearing surface of the holder or between the insert side surfaces and the constraint surface of the holder.

If there is any clearance, remove the insert and mount it again according to the above steps.



Cutting Conditions

Workpiece Material	Recommended Chipbreaker per Material ※ROMU12 ap=0.118 ROMU16 ap=0.158 Recommended feed rate (standard value) for ROMU12: ap=0.158, ROMU16: ap=0.158			Recommended Insert Grade / (sfm)			
				MEGACOAT NANO			CVD Coating
	GM	SM	GH	PR1525	PR1510	PR1535	CA6535
Carbon Steel (SxxC)	★ 0.004- 0.008 -0.012	☆ 0.002- 0.006 -0.008	☆ 0.006- 0.012 -0.014	★ 400- 600 -825	-	-	-
Alloy Steel (SCM)	★ 0.004- 0.008 -0.012	☆ 0.002- 0.006 -0.008	☆ 0.006- 0.012 -0.014	★ 325- 525 -725	-	-	-
Die Steel (SKD/NAK)	★ 0.004- 0.006 -0.010	☆ 0.002- 0.005 -0.008	☆ 0.006- 0.008 -0.012	★ 250- 450 -600	-	-	-
Austenitic Stainless Steel (SUS304)	☆ 0.004- 0.006 -0.008	★ 0.002- 0.005 -0.008	-	☆ 325- 525 -650	-	★ 325- 525 -650	-
Martensitic Stainless Steel (SUS403)	☆ 0.004- 0.006 -0.008	★ 0.002- 0.005 -0.008	-	-	-	☆ 500- 650 -825	★ 600- 775 -975
Precipitation Hardened Stainless Steel (SUS630)	★ 0.004- 0.006 -0.008	☆ 0.002- 0.005 -0.008	-	-	-	★ 300- 400 -500	-
Gray Cast Iron (FC)	★ 0.004- 0.008 -0.012	-	☆ 0.006- 0.012 -0.014	-	★ 400- 600 -825	-	-
Nodular Cast Iron (FCD)	★ 0.004- 0.006 -0.010	-	☆ 0.006- 0.008 -0.012	-	★ 325- 500 -650	-	-
Ni-base Heat Resistant Alloy	★ 0.004- 0.005 -0.006	☆ 0.002- 0.004 -0.006	-	-	-	☆ 75- 100 -500	★ 75- 100 -500
Titanium Alloy (Ti-6Al-4V)	☆ 0.004- 0.005 -0.006	★ 0.002- 0.004 -0.006	-	-	☆ 100- 150 -225	★ 125- 200 -250	-

※ Machining with coolant is recommended for Ni-base Heat Resistant Alloy and Titanium Alloy

※ The figure in bold font is center value of the recommended cutting conditions. 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 $r\epsilon/2$ (0.118" for ROMU12, 0.158" for ROMU16).

For lower feed rates than the above conditions, the conversion factor in the following table is recommended.

Conversion Factor for Feed Per Tooth by Depth of Cut (ap)

Insert	ap (recommended)	ap (max)	Conversion factor for feed per tooth				
			ap=0.020"	ap=0.039"	ap=0.079"	ap=0.118"	ap=0.158"
ROMU12	0.118" or less	0.236"	2.1	1.5	1.1	1.0 (Standard)	-
ROMU16	0.158" or less	0.315"	2.4	1.7	1.3	1.1	1.0 (Standard)

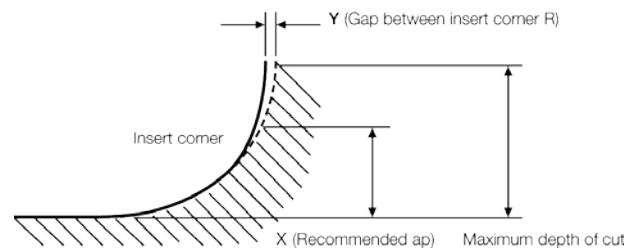
• Example (ROMU12, Carbon Steel, GM chipbreaker, ap=0.039")

Recommended feed per tooth: 0.008ipt (standard value for Carbon Steel / GM chipbreaker) x 1.5 (Conversion factor for ROMU12 / ap=0.039")=0.012ipt

※ Recommended ap: 0.118" or less for ROMU12, 0.158" or less for ROMU16

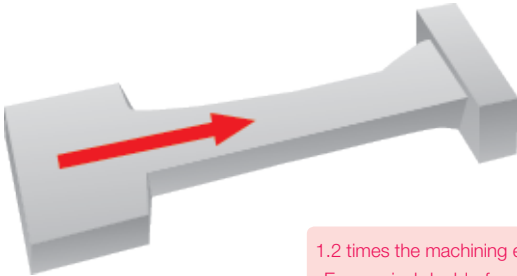
Corner R Shape During Processing with MRW (see Fig.)

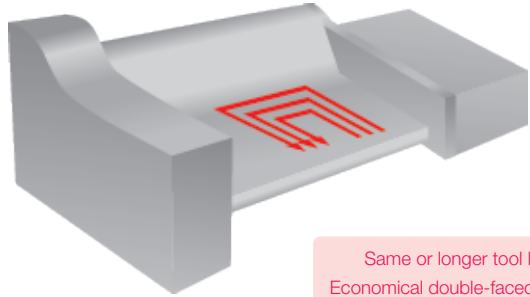
Insert	ap (max)	X	Y
ROMU12	0.236"	0.118"	0.004"
ROMU16	0.315"	0.158"	0.004"



※ When machining with larger ap than recommended ap (X), there is a gap (Y) between the workpiece corner and insert corner R (r ϵ).

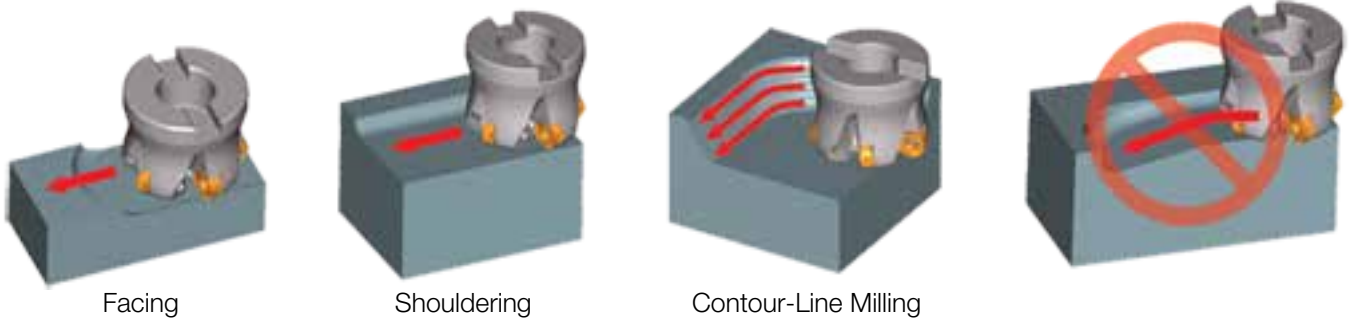
※ The above figure is an estimation. There is a ± 0.008 " variation depending on the cutting conditions.

12Cr Steel	
	
<p>1.2 times the machining efficiency Economical double-faced insert</p>	
<ul style="list-style-type: none"> • Turbine Blade • Vc=825sfm • fz=0.006ipt • ap=0.020~0.039" • ae=max1.378" • Dry • MRW050R-12-6T-M 6 inserts) • ROMU1204M0ER-SM (CA6535) 	
CA6535	Stable Machining
Competitor A (Positive Cutter)	Unstable Machining
<p>MRW improved machining efficiency 1.2 times with same tool life compared to Competitor A. MRW has a cost advantage due to double sided inserts.</p> <p style="text-align: right;">(User Evaluation)</p>	

12Cr Steel	
	
<p>Same or longer tool life Economical double-faced insert</p>	
<ul style="list-style-type: none"> • Turbine Blade • Vc=825sfm • fz=0.006ipt • ap=0.079" • ae=0.197~1.181" • Wet • MRW050R-12-5T-M (5 inserts) • ROMU1204M0ER-SM (CA6535) 	
CA6535	Stable, available for further machining
Competitor B (Positive Cutter)	Unstable Machining
<p>MRW showed less damage on the cutting edge and reduced cutting noise. MRW has equal or longer tool life and cost advantage due to double sided inserts.</p> <p style="text-align: right;">(User Evaluation)</p>	

Application

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





Kyocera Precision Tools

100 Industrial Park Road ■ Hendersonville, NC 28792

Email: cuttingtools@kyocera.com

Website: www.kyocera.com/cuttingtools

Distributor Website: <http://mykicc.kyocera.com>

Customer Service: 800.823.7284 - Option 1

Technical Support: 800.823.7284 - Option 2

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