KYOCERA

AHB TOOLING & MACHINERY

COMPLETE METALWORKING SOLUTIONS

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M-SIX (MFWN)

High Efficiency Milling Cutter

Double-Sided 6-edge Milling Cutter

Sharp Cutting due to Lower Cutting Forces

Resistant to Chattering and Applicable to Long Overhang

MEGACOAT NANO Coated Insert Grade for Long Tool Life

NEW

MFWN-Mini

Small Diameter End Mills and Face Mills

Face Mills: ø50mm ~ ø125mm

End Mills: ø25mm ~ ø80mm

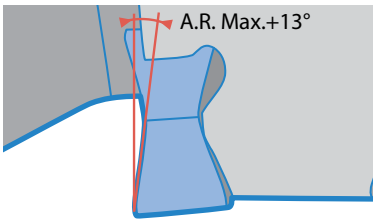
M-SIX (MFWN)

Low Cutting Forces for Reduced Chattering and Superior Fracture Resistance
Wide Application Range and Now Includes PDL025 DLC Coated Inserts for Aluminum

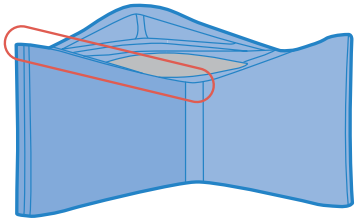
1 Sharp Cutting due to Lower Cutting Forces

Low Cutting Force due to Steep Rake Angle

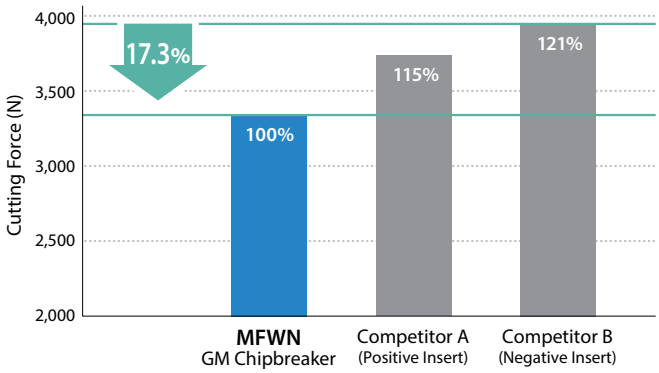
Dynamic Slant Design Reduces Initial Impact when Cutting Edge Enters the Workpiece



Dynamic Slant Design



Cutting Force Comparison (In-house Evaluation)



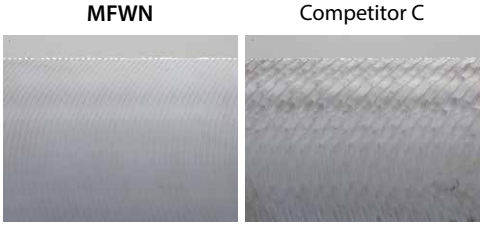
Cutting Force is the Resultant Force of the Principal Force and the Feed Force

Cutting Conditions: Vc = 590 sfm, D.O.C. × ae = 0.275" × 0.400", fz = 0.008 ipt
Workpiece: 1049 Cutter Dia. Ø5.000"

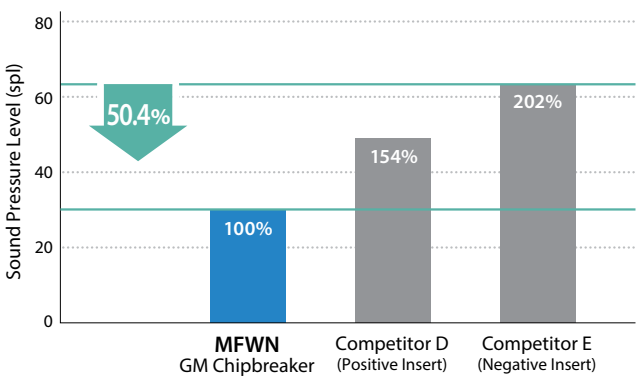
2 Reduced Chattering Even with Extended Milling Adapters

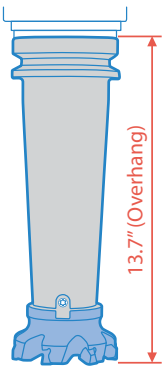
Resistant to Chattering due to Low Cutting Force Design and applicable to long overhang

Surface Roughness Comparison (In-house Evaluation)



Cutting Noise Comparison (In-house Evaluation)

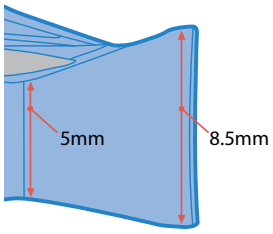




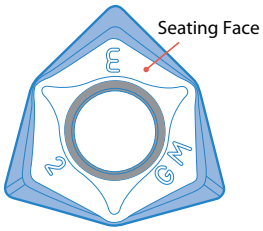
Cutting Conditions: Vc = 660 sfm, D.O.C. × ae = 0.118" × 0.590", fz = 0.004 ipt
Workpiece: 1049 Cutter Dia. Ø3.000" (7 Inserts)

3 Superior Fracture Resistance with Thick Edge Design

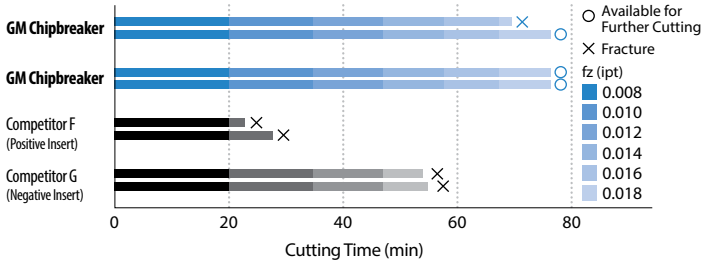
Cutting Edge Thickness: 5 - 8.5mm



Stable Clamping with the Unique Insert Face Design



Fracture Resistance Comparison (In-house Evaluation)



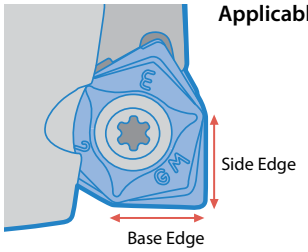
Cutting Conditions: Vc = 330 sfm, D.O.C. × ae = 0.080" × 4.000", fz = 0.004 ~ 0.018 ipt, Dry
Workpiece: 4140H (38 ~ 42HS) Interrupted with a Slot in the Workpiece

4 Neutral Inserts

Available for Shouldering and Facing

Neutral Inserts are Applicable to Left-hand Cutters (Custom Order)

Applicable to a Wide Range of Applications

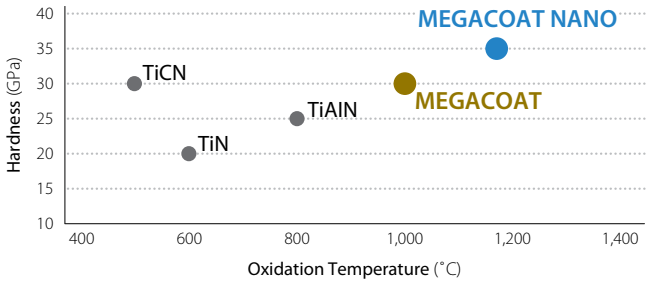


5 MEGACOAT NANO Coated Insert Grade for Long Tool Life

PR1525 for steel, PR1510 for cast iron and PR1535 for Ni-base heat-resistant alloy, titanium alloy and precipitation-hardened stainless steel

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

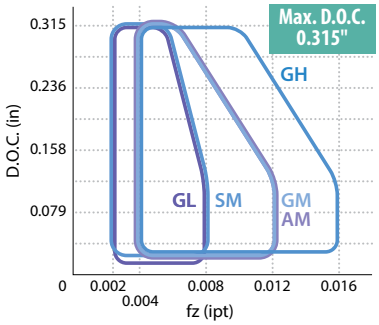
Coating Property



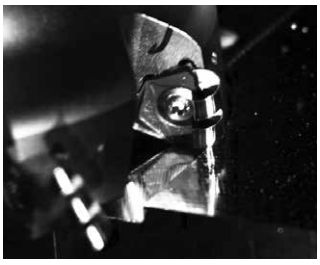
6 Extensive Insert Lineup Covering Various Applications

Chipbreaker	Applications	Shape
GM	General Purpose	
SM	Low Cutting Force	
GH	Heavy Milling	
GL	Surface-Finish Oriented	
AM	Aluminum / Non-ferrous Metals	

Application Range



Smooth Chip Evacuation



Properly Curled Chips
(The Photo was Taken by a High Speed Camera)

Face Mills (Inch Size)

Rake Angle (°)	A.R.	R.R.	
	(MAX) +13°	ØD = 2.000" -12° ØD = 2.500" -10° ØD = 3.000" -9°	ØD = 4.000" -8° ØD = 5.000" -7.5° ØD = 6.000"-10.000" -7°

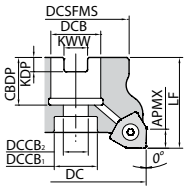


Fig.1

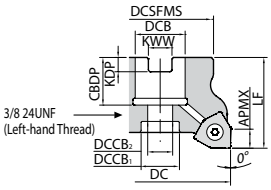


Fig.2

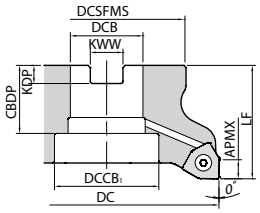


Fig.3

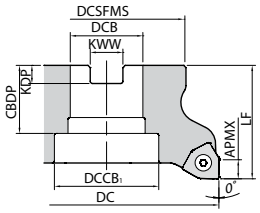


Fig.4

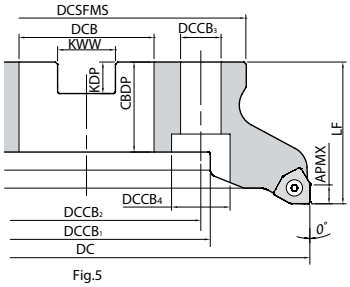


Fig.5

Toolholder Dimensions (Inch Size)

Part Number		Stock	No. of Inserts	Dimensions (in)												Drawing	Weight (kg)	Shim	Coolant Hole
				DC	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX	$DCCB_3$	$DCCB_4$				
Coarse Pitch	MFWN 902500R-3T	●	3	2.500	1.890	0.750	0.669	0.433	1.575	0.750	0.187	0.312		-	-	Fig.1	0.4		
	903000R-4T	●	4	3.000	2.283	1.000	0.875	0.551	1.968	1.063	0.236	0.381		-	-	Fig.1	0.8		✓
	904000R-5T	●	5	4.000	2.756	1.500	2.047	-	1.968	1.142	0.393	0.625		-	-	Fig.3	1.1		
	905000R-6T	●	6	5.000	3.425	1.500	2.175	-	2.480	1.496	0.393	0.625	0.315	-	-	Fig.3	2.5	✓	
	906000R-8T	●	8	6.000	4.016	2.000	2.835	-	2.480	1.496	0.433	0.752		-	-	Fig.4	3.4		
	908000R-10T	●	10	8.000	5.591	2.500	3.937	4.000	2.480	1.575	0.551	1.008		0.709	1.024	Fig.5	6.0		×
	9010000R-12T	●	12	10.000	5.591	2.500	3.937	4.000	2.480	1.575	0.551	1.008		0.709	1.024	Fig.5	8.2		
Fine Pitch	MFWN 902000R-4T	●	4	2.000	1.752	0.750	0.500	3/8 24UNF	1.968	0.830	0.187	0.312		-	-	Fig.2	0.4		
	902500R-4T	●	4	2.500	1.890	0.750	0.669	0.433	1.575	0.750	0.187	0.312		-	-	Fig.1	0.5		
	903000R-5T	●	5	3.000	2.283	1.000	0.875	0.551	1.968	1.063	0.236	0.381		-	-	Fig.1	0.8		✓
	904000R-7T	●	7	4.000	2.756	1.500	2.047	-	1.968	1.142	0.393	0.625		-	-	Fig.3	1.0		
	905000R-8T	●	8	5.000	3.425	1.500	2.175	-	2.480	1.496	0.393	0.625	0.315	-	-	Fig.3	2.5	×	
	906000R-10T	●	10	6.000	4.016	2.000	2.835	-	2.480	1.496	0.433	0.752		-	-	Fig.4	3.5		
	908000R-12T	●	12	8.000	5.591	2.500	3.937	4.000	2.480	1.575	0.551	1.008		0.709	1.024	Fig.5	6.2		×
	9010000R-14T	●	14	10.000	5.591	2.500	3.937	4.000	2.480	1.575	0.551	1.008		0.709	1.024	Fig.5	8.4		
Extra-Fine Pitch	MFWN 902500R-5T	●	5	2.500	1.890	0.750	0.669	0.433	1.575	0.750	0.187	0.312		-	-	Fig.1	0.4		
	903000R-7T	●	7	3.000	2.283	1.000	0.875	0.551	1.968	1.063	0.236	0.381		-	-	Fig.1	0.8		✓
	904000R-9T	●	9	4.000	2.756	1.500	2.047	-	1.968	1.142	0.393	0.625		-	-	Fig.3	1.0		
	905000R-12T	●	12	5.000	3.425	1.500	2.175	-	2.480	1.496	0.393	0.625	0.315	-	-	Fig.3	2.4	×	
	906000R-14T	●	14	6.000	4.016	2.000	2.835	-	2.480	1.496	0.433	0.752		-	-	Fig.4	3.4		
	908000R-16T	●	16	8.000	5.591	2.500	3.937	4.000	2.480	1.575	0.551	1.008		0.709	1.024	Fig.5	6.1		×
	9010000R-18T	●	18	10.000	5.591	2.500	3.937	4.000	2.480	1.575	0.551	1.008		0.709	1.024	Fig.5	8.4		

Spare Parts see **Page 6**
Applicable Inserts see **Page 8**

● : Standard Item

Face Mills (Metric Size)

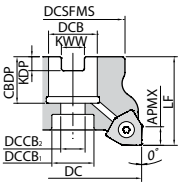


Fig.1

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

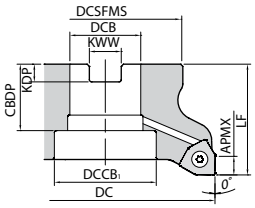


Fig.2

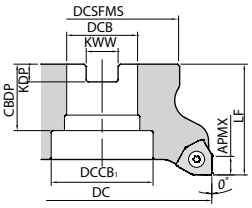


Fig.3

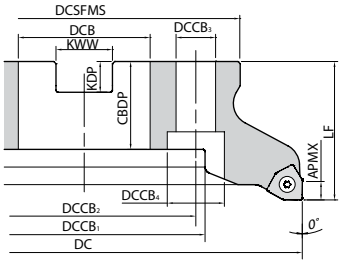


Fig.4

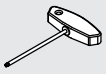
Toolholder Dimensions (Metric Size)

		Part Number	Stock	No. of Inserts	Dimensions (mm)												Drawing	Weight (kg)	Shim	Coolant Hole
					DC	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX	$DCCB_3$	$DCCB_4$				
Bore Dia. Inch Spec	Coarse Pitch	MFWN 90080R-4T	●	4	80	60	1.000″	20	13	50	27	6	0.375″	8	-	-	Fig.1	1.0	✓	✓
		90100R-5T	●	5	100	70	1.250″	46	-	50	34	8	0.500″				Fig.2	1.3		
		90125R-6T	●	6	125	87	1.500″	55	-	63	38	10	0.625″				Fig.2	2.6		
		90160R-8T	●	8	160	102	2.000″	72	-	63	38	11	0.750″				Fig.3	3.9		×
		90200R-10T	●	10	200	142	1.875″	110	101.6	63	40	14	1.000″				Fig.4	6.3		
		90250R-12T	●	12	250	142	1.875″	110	101.6	63	40	14	1.000″				Fig.4	8.7		
	Fine Pitch	MFWN 90080R-5T	●	5	80	60	1.000″	20	13	50	27	6	0.375″	8	-	-	Fig.1	1.0	×	✓
		90100R-7T	●	7	100	70	1.250″	46	-	50	34	8	0.500″				Fig.2	1.4		
		90125R-8T	●	8	125	87	1.500″	55	-	63	38	10	0.625″				Fig.2	2.7		
		90160R-10T	●	10	160	102	2.000″	72	-	63	38	11	0.750″				Fig.3	4.0		×
		90200R-12T	●	12	200	142	1.875″	110	101.6	63	40	14	1.000″		18	26	Fig.4	6.6		
		90250R-14T	●	14	250	142	1.875″	110	101.6	63	40	14	1.000″		18	26	Fig.4	8.9		
	Extra-Fine Pitch	MFWN 90080R-7T	●	7	80	60	1.000″	20	13	50	27	6	0.375″	8	-	-	Fig.1	1.1	×	✓
		90100R-9T	●	9	100	70	1.250″	46	-	50	34	8	0.500″				Fig.2	1.3		
		90125R-12T	●	12	125	87	1.500″	55	-	63	38	10	0.625″				Fig.2	2.7		
		90160R-14T	●	14	160	102	2.000″	72	-	63	38	11	0.750″				Fig.3	4.1		×
		90200R-16T	●	16	200	142	1.875″	110	101.6	63	40	14	1.000″		18	26	Fig.4	6.7		
		90250R-18T	●	18	250	142	1.875″	110	101.6	63	40	14	1.000″		18	26	Fig.4	9.1		
Metric	Coarse Pitch	MFWN 90063R-3T-M	●	3	63	47	22	19	11	40	21	6.3	10.4	8	-	-	Fig.1	0.5	✓	✓
		90080R-4T-M	●	4	80	60	27	20	13	50	24	7	12.4				Fig.1	1.0		
		90100R-5T-M	●	5	100	70	32	46	-	50	30	8	14.4				Fig.2	1.3		
		90125R-6T-M	●	6	125	87	40	55	-	63	33	9	16.4				Fig.2	2.5		
		90160R-8T-M	●	8	160	102	40	68	66.7	63	32	9	16.4		14	20	Fig.4	3.8		×
		90200R-10T-M	●	10	200	142	60	110	101.6	63	40	14	25.7		18	26	Fig.4	6.0		
		90250R-12T-M	●	12	250	142	60	110	101.6	63	40	14	25.7		18	26	Fig.4	8.4		
	Fine Pitch	MFWN 90063R-4T-M	●	4	63	47	22	19	11	40	21	6.3	10.4	8	-	-	Fig.1	0.5	×	✓
		90080R-5T-M	●	5	80	60	27	20	13	50	24	7	12.4				Fig.1	1.0		
		90100R-7T-M	●	7	100	70	32	46	-	50	30	8	14.4				Fig.2	1.3		
		90125R-8T-M	●	8	125	87	40	55	-	63	33	9	16.4				Fig.2	2.6		
		90160R-10T-M	●	10	160	102	40	68	66.7	63	32	9	16.4		14	20	Fig.4	3.9		×
		90200R-12T-M	●	12	200	142	60	110	101.6	63	40	14	25.7		18	26	Fig.4	6.3		
		90250R-14T-M	●	14	250	142	60	110	101.6	63	40	14	25.7		18	26	Fig.4	8.7		
	Extra-Fine Pitch	MFWN 90063R-5T-M	●	5	63	47	22	19	11	40	21	6.3	10.4	8	-	-	Fig.1	0.5	×	✓
		90080R-7T-M	●	7	80	60	27	20	13	50	24	7	12.4				Fig.1	1.1		
		90100R-9T-M	●	9	100	70	32	46	-	50	30	8	14.4				Fig.2	1.3		
		90125R-12T-M	●	12	125	87	40	55	-	63	33	9	16.4				Fig.2	2.6		
		90160R-14T-M	●	14	160	102	40	68	66.7	63	32	9	16.4		14	20	Fig.4	3.9		×
		90200R-16T-M	●	16	200	142	60	110	101.6	63	40	14	25.7		18	26	Fig.4	6.4		
		90250R-18T-M	●	18	250	142	60	110	101.6	63	40	14	25.7		18	26	Fig.4	8.8		

Spare Parts see **Page 6**
Applicable Inserts see **Page 8**

● : Standard Item

Face Mill Spare Parts (Inch Size)

	Part Number	Spare Parts							
		Insert Screw	Wrench		Shim	Shim Screw	Wrench	Anti-Seize Compound	Arbor Bolt
			TTW*1	DTM					
									
Coarse Pitch	MFWN 902500R-3T	SB-50140TR	TTW-15 (TT-15)	-	MFWN-90	SPW-7050	LW-5	P-37	HH3/8-1.25 (HH3/8-1.25H)
	903000R-4T	Recommended Torque for Insert Clamp 4.2 N·m			Recommended Torque for Insert Clamp 6.0 N·m				HH1/2-1.25 (HH1/2-1.25H)
	904000R-5T ~ 9010000R-12T								-
Fine Pitch	MFWN 902000R-4T	SB-50140TR	TTW-15 (TT-15)	-	-	-	-	P-37	XNS610*2
	902500R-4T	Recommended Torque for Insert Clamp 4.2 N·m							HH3/8-1.25 (HH3/8-1.25H)
	903000R-5T								HH1/2-1.25 (HH1/2-1.25H)
	904000R-7T ~ 9010000R-14T								-
Extra-Fine Pitch	MFWN 902500R-5T	SB-50140TR	TTW-15 (TT-15)	-	-	-	-	P-37	HH3/8-1.25 (HH3/8-1.25H)
	903000R-7T	SB-40140TRN	-	DTM-15					HH1/2-1.25 (HH1/2-1.25H)
	904000R-9T ~ 9010000R-18T	Recommended Torque for Insert Clamp 3.5 N·m							-

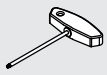
Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.

Recommended Cutting Conditions see **Page 9**

If through spindle coolant is required, please order arbor bolt in ( ) separately.

*1 TTW-15 wrenches will replace older TT-15 wrenches. Either model is compatible. *2 Differential screw (3/8-24UNF)

Face Mill Spare Parts (Metric Size)

	Part Number	Spare Parts							
		Insert Screw	Wrench		Shim	Shim Screw	Wrench	Anti-Seize Compound	Arbor Bolt
			TTW*1	DTM					
									
Coarse Pitch	MFWN 90063R-3T-M	SB-50140TR	TTW-15 (TT-15)	-	MFWN-90	SPW-7050	LW-5	P-37	HH10-30 (HH10-1.25H)
	90080R-4T-(M)	Recommended Torque for Insert Clamp 4.2 N·m			Recommended Torque for Insert Clamp 6.0 N·m				HH12-35 (HH12-35H)
	90100R-5T-(M) ~ 90250R-12T-(M)								-
Fine Pitch	MFWN 90063R-4T-M	SB-50140TR	TTW-15 (TT-15)	-	-	-	-	P-37	HH10-30 (HH10-1.25H)
	90080R-5T-(M)	Recommended Torque for Insert Clamp 4.2 N·m							HH12-35 (HH12-35H)
	90100R-7T-(M) ~ 90250R-14T-(M)								-
Extra-Fine Pitch	MFWN 90063R-5T-M	SB-50140TR	TTW-15 (TT-15)	-	-	-	-	P-37	HH10-30 (HH10-1.25H)
	90080R-7T-(M)	SB-40140TRN	-	DTM-15					HH12-35 (HH12-35H)
	90100R-9T-(M) ~ 90250R-18T-(M)	Recommended Torque for Insert Clamp 3.5 N·m							-

Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.

Recommended Cutting Conditions see **Page 9**

If through spindle coolant is required, please order arbor bolt in ( ) separately.

*1 TTW-15 wrenches will replace older TT-15 wrenches. Either model is compatible.

How to Replace the 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 (see Fig. 1) and lightly pressing the shim toward the constraint surface of the pocket wall (see Fig. 2), insert the screw into the hole of the shim and tighten (See Fig. 3). When tightening screw, make sure that the screw is vertical to the pocket floor (See Fig 3). Recommended torque is 6.0Nm
3. After tightening the screw, make sure that there is no clearance between the shim seat surface and the pocket floor. If there is any clearance, remove the shim and mount it again according to the above steps

Fig.1

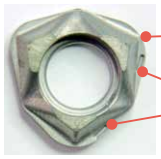


Fig.2

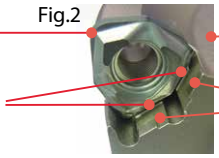
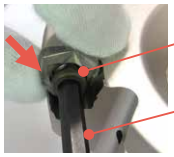
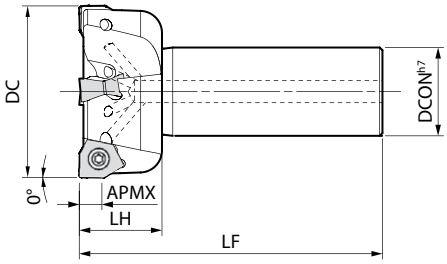


Fig.3



End Mills (with Coolant Hole)



Toolholder Dimensions

Part Number		Stock	Unit	No. of Inserts	Dimensions					Rake Angle (°)		Coolant Hole	Spare Parts		
					DC	DCON	LF	LH	APMX	A.R. (Max)	R.R.		Screw Clamp	Wrench*1	Anti-Seize Compound
MFWN	902000R-W125-3T	●	inch	3	2.000	1.250	3.600	1.180	0.315	+13°	-12°	✓	SB-50140TR	TTW-15 (TT-15)	P-37
	902500R-W125-4T	●		4	2.500						-10°		Recommended Torque for Insert Clamp 4.2 N·m		
	903000R-W125-5T	●		5	3.000						-8°				
MFWN	90050R-S32-3T	●	mm	3	50	32	110	30	8	+13°	-12°	✓	SB-50140TR	TTW-15 (TT-15)	P-37
	90063R-S32-4T	●		4	63						-10°		Recommended Torque for Insert Clamp 4.2 N·m		
	90080R-S32-5T	●		5	80						-9°				

Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.

● : Standard Item

*1 TTW-15 wrenches will replace older TT-15 wrenches. Either model is compatible.

Applicable Inserts see **Page 8**

Applicable Inserts

Usage Classification											
★ Roughing / 1st Choice ☆ Roughing / 2nd Choice ■ Finishing / 1st Choice □ Finishing / 2nd Choice (When hardness is under 45HRC)	P	Carbon Steel / Alloy Steel	■	☆	★					
		Mold Steel	■	☆	★					
	M	Austenitic Stainless Steel		★	☆					
		Martensitic Stainless Steel		☆				★		
		Precipitation Hardened Stainless Steel		★						
	K	Gray Cast Iron				★				
		Ductile Cast Iron				★				
	N	Non-Ferrous Metals							★	☆
	S	Heat Resistant Alloy (Ni-base)		☆				★		
		Titanium Alloy (Ti-6Al-4V)		★						
	H	Hardened Materials			■		★			

Insert		Part Number	Dimensions (in)					Cermet	MEGACOAT NANO			MEGACOAT HARD	CVD Coated Carbide	DLC Coated Carbide	Carbide
			IC	S	D1	BS	RE	TN620M	PR1535	PR1525	PR1510	PR015S	CA6535	PDL025	GW25
General Purpose		WNMU 080604EN-GM	0.552	0.262	0.244	0.067	1/64	●	●	●	●		●		
		080608EN-GM	0.552	0.262	0.244	0.051	1/32	●	●	●	●		●		
Low Cutting Force		WNMU 080608EN-SM	0.552	0.262	0.244	0.051	1/32		●	●	●		●		
Tough Edge (Heavy Milling)		WNMU 080608EN-GH	0.552	0.262	0.244	0.051	1/32		●	●	●	●	●		
Surface Finish Oriented (Ground Tolerance)		WNEU 080608EN-GL	0.552	0.262	0.244	0.059	1/32	●	●	●	●		●		
Aluminum / Non-Ferrous Metals (3-edge)		WNGT 080608FN-AM	0.552	0.262	0.244	0.059	1/32							●	●

● : Standard Item

Recommended Cutting Conditions see **Page 9**

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 constraint surfaces, put the screw into the hole of the insert and tighten (See 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 angled to the pocket floor (See 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 constraint surface of the holder. If there is any clearance, remove the insert and mount it again according to the above steps
6. To index the cutting edge of the insert, turn the insert counterclockwise. (See Fig. 4) The insert corner identification number is stamped on the top surface of the insert

Fig.1

Fig.2

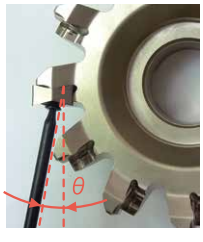


Fig.3

Fig.4

Recommended Cutting Conditions ★ 1st Recommendation ☆ 2nd Recommendation

Chipbreaker	Workpiece Material	Feed Rate fz (ipt) ( ) : TN620M	Recommended Insert Grade (Vc sfm)							
			Cermet	MEGACOAT NANO			MEGACOAT HARD	CVD Coated Carbide	DLC Coated Carbide	Carbide
			TN620M	**PR1535**	**PR1525**	**PR1510**	**PR015S**	**CA6535**	**PDL025**	**GW25**
GM	Carbon Steel	0.004 – 0.008 – 0.012 (0.002 – 0.004 – 0.006)	★ 660 – 820 – 980	☆ 390 – 590 – 820	★ 390 – 590 – 820	-	-	-	-	-
	Alloy Steel	0.004 – 0.008 – 0.012 (0.002 – 0.004 – 0.006)	★ 590 – 720 – 820	☆ 330 – 520 – 720	★ 330 – 520 – 720	-	-	-	-	-
	Mold Steel	0.004 – 0.006 – 0.010 (0.002 – 0.004 – 0.005)	★ 490 – 590 – 720	☆ 260 – 460 – 590	★ 260 – 460 – 590	-	-	-	-	-
	Austenitic Stainless Steel	0.004 – 0.006 – 0.010	-	☆ 330 – 520 – 660	☆ 330 – 520 – 660	-	-	-	-	-
	Martensitic Stainless Steel	0.004 – 0.006 – 0.010	-	☆ 490 – 660 – 820	-	-	-	☆ 590 – 790 – 980	-	-
	Precipitation Hardened Stainless Steel	0.004 – 0.006 – 0.010	-	★ 300 – 390 – 490	-	-	-	-	-	-
	Gray Cast Iron	0.004 – 0.008 – 0.012	-	-	-	★ 390 – 590 – 820	-	-	-	-
	Nodular Cast Iron	0.004 – 0.006 – 0.010	-	-	-	★ 330 – 490 – 660	-	-	-	-
	Ni-base Heat Resistant Alloy	0.004 – 0.005 – 0.008	-	☆ 70 – 100 – 160	-	-	-	★ 70 – 130 – 160	-	-
SM *(GL)	Carbon Steel	0.002 – 0.005 – 0.008 (0.002 – 0.003 – 0.005)	★ 660 – 820 – 980	☆ 390 – 590 – 820	☆ 390 – 590 – 820	-	-	-	-	-
	Alloy Steel	0.002 – 0.005 – 0.008 (0.002 – 0.003 – 0.005)	★ 590 – 720 – 820	☆ 330 – 520 – 720	☆ 330 – 520 – 720	-	-	-	-	-
	Mold Steel	0.002 – 0.003 – 0.006 (0.002 – 0.003 – 0.004)	★ 490 – 590 – 720	☆ 260 – 460 – 590	☆ 260 – 460 – 590	-	-	-	-	-
	Austenitic Stainless Steel	0.002 – 0.005 – 0.008	-	★ 330 – 520 – 660	☆ 330 – 520 – 660	-	-	-	-	-
	Martensitic Stainless Steel	0.002 – 0.005 – 0.008	-	☆ 490 – 660 – 820	-	-	-	★ 590 – 790 – 980	-	-
	Precipitation Hardened Stainless Steel	0.002 – 0.005 – 0.008	-	☆ 300 – 390 – 490	-	-	-	-	-	-
	Gray Cast Iron	0.002 – 0.005 – 0.008	-	-	-	☆ 390 – 590 – 820	-	-	-	-
	Nodular Cast Iron	0.002 – 0.003 – 0.006	-	-	-	☆ 330 – 490 – 660	-	-	-	-
	Ni-base Heat Resistant Alloy	0.002 – 0.004 – 0.006	-	☆ 70 – 100 – 160	-	-	-	☆ 70 – 130 – 160	-	-
	Titanium Alloy	0.002 – 0.003 – 0.006	-	★ 130 – 200 – 260	-	-	-	-	-	-
GH	Carbon Steel	0.008 – 0.012 – 0.016	-	☆ 390 – 590 – 820	☆ 390 – 590 – 820	-	-	-	-	-
	Alloy Steel	0.008 – 0.012 – 0.016	-	☆ 330 – 520 – 720	☆ 330 – 520 – 720	-	-	-	-	-
	Mold Steel	0.006 – 0.008 – 0.012	-	☆ 260 – 460 – 590	☆ 260 – 460 – 590	-	-	-	-	-
	Austenitic Stainless Steel	0.008 – 0.010 – 0.012	-	☆ 330 – 520 – 660	☆ 330 – 520 – 660	-	-	-	-	-
	Martensitic Stainless Steel	0.008 – 0.010 – 0.012	-	☆ 490 – 660 – 820	-	-	-	☆ 590 – 790 – 980	-	-
	Precipitation Hardened Stainless Steel	0.008 – 0.010 – 0.012	-	☆ 300 – 390 – 490	-	-	-	-	-	-
	Gray Cast Iron	0.008 – 0.012 – 0.016	-	-	-	☆ 390 – 590 – 820	-	-	-	-
	Nodular Cast Iron	0.006 – 0.008 – 0.012	-	-	-	☆ 330 – 490 – 660	-	-	-	-
	Ni-base Heat Resistant Alloy	0.006 – 0.008 – 0.010	-	☆ 70 – 100 – 160	-	-	-	☆ 70 – 130 – 160	-	-
	Hardened Material (≤ 60 HRC)	0.006 – 0.008 – 0.010	-	-	-	-	★ 260 – 330 – 390	-	-	-
AM	Non-ferrous Material	0.004 – 0.008 – 0.012	-	-	-	-	-	-	★ 660 – 1970 – 2950	☆ 660 – 1640 – 2620

The figures in bold font represent the 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

Machining with coolant is recommended for Ni-base Heat-resistant alloy and Titanium Alloy *GL chiphreaker is recommended for surface finish oriented milling
When using GH chipbreaker for fine pitch cutters, recommended feed is fz ≦ 0.012 ipt
GH chipbreaker is not recommended for extra fine pitch cutter

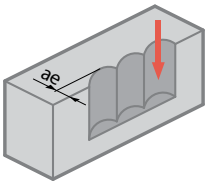
Applicable Chipbreaker

Cutter	Chipbreaker			
	GM	SM (GL)	GH	AM
Coarse Pitch (with Shim)	✓	✓	✓	✓
Fine Pitch (without Shim)	✓	✓	✓ (fz ≤ 0.012 ipt Recommended)	✓
Extra Fine Pitch (without Shim)	✓	✓	Not Recommended	Not Recommended

Cutter Type and Insert Selection Guide

Purpose	Cutter			Chipbreaker				
	Coarse Pitch	Fine Pitch	Extra Fine Pitch	GM	SM	GH	GL	AM
General Milling for Steel and Alloy Steel		✓		✓				
Steel and Alloy Steel (to prevent chattering due to low rigidity machine or poor clamping power)	✓				✓			
Productivity Oriented (D.O.C. ≥ 0.158" fz ≥ 0.010 ipt)	✓					✓		
Surface Roughness Oriented	✓	✓					✓	
General Milling for Stainless Steel		✓			✓			
Stainless Steel (to prevent chattering due to low rigidity machine or poor clamping power)	✓				✓			
Cast Iron Milling (Improved Efficiency)			✓	✓				
Cast Iron (D.O.C. ≥ 0.158" fz ≥ 0.010 ipt)	✓					✓		
General Milling for Aluminum Alloys		✓						✓
Aluminum Alloys (to prevent chattering due to low rigidity)	✓							✓

Plunge Milling

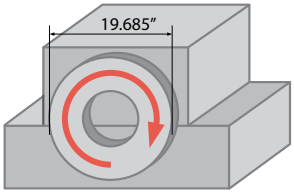


Cutting Dia.	MAX. Width of Cut (ae)
All Items	0.315"

NOT available for ramping or helical milling, due to interference between workpiece and insert.

Case Studies

Machine Part (No.50)



Vc = 560 sfm
fz = 0.007 ipt (Vf = 19.685 in/min)
ap × ae = 0.098" × 5.118" Wet
MFWN90160R-8T (8 Inserts)
WNMU080608EN-GM PR1510

Chip Removal Rate

PR1510 163cc/min

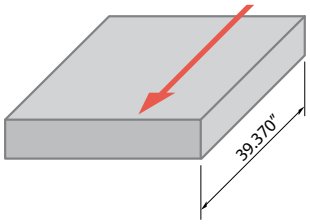
Competitor A (Positive Cutter) 68cc/min

Efficiency x2.3

Competitor A continued to cut under low cutting conditions as the workpiece was slipping due to unstable chucking. With MFWN, stable cutting was possible at higher feed rates.

(User Evaluation)

Frame (No.45)



Vc = 490 sfm
fz = 0.009 ipt (Vf = 28.150 in/min)
ap × ae = 0.158" × 6.299" Dry
MFWN90160R-10T (10 Inserts)
WNMU080608EN-GM PR1510

Chip Removal Rate

PR1510 458cc/min

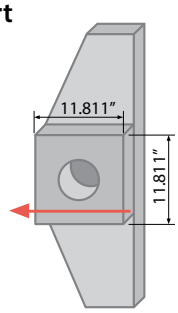
Competitor B (Negative Cutter) 282cc/min

Efficiency x1.6

While Competitor B could not improve the cutting conditions due to chattering, MFWN improved conditions by 160% with NO chattering.

(User Evaluation)

Construction Equipment Part (Manganese Steel)



Vc = 490 sfm
fz = 0.008 ipt (Vf = 26.299 in/min)
ap × ae = 0.039" × 3.937" Dry
MFWN90100R-7T (7 Inserts)
WNMU080608EN-GM PR1525

Machining Efficiency

PR1525 2pcs/edge

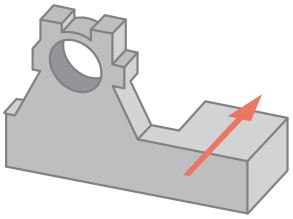
Competitor C (Negative Cutter) 1pc/edge

Tool Life x2

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

(User Evaluation)

Machine Part (Structural Steel)



Vc = 740 sfm
fz = 0.006 ipt (Vf = 39.370 in/min)
ap × ae = 0.059" × 3.150" Dry
MFWN90080R-7T (7 Inserts)
WNMU080608EN-GM PR1525

Machining Efficiency

PR1525 3pcs/edge

Competitor D (Positive Cutter) 1pc/edge

Tool Life x3

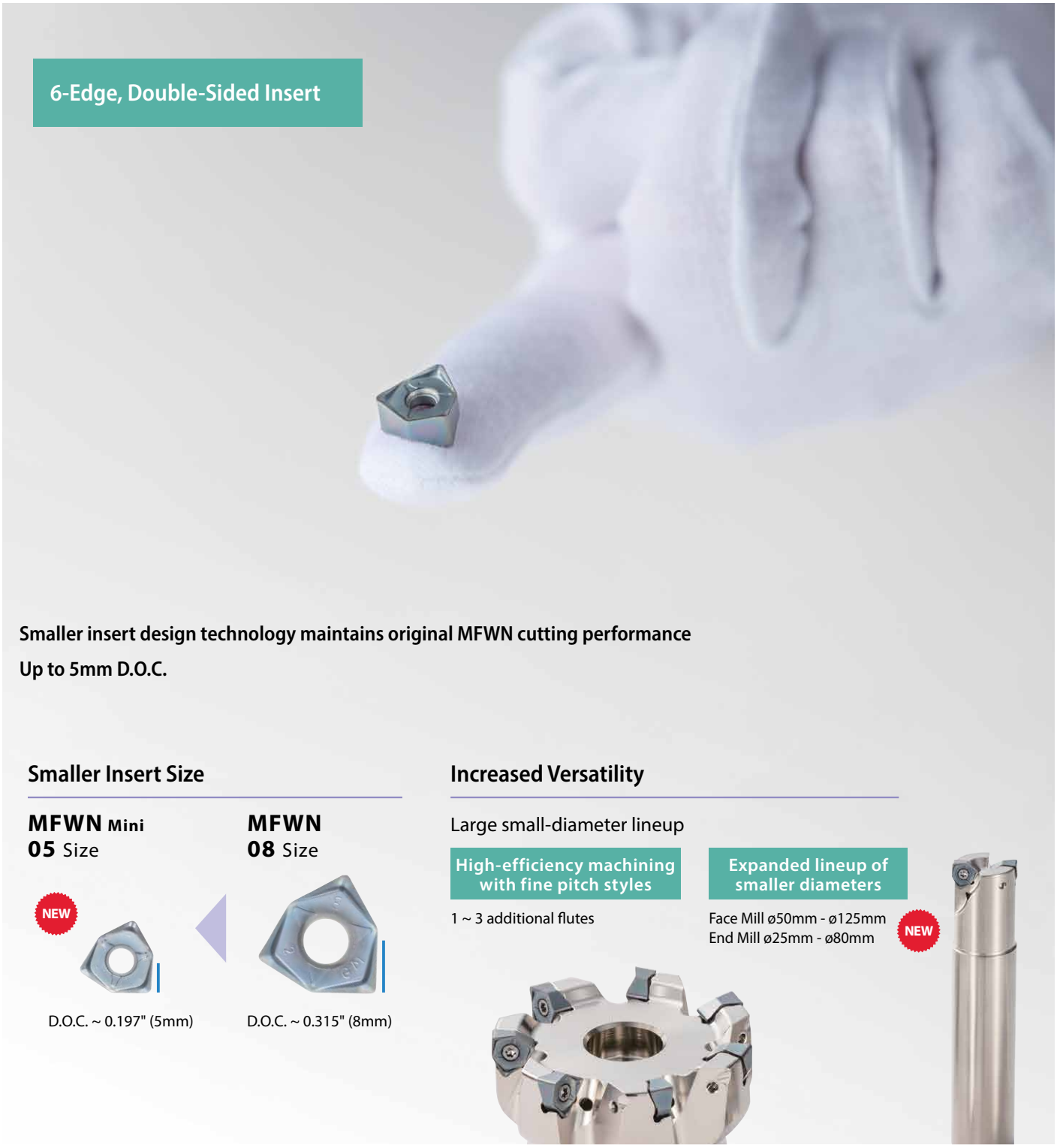
MFWN tripled tool life under the same cutting conditions as Competitor D.

(User Evaluation)

MFWN Mini NEW

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

1 MFWN Mini Uses Cost-Efficient 6-Edge Inserts



6-Edge, Double-Sided Insert

Smaller insert design technology maintains original MFWN cutting performance

Up to 5mm D.O.C.

Smaller Insert Size

MFWN Mini
05 Size

NEW

D.O.C. ~ 0.197" (5mm)

MFWN
08 Size

D.O.C. ~ 0.315" (8mm)

Increased Versatility

Large small-diameter lineup

High-efficiency machining with fine pitch styles

1 ~ 3 additional flutes

Expanded lineup of smaller diameters

Face Mill ø50mm - ø125mm
End Mill ø25mm - ø80mm

NEW

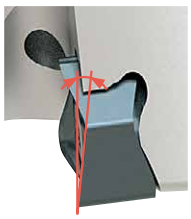
2 Fracture-Resistant Inserts and Low Cutting Forces

1 Low Cutting Force and High Chattering-Resistance

Steep rake angle minimizes cutting forces

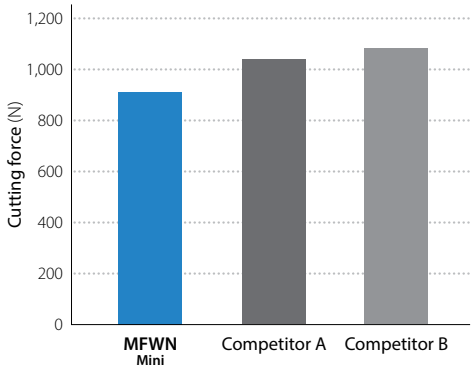
Dynamic slant design reduces initial impact when entering the workpiece

A.R. Max +11°



Dynamic Slant Design

Cutting Force Comparison (Internal Evaluation)

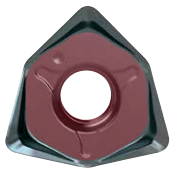


Cutting conditions : Vc = 490 sfm, fz = 0.006 ipt, D.O.C. x ae = 0.059" x 1.378", Dry
Cutting Dia. ø63mm Workpiece : 4140

2 Superior Fracture Resistance with Thick Edge Design

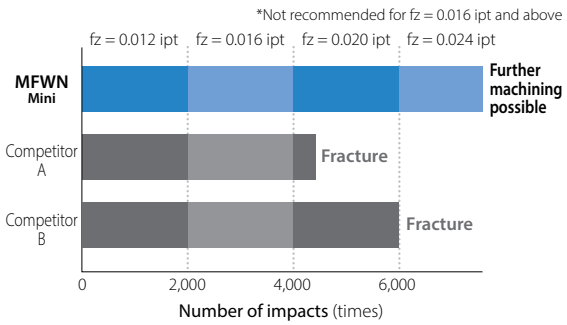
Stable Clamping Strength with Unique Insert Face Design

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



Optimized Seating Surface

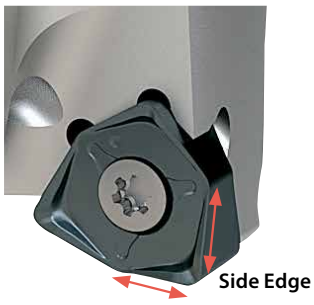
Fracture resistance comparison (Internal Evaluation)



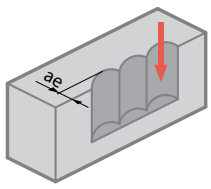
Cutting conditions : Vc = 390 sfm, D.O.C. x ae = 0.059" x 1.181", Dry
Cutting Dia. ø63mm Workpiece : Mold Steel 37 ~ 43 HRC

3 Neutral Inserts for Various Applications

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



Can be used for plunging applications



Left-handed Toolholders are also Available (Custom Order)

3 Comprehensive Insert Lineup for Various Machining Applications

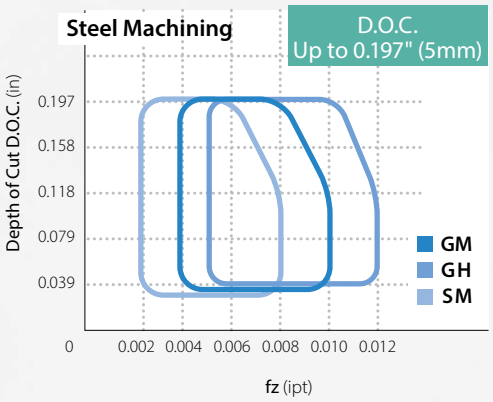
Three insert chipbreakers and four grades available

GM
General Purpose

SM
Low Cutting Force

GH
Tough Edge

Applicable Chipbreaker Range



Steel, Cast Iron, Stainless Steel and Heat-Resistant Alloy

MEGACOAT NANO **PR1510 / PR1525 / PR1535**

Hardened Materials (60 HRC or less)

MEGACOAT HARD **PR015S** (GH only)

Recommended Cutting Conditions ★ 1st Recommendation ☆ 2nd Recommendation

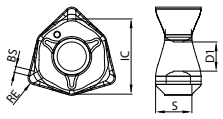
Chipbreaker	Workpiece Material	Feed Rate fz (ipt)	Recommended Insert Grade (Vc sfm)			
			MEGACOAT NANO			MEGACOAT HARD
			PR1535	**PR1525**	**PR1510**	**PR015S**
GM	Carbon Steel	0.004 – **0.008** – 0.010	☆ 390 – **590** – 820	★ 390 – **590** – 820	-	-
	Alloy Steel	0.004 – **0.008** – 0.010	☆ 330 – **520** – 720	★ 330 – **520** – 720	-	-
	Mold Steel	0.004 – **0.006** – 0.008	☆ 260 – **460** – 590	★ 260 – **460** – 590	-	-
	Austenitic Stainless Steel	0.004 – **0.006** – 0.008	☆ 330 – **520** – 660	☆ 330 – **520** – 660	-	-
	Martensitic Stainless Steel	0.004 – **0.006** – 0.008	☆ 490 – **660** – 820	-	-	-
	Precipitation Hardened Stainless Steel	0.004 – **0.006** – 0.008	★ 300 – **390** – 490	-	-	-
	Gray Cast Iron	0.004 – **0.008** – 0.010	-	-	★ 390 – **590** – 820	-
	Nodular Cast Iron	0.004 – **0.006** – 0.008	-	-	★ 330 – **490** – 660	-
	Ni-base Heat Resistant Alloy	0.004 – **0.005** – 0.006	☆ 70 – **100** – 160	-	-	-
SM	Carbon Steel	0.002 – **0.005** – 0.008	☆ 390 – **590** – 820	☆ 390 – **590** – 820	-	-
	Alloy Steel	0.002 – **0.005** – 0.008	☆ 330 – **520** – 720	☆ 330 – **520** – 720	-	-
	Mold Steel	0.002 – **0.003** – 0.006	☆ 260 – **460** – 590	☆ 260 – **460** – 590	-	-
	Austenitic Stainless Steel	0.002 – **0.005** – 0.008	☆ 330 – **520** – 660	☆ 330 – **520** – 660	-	-
	Martensitic Stainless Steel	0.002 – **0.005** – 0.008	☆ 490 – **660** – 820	-	-	-
	Precipitation Hardened Stainless Steel	0.002 – **0.005** – 0.008	★ 300 – **390** – 490	-	-	-
	Gray Cast Iron	0.002 – **0.005** – 0.008	-	-	☆ 390 – **590** – 820	-
	Nodular Cast Iron	0.002 – **0.003** – 0.006	-	-	☆ 330 – **490** – 660	-
	Ni-base Heat Resistant Alloy	0.002 – **0.003** – 0.006	★ 70 – **100** – 160	-	-	-
	Titanium Alloy	0.002 – **0.003** – 0.006	★ 130 – **200** – 260	-	☆ 130 – **200** – 260	-
GH	Carbon Steel	0.006 – **0.008** – 0.012	☆ 390 – **590** – 820	☆ 390 – **590** – 820	-	-
	Alloy Steel	0.006 – **0.008** – 0.012	☆ 330 – **520** – 720	☆ 390 – **520** – 720	-	-
	Mold Steel	0.006 – **0.008** – 0.010	☆ 260 – **460** – 590	☆ 260 – **460** – 590	-	-
	Austenitic Stainless Steel	0.006 – **0.008** – 0.010	☆ 330 – **520** – 660	☆ 330 – **520** – 660	-	-
	Martensitic Stainless Steel	0.006 – **0.008** – 0.010	☆ 490 – **660** – 820	-	-	-
	Precipitation Hardened Stainless Steel	0.006 – **0.008** – 0.010	☆ 300 – **390** – 490	-	-	-
	Gray Cast Iron	0.006 – **0.008** – 0.012	-	☆ 390 – **590** – 820	☆ 390 – **590** – 820	-
	Nodular Cast Iron	0.006 – **0.008** – 0.010	-	☆ 330 – **490** – 660	☆ 330 – **490** – 660	-
	Ni-base Heat Resistant Alloy	0.004 – **0.006** – 0.008	☆ 70 – **100** – 160	-	-	-
	Hardened Material (≤ 60 HRC)	0.002 – **0.003** – 0.006	-	-	-	★ 160 – **260** – 330

The figures in bold font represent the 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

Machining with coolant is recommended for Ni-base Heat-resistant alloy and Titanium Alloy
When using GH chipbreaker in extra fine pitch cutters, recommended feed is ≤ 0.008 ipt

Applicable Inserts

Usage Classification						
★ Roughing / 1st Choice ☆ Roughing / 2nd Choice ■ Finishing / 1st Choice □ Finishing / 2nd Choice (When hardness is under 45HRC)	P	Carbon Steel / Alloy Steel	☆	★		
		Mold Steel	☆	★		
	M	Austenitic Stainless Steel	★	☆		
		Martensitic Stainless Steel	★			
		Precipitation Hardened Stainless Steel	★			
	K	Gray Cast Iron			★	
		Ductile Cast Iron			★	
	N	Non-Ferrous Metals				
	S	Heat Resistant Alloy (Ni-base)	★			
		Titanium Alloy (Ti-6Al-4V)	★			
	H	Hardened Materials				★

Insert		Part Number	Dimensions (in)					MEGACOAT NANO			MEGACOAT HARD
			IC	S	D1	BS	RE	PR1535	PR1525	PR1510	PR015S
 General Purpose		**WNMU 080604EN-GM**	0.346	0.165	0.134	0.028	1/64	●	●	●	
 Low Cutting Force		**WNMU 080608EN-SM**	0.346	0.165	0.134	0.028	1/32	●	●	●	
 Tough Edge (Heavy Milling)		**WNMU 080608EN-GH**	0.346	0.165	0.134	0.028	1/32	●	●	●	●

● : Standard Item

Recommended Cutting Conditions see **Page 14**

PR015S

Long tool life and stable machining for hardened materials

Excellent performance with improved thermal properties and MEGACOAT HARD

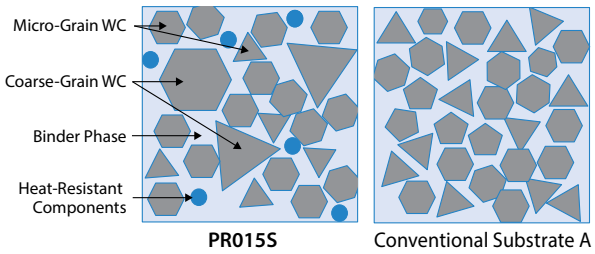
NEW

1 Improved Thermal Properties to Reduce Sudden Defects and Insert Boundary Damage

Improved thermal conductivity by optimum distribution of WC coarse grains (Compared to previous model)

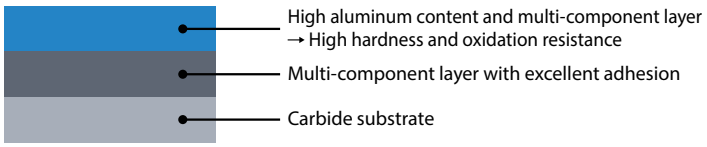
Resists heat concentration at the cutting edge to promote stable machining

(Pattern Diagram)

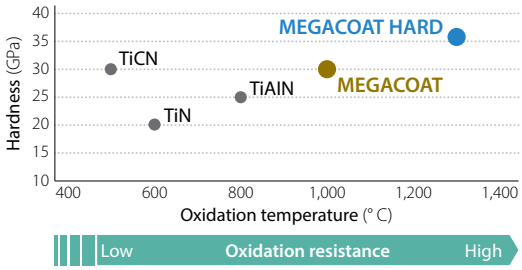


2 Improved wear resistance with MEGACOAT HARD coating

MEGACOAT HARD : High hardness and high heat-resistant PVD layer



Coating Properties (Internal Evaluation)



Excellent wear resistance with high-hardness and resists boundary damage with improved thermal properties

MFWN Mini Face Mills (Metric Size)

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

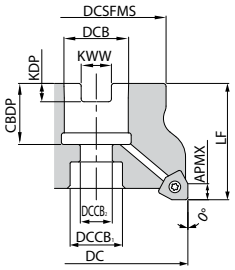


Fig.1

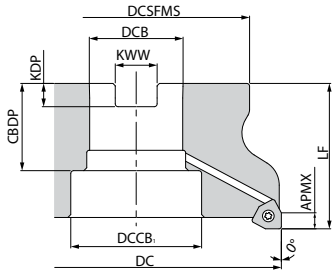


Fig.2

Toolholder Dimensions (Metric Size)

		Part Number	Stock	No. of Inserts	Dimensions (mm)										Coolant Hole	Drawing	Weight (kg)	Max RPM
					DC	DCSFMS	DCB	$DCCB_1$	$DCCB_2$	LF	CBDP	KDP	KWW	APMX				
Inch Bore Dia.	Coarse Pitch	MFWN 90080R-05-7T	●	7	80	70	25.4	20	13	50	27	6	9.5		Yes	Fig.1	1.3	10,900
		90100R-05-8T	●	8	100	78	31.75	45	-		34	8	12.7	5	Yes	Fig.2	1.6	9,700
		90125R-05-11T	●	11	125	89	38.1	55		63	38	10	15.9		Yes		2.9	8,700
	Extra-Fine Pitch	MFWN 90080R-05-9T	●	9	80	70	25.4	20	13	50	27	6	9.5		Yes	Fig.1	1.2	10,900
		90100R-05-11T	●	11	100	78	31.75	45	-		34	8	12.7	5	Yes	Fig.2	1.6	9,700
		90125R-05-14T	●	14	125	89	38.1	55		63	38	10	15.9		Yes		2.8	8,700
Metric Bore Dia.	Coarse Pitch	MFWN 90050R-05-5T-M	●	5	50	48	22	17.5	11	40	21	6.3	10.4		Yes		0.4	13,800
		90063R-05-6T-M	●	6	63			18							Yes	Fig.1	0.5	12,300
		90080R-05-7T-M	●	7	80	70	27	20	13	50	24	7	12.4	5	Yes		1.2	10,900
		90100R-05-8T-M	●	8	100	78	32	45	-		30	8	14.4		Yes	Fig.2	1.6	9,700
		90125R-05-11T-M	●	11	125	89	40	55		63	33	9	16.4		Yes		2.8	8,700
	Extra-Fine Pitch	MFWN 90050R-05-6T-M	●	6	50	48	22	17.5	11	40	21	6.3	10.4		Yes		0.4	13,800
		90063R-05-7T-M	●	7	63			18							Yes	Fig.1	0.5	12,300
		90080R-05-9T-M	●	9	80	70	27	20	13	50	24	7	12.4	5	Yes		1.2	10,900
		90100R-05-11T-M	●	11	100	78	32	45	-		30	8	14.4		Yes	Fig.2	1.5	9,700
		90125R-05-14T-M	●	14	125	89	40	55		63	33	9	16.4		Yes		2.7	8,700

Caution with Max RPM

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page 14.
Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

● : Standard Item

Applicable Inserts see **Page 15**

MFWN Mini Face Mill Spare Parts

	Part Number	Clamp screw	Wrench	Anti-Seize Compound	Arbor Bolt
					
Cross pitch	MFWN 90050R-05-5T-M	SB-3065TRP	DTPM-8	P-37	HH10×30
	90063R-05-6T-M				HH10×30
	90080R-05-7T(-M)				HH12×35
	90100R-05-8T(-M)				-
	90125R-05-11T(-M)				
Extra cross pitch	MFWN 90050R-05-6T-M	SB-3065TRP	DTPM-8	P-37	HH10×30
	90063R-05-7T-M				HH10×30
	90080R-05-9T(-M)				HH12×35
	90100R-05-11T(-M)				-
	90125R-05-14T(-M)				

Recommended Torque for Insert Clamp 1.2 N·m

Recommended Torque for Insert Clamp 1.2 N·m

Coat Anti-Seize Compound (P-37) thinly on portion of taper and thread prior to installation.

MFWN Mini End Mills (Metric Size)

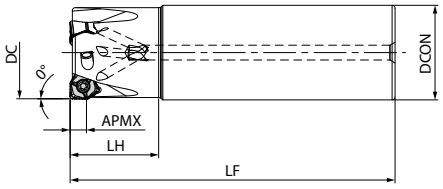


Fig.1

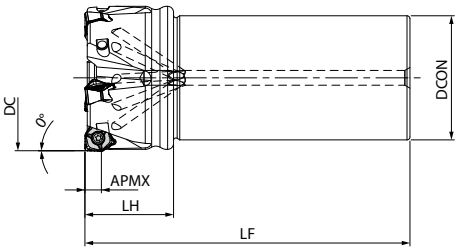


Fig.2

Toolholder Dimensions (Metric Size)

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

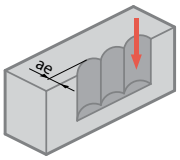
Caution with Max RPM

Set the number of revolutions per minute within the recommended cutting speed specified by the workpiece on page 14.
Do not use the cutter at the maximum revolution or higher since the centrifugal force may cause chips and parts to scatter even under no load.

● : Standard Item

Applicable Inserts see **Page 15**

Plunge Milling (MFWN Mini)



Cutting Dia.	Maximum Width of Cut (ae)
All Part Numbers	0.197" (5mm)

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

Applicable Chipbreaker by Cutter Type (MFWN Mini)

Cutter Type	Chipbreaker		
	GM	SM	GH
Coarse Pitch	○	○	○
Extra Fine Pitch	○	○	△ (fz = 0.008 ipt or less is recommended)

How to Mount Inserts (Refer to Page 8)

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