MITSUBISHI MATERIALS

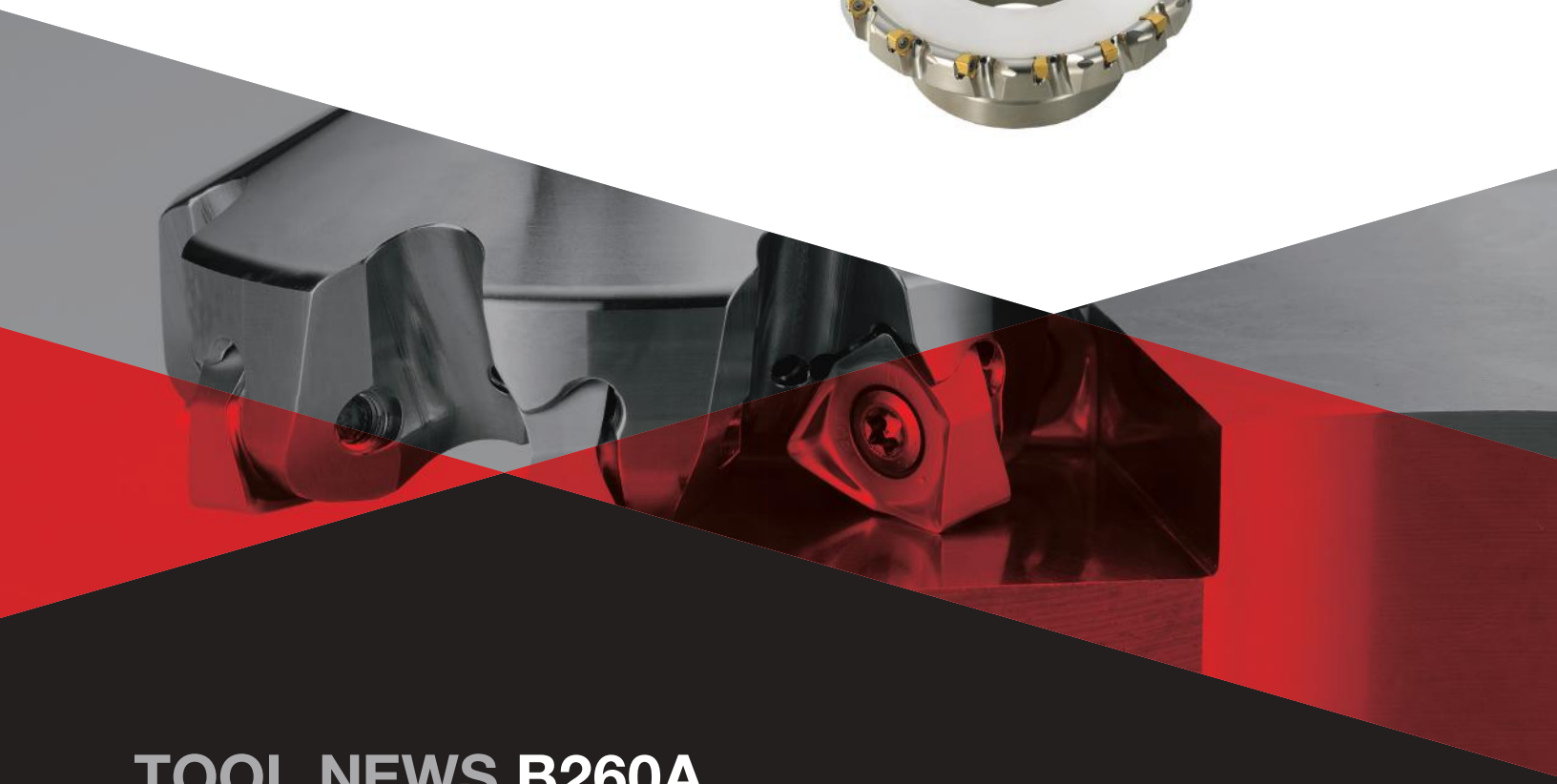
WWX Series



DOUBLE-SIDED INSERT TYPE SHOULDER MILL



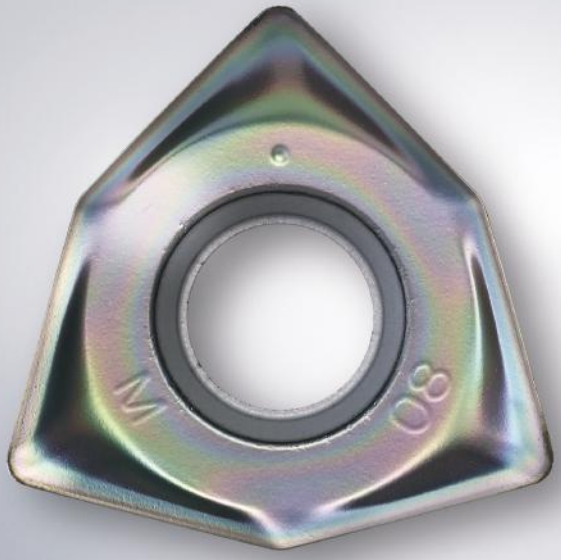
Strong X Geometry



TOOL NEWS **B260A**

Double-Sided Insert Type Shoulder Mill

WWX Series



Economical double-sided insert with 6 corners.



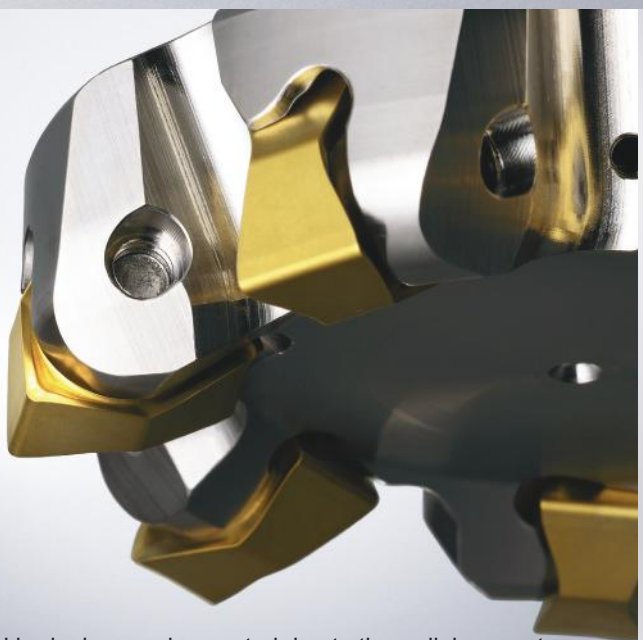
The insert thickness was greatly increased to markedly improve the fracture resistance (MMC comparison).



Stable and Reliable

The optimized “X-type” insert enables stable, high quality machining.

Strong X Geometry



Tool body damage is negated due to the radial geometry behind the insert.



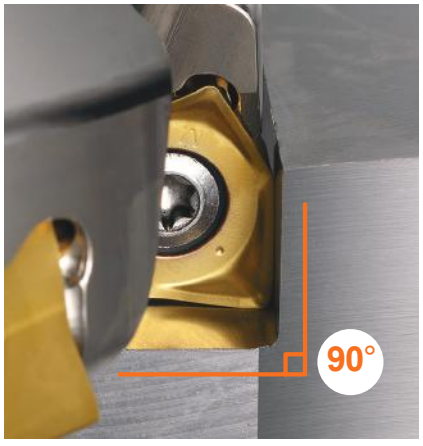
Are available to machine a vast range of materials.



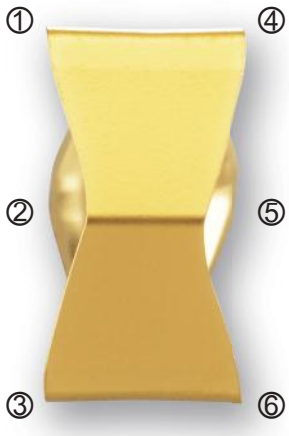
The optimized “X-type” insert meets the demand for greater strength.

The “X-Type” insert shape provides economic efficiency as well as maintaining high quality surface finishes.

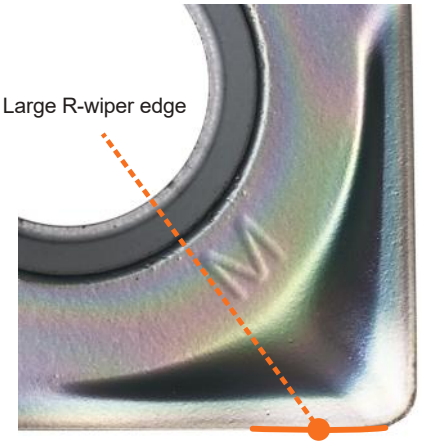
A 90º wall surface is produced and the large R-wiper edge achieves good surface finishes. In addition the optimized X-type insert with 6 corners contributes to lower tooling costs.



High-quality wall surface machining is possible.



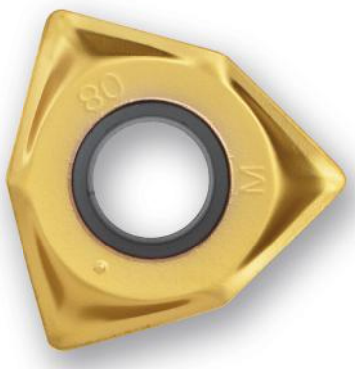
Economical double-sided 6 corners.



Large R-wiper edge achieves a good surface finish.

The generous thickness of the insert provides high rigidity.

The new WWX200 insert is 1.5 times thicker than a conventional ASX400 insert, and the WWX400 is 2.2 times thicker. This extra thickness provides higher rigidity and fracture resistance.
Additionally, the extra rigidity eliminates the need for a shim. Therefore direct clamping of the insert to the body provides extra stability.





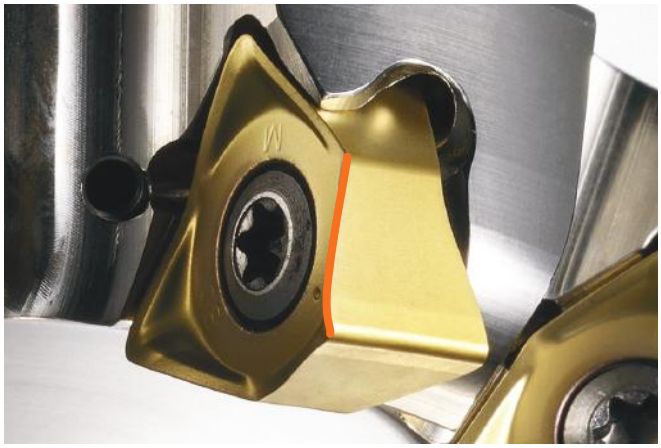
WWX200=.236 inch
WWX400=.354 inch

Strong X Geometry

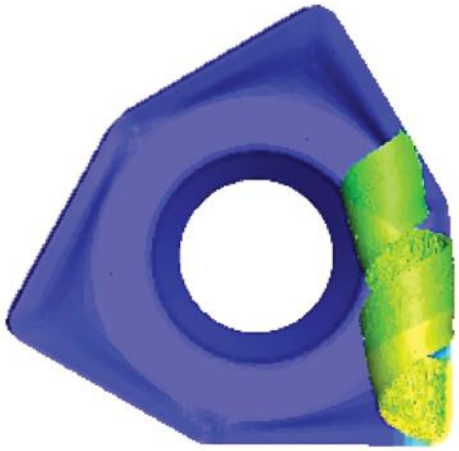
Excellent control and chip abrasion prevention.

CAE* analysis was used for the main cutting edge design. This resulted in changing from a straight to a curved cutting edge. Additionally, the rake angle shape of the optimized cutting edge greatly suppresses the scattering of chips on the finished surface. This enables good surface finishes and markedly improved efficiency.

*CAE : Computer Aided Engineering



Curved cutting edge shape designed with an optimum rake face.



Chips are created in a helical shape for efficient dispersal.

Comments from The Developer

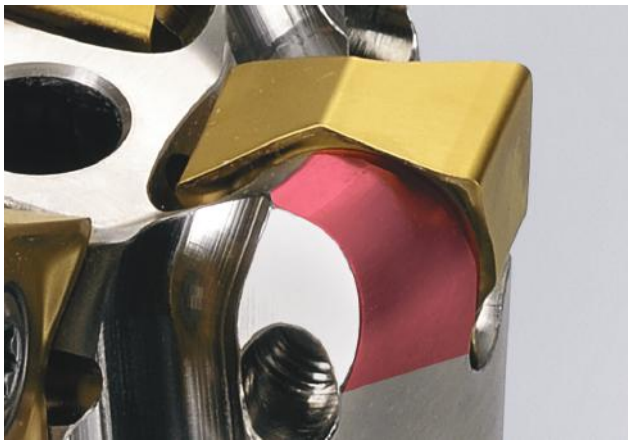
The WWX Series was developed under the concept of “Stable and Worry-free” using an optimized insert shape with a maximum thickness of WWX200=.234", WWX400=.354” in response to recent trends of unmanned operations and the demand for increased efficiency. The main attributes improved were rigidity and fracture resistance. Attention was also given to the cutting edge shape to achieve improved finished surface quality and good chip discharge. Be sure to experience the proprietary “X-type” insert developed by Mitsubishi Materials.



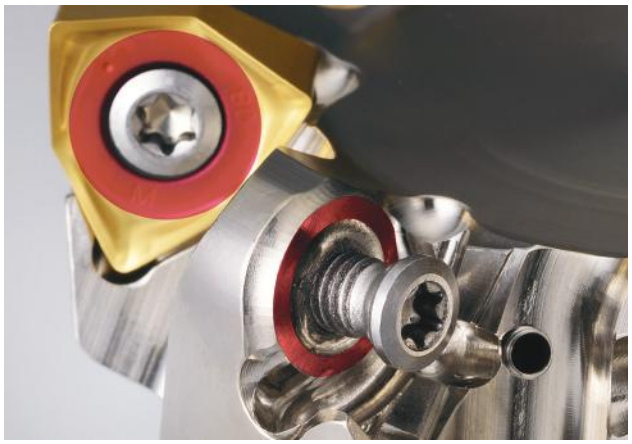
Extreme clamping stability and high-quality machining.

Optimized support under the insert and high clamping rigidity improves stability.

The conical shaped seating surface widely supports the insert seating surface while the radial geometry of the tool body behind the insert provides necessary clearance to suppress body damage from scratches and chip abrasion. Additionally, the strong clamping force of the screws provides robust clamping.



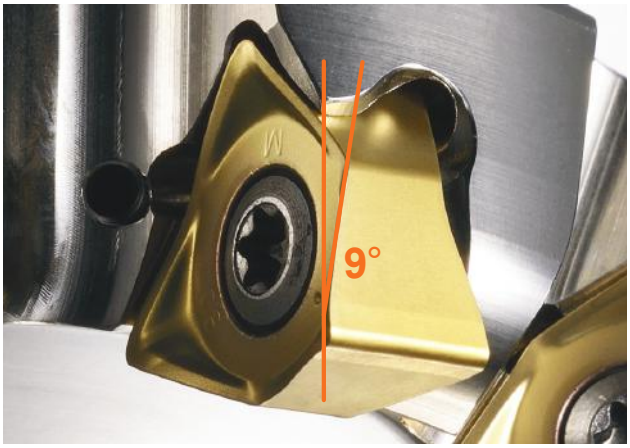
Radius geometry of the tool body behind the insert.



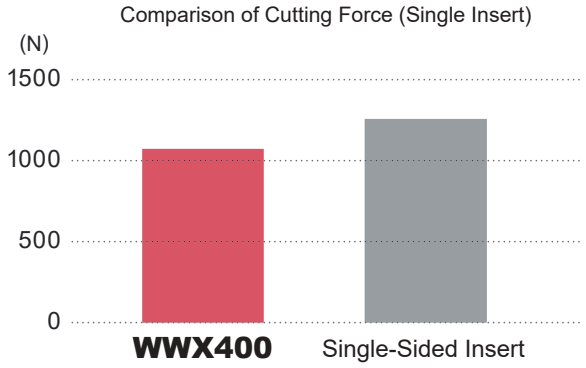
The conical shim surface and the M5 screw for WWX400, and the M3 screw for WWX200 provide a high clamping force.

Low cutting resistance suppresses chatter vibration even for thin workpieces.

Although a double-sided insert type with an axial rake angle of 9° (close to that of a single-sided insert type) is used, the WWX Series insert achieves lower cutting resistance than a single-sided insert (in-house comparison) and suppresses chatter vibration when machining thin workpieces.



Axial Rake Angle of 9°



<Cutting Conditions>

Material	: AISI 4140
Cutter Dia.	: DC=3.000"
Cutting Speed	: vc=525 SFM
Feed per Tooth	: fz=.008 IPT
Depth of Cut	: ap=.079"
Width of Cut	: ae=2.520"
Cutting Mode	: Dry Cutting

Variety of cutter types, diameters & pitches.

Increasing the insert thickness, while achieving a shim-less clamping face made it possible to incorporate a large number of teeth while maintaining large chip pockets to provide a variety of cutter options. A standard inventory is maintained consisting of 3 pitch types of both arbor and shank type cutters of the same diameter. Fine pitch types in particular allow a high table feed and greatly improve efficiency.



DC=ø3.000"
Fine Pitch Type



DC=ø3.000"
Coarse Pitch Type

Comments from The Developer

The pursuit of "trouble free machining" is also reflected in the cutter body. The highly rigid radial insert support achieves a stable insert seating face by using a conical shaped shim and M5 screws. This design allows for long use and is the answer to the dissatisfied customers who have experienced “when damage to the insert has also made the cutter body unusable.”

WWX Series Classification

Arbor Type

The table feed is calculated from the recommended conditions of a M chipbreaker for mild steel, during dry, stable cutting and with a cutting width of .5DC. APMX is the maximum depth of cut which differs from the recommended cutting conditions.

DC		WWX200 APMX= .197 inch						WWX400 APMX= .323 inch					
(inch)	(mm)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)
1.500	40	3	29.3	4	39.1	–	–	–	–	–	–	–	–
2.000	50	4	31.3	5	39.1	6	46.9	3	23.5	4	31.3	–	–
2.500	63	5	31.1	6	37.2	7	43.5	3	18.6	4	24.8	5	31.1
3.000	80	5	24.4	7	34.2	9	44.0	4	19.6	5	24.4	7	34.2
4.000	100	6	23.5	8	31.3	11	43.0	5	19.6	7	27.4	9	35.2
5.000	125	7	21.9	11	34.4	14	43.8	6	18.8	8	25.0	12	37.6
6.000	160	9	22.0	12	29.3	16	39.1	8	19.6	10	24.4	14	34.2
8.000	200	–	–	–	–	–	–	10	19.6	12	23.5	16	31.3
10.000	250	–	–	–	–	–	–	12	18.8	14	21.9	18	28.1

* Number of Teeth

Shank Type

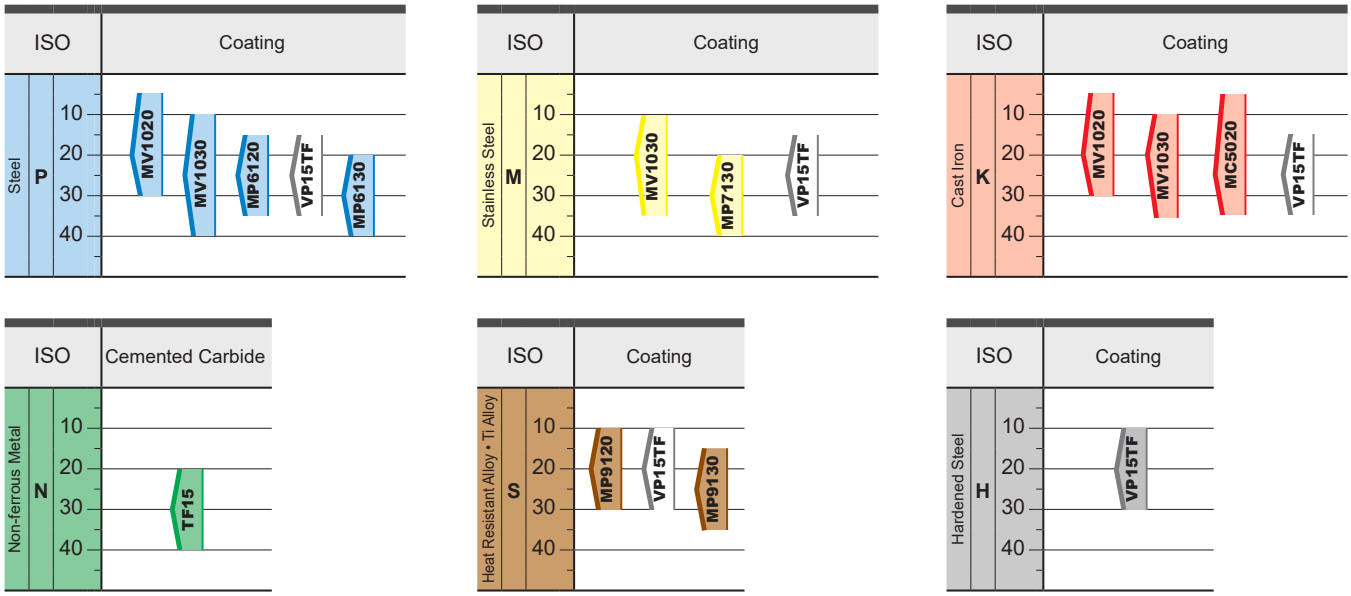
(inch)

DC	WWX200 APMX= .197 inch						WWX400 APMX= .323 inch				
(inch)	DCONMS	Functional Length LF		Number of Teeth			DCONMS	Functional Length LF	Number of Teeth		
1.000	1.000	4.750	8.500	2	–	–	–	–	–	–	–
1.125	1.000	8.500	–	2	–	–	–	–	–	–	–
1.250	1.000	5.125	–	2	3	–	–	–	–	–	–
	1.000	9.000	–	3	–	–	–	–	–	–	–
	1.250	5.125	–	2	3	–	–	–	–	–	–
	1.250	9.000	–	3	–	–	–	–	–	–	–
1.500	1.250	5.125	–	3	4	–	–	–	–	–	–
	1.250	9.000	–	4	–	–	–	–	–	–	–
2.000	–	–	–	–	–	–	1.250	4.750	3	4	–
2.500	–	–	–	–	–	–	1.250	4.750	3	4	5
3.000	–	–	–	–	–	–	1.250	4.750	4	5	7

(mm)

DC	WWX200 APMX 5.0 mm						WWX400 APMX 8.2 mm				
(mm)	DCONMS	Functional Length LF		Number of Teeth			DCONMS	Functional Length LF	Number of Teeth		
25	20	115	–	2	–	–	–	–	–	–	–
	25	115	170	2	–	–	–	–	–	–	–
28	25	115	170	2	–	–	–	–	–	–	–
30	25	125	–	2	–	–	–	–	–	–	–
32	32	125	–	2	3	–	–	–	–	–	–
	32	190	–	3	–	–	–	–	–	–	–
35	32	190	–	3	–	–	–	–	–	–	–
40	32	125	–	3	4	–	–	–	–	–	–
50	32	125	–	4	5	6	32	125	3	4	–
63	–	–	–	–	–	–	32	125	3	4	5
80	–	–	–	–	–	–	32	125	4	5	7

Inserts Grades for a Wide Range of Materials



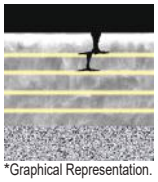
MP6100/MP7100/MP9100 Series

TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

Base Layer
High Al-(Al, Ti)N

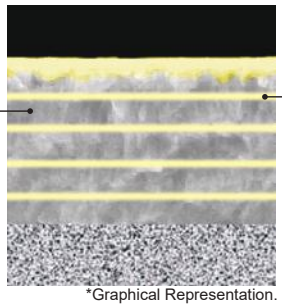
The new technology Al-(Al, Ti)N coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

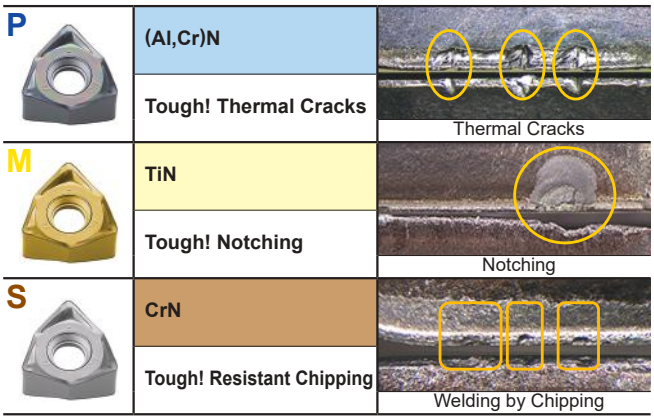
*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

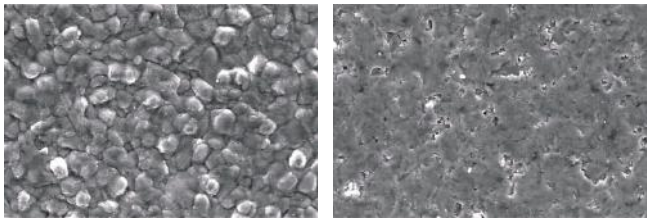
Best Layer of Each Workpiece Material



CVD Coating MC5020

First recommendation for cast iron milling.
MC5020 has excellent wear resistance and also controls thermal cracking and chipping that are common when machining ductile cast iron.

Comparison of Coating Surface



Conventional Coating | Black Super-smooth Coating

Black Super-smooth Coating

Black super-smooth coating prevents abnormal damage such as weld chipping.

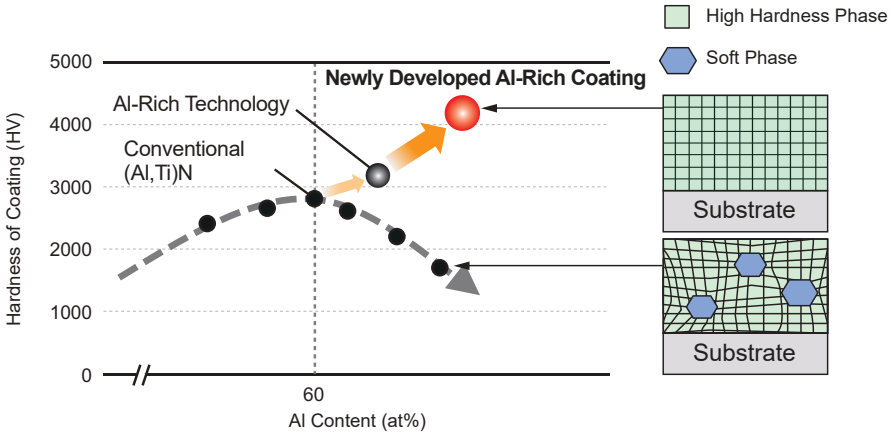
Coated Carbide Grade for Milling

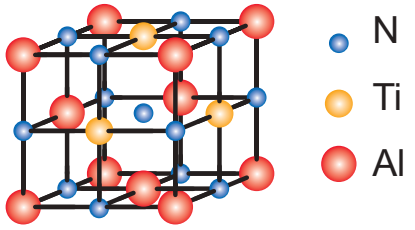
MV1020/MV1030

Newly Developed Al-Rich Coating

Advanced Wear and Thermal Shock Resistance

By adopting the newly developed Al-Rich coating technology, the (Al,Ti)N with a high Al content ratio displays a very high hardness. This greatly improves oxidation and wear resistance.
The extreme heat resistance of this new series achieves amazing stability not only during dry cutting, but also when wet cutting where inserts are usually prone to thermal cracking.
MV1020 offers overwhelmingly superior performance in high-speed cutting, and MV1030 achieves stable performance during interrupted and stainless steel machining.

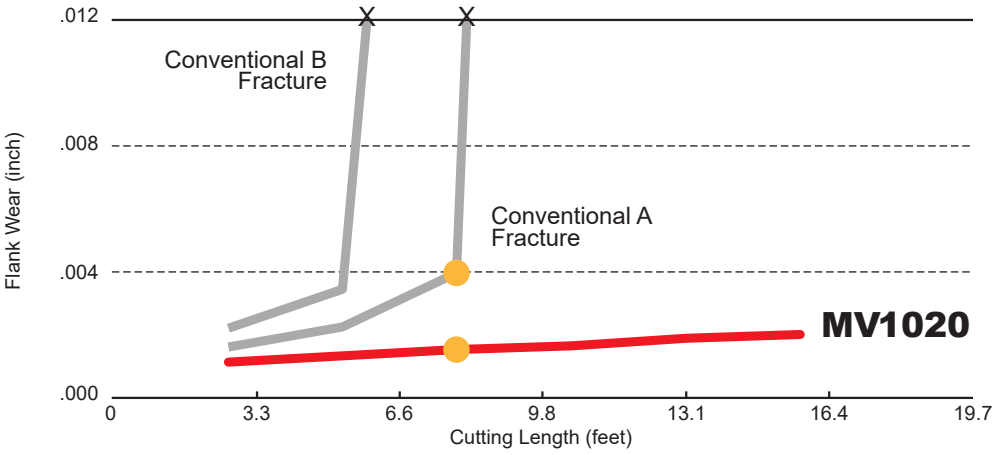




Crystal image of **MV1000** series

Cutting Performance

Comparison of wear resistance when machining alloy steel 4140



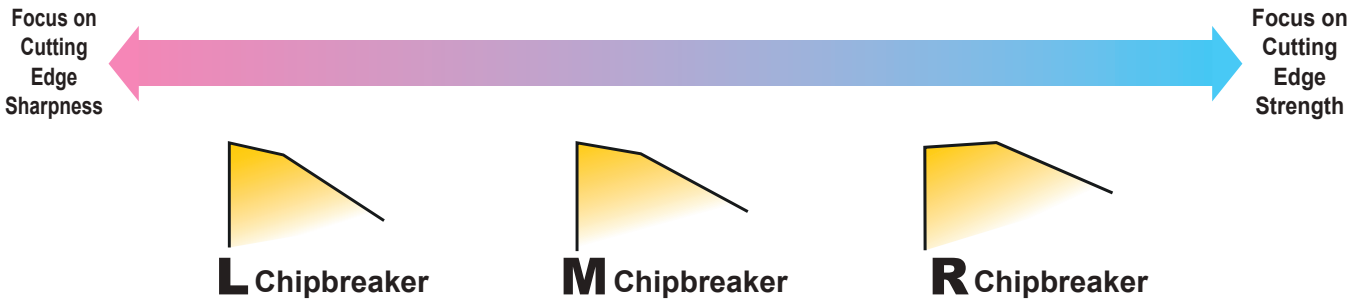
<Cutting Conditions>
Material : AISI 4140
Tool : WWX400
Inserts : 6NMU1409080PNER-M
Cutting Speed : vc=985 SFM
Feed per Tooth : fz=.006 IPT
Depth of Cut : ap=.118 inch
Width of Cut : ae=2.047 inch
Cutting Mode : Dry Cutting
Single Insert

Taken after cutting length of 7.9 feet



MV1020 Conventional A Conventional B

Chipbreaker System



Material	Cutting Conditions		
	Stable Cutting	General Cutting	Unstable Cutting
P	L	M	R
M	L	M	
K	L	M	R
N	L		
S	L	M	R
H	L	M	R

L chipbreaker ideal for machining aluminum alloys and non-ferrous metals

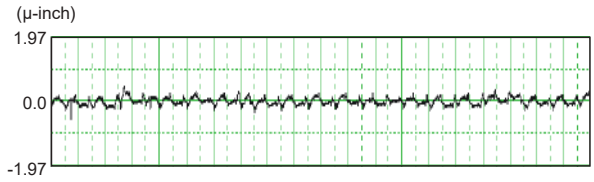
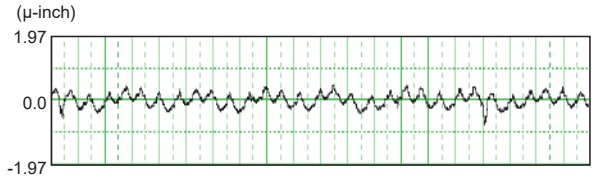
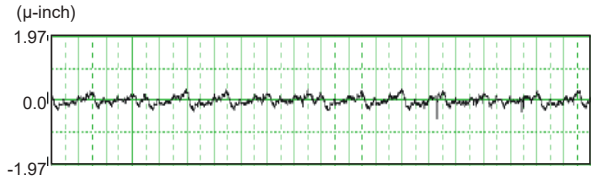
Cost advantage of using 6 corners.
Precision grade provides high adhesion resistance and excellent machined surface quality.
Low cutting force and good chip control.



Cutting Performance

Finished Surface Comparison after Single Insert Machining of 4140

WWX400 M class inserts achieve excellent surface finishes, better than conventional G class products.

	Ra (µ-inch)	Rz (µ-inch)	Measured Value
WWX400 MP6120 (M class)	**.009**	**.054**	
Conventional (M class)	.016	.090	
Conventional (G class)	.011	.067	

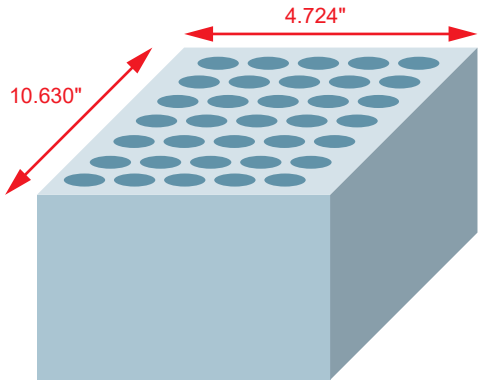
<Cutting Conditions>
Material : AISI 4140
Cutter Dia. : DC=ø3.150"
Cutting Speed : vc = 720 SFM
Feed per Tooth : fz = .004 IPT
Depth of Cut : ap = .039"
Width of Cut : ae = 2.520" (.8DC)
Cutting Mode : Dry Cutting

Fracture Resistance Comparison when Machining 4140

High stability is achieved without fracturing even at a feed of fz=.014 IPT.

fz (IPT) / Item	.008	.010	.012	.014
WWX400 MP6120 (Grade M)	✓	✓	✓	✓
Conventional Single-sided Insert	✗			

✓ : Cutting Length 5.32 Feet Possible
✗ : Fracture

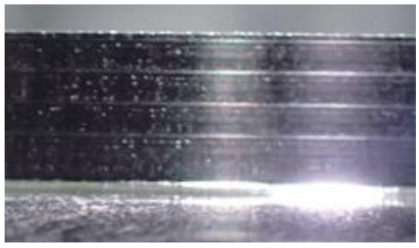


2.66 feet x 2 = 5.32 feet

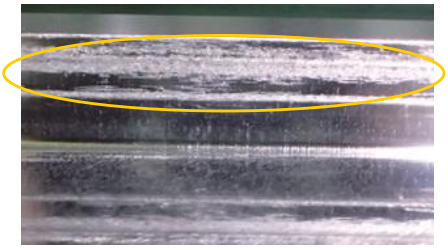
<Cutting Conditions>
Material : AISI 4140
Cutter Dia. : DC=ø3.150"
Cutting Speed : vc = 460 SFM
Depth of Cut : ap = .079"
Width of Cut : ae = 1.575" (.5DC)
Cutting Mode : Dry Cutting, Single Insert

Comparison of Wall after Shoulder Milling Alloy Steel 4140

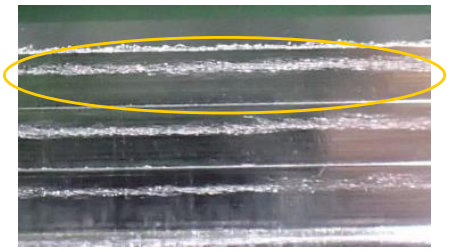
Excels in chip control and achieves excellent, scratch-free wall surfaces.



WWX200



Damage caused by Chips
Conventional A



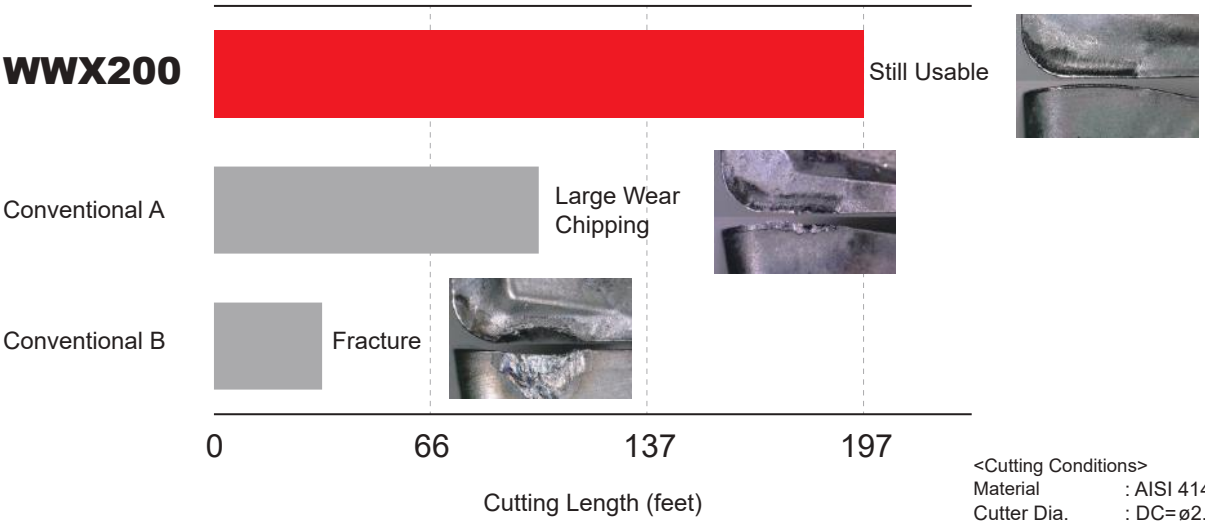
Damage caused by Chips
Conventional B

<Cutting Conditions>

Material	: AISI 4140
Cutter Dia.	: DC=ø2.000 inch
Cutting Speed	: vc = 590 SFM
Feed per Tooth	: fz = .004 IPT
Depth of Cut	: ap = .039 inch
Width of Cut	: ae = 1.575 inch
Cutting Mode	: Dry Cutting Single Insert

Comparison of Overall Cutting Length when Machining Alloy Steel 4140

Displays excellent wear and fracture resistance, and contributes to the extension of cutting length.



<Cutting Conditions>

Material	: AISI 4140
Cutter Dia.	: DC=ø2.000 inch
Inserts	: M Chipbreaker, MP6120
Cutting Speed	: vc = 590 SFM
Feed per Tooth	: fz = .006 IPT
Depth of Cut	: ap = .079 inch
Width of Cut	: ae = 1.575 inch
Cutting Mode	: Dry Cutting Single Insert

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX200

P M K N S H





Fig.1
ø1.500"
ø2.000"

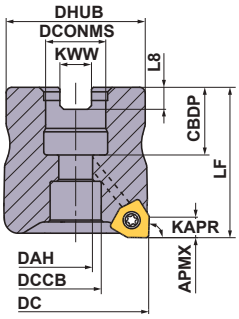
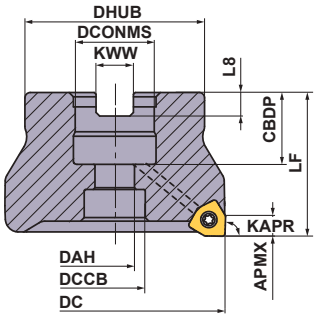


Fig.2
ø2.500"
ø3.000"



Right hand tool holder only.

Arbor Type

DCONMS = inch size (inch)

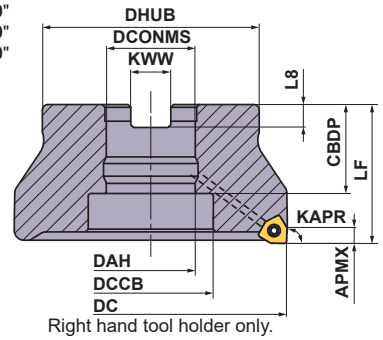
DC	Order Number	Stock R	✶1 Coolant Thru	✶2 No.T	LF	DCONMS	WT (lbs)	APMX	RPMX (min^{-1})	Fig.
1.500	**WWX200UR1.5003SA**	●	Y	3	1.750	.500	.6	.197	21600	1
1.500	**WWX200UR1.5004SA**	●	Y	4	1.750	.500	.5	.197	21600	1
2.000	**WWX200UR2.0004AA**	●	Y	4	1.750	.750	.9	.197	18600	1
2.000	**WWX200UR2.0005AA**	●	Y	5	1.750	.750	.9	.197	18600	1
2.000	**WWX200UR2.0006AA**	●	Y	6	1.750	.750	.9	.197	18600	1
2.500	**WWX200UR2.5005CA**	●	Y	5	2.000	1.000	1.7	.197	16000	2
2.500	**WWX200UR2.5006CA**	●	Y	6	2.000	1.000	1.6	.197	16000	2
2.500	**WWX200UR2.5007CA**	●	Y	7	2.000	1.000	1.6	.197	16000	2
3.000	**WWX200UR3.0005CA**	●	Y	5	2.000	1.000	2.2	.197	13600	2
3.000	**WWX200UR3.0007CA**	●	Y	7	2.000	1.000	2.2	.197	13600	2
3.000	**WWX200UR3.0009CA**	●	Y	9	2.000	1.000	2.1	.197	13600	2
4.000	**WWX200UR4.0006EA**	●	Y	6	2.500	1.500	5.1	.197	11700	3
4.000	**WWX200UR4.0008EA**	●	Y	8	2.500	1.500	5.0	.197	11700	3
4.000	**WWX200UR4.0011EA**	●	Y	11	2.500	1.500	4.9	.197	11700	3
5.000	**WWX200UR5.0007EA**	●	Y	7	2.500	1.500	7.8	.197	10100	3
5.000	**WWX200UR5.0011EA**	●	Y	11	2.500	1.500	7.6	.197	10100	3
5.000	**WWX200UR5.0014EA**	●	Y	14	2.500	1.500	7.6	.197	10100	3
6.000	**WWX200UR6.0009EA**	●	N	9	2.500	1.500	10.0	.197	8600	3
6.000	**WWX200UR6.0012EA**	●	N	12	2.500	1.500	9.8	.197	8600	3
6.000	**WWX200UR6.0016EA**	●	N	16	2.500	1.500	9.8	.197	8600	3

✶1 Y=Yes, N=No
✶2 Number of Teeth

● : USA Stock

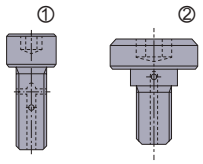
Fig.3

ø4.000"
ø5.000"
ø6.000"



Right hand tool holder only.

DC	Set Bolt	Geometry
1.500	HSCU25011H	①
2.000	HSCU37513H	
2.500	HSCU50014H	
3.000	HSCU50014H	
4.000	MBAU75016H	②
5.000	MBAU75016H	
6.000	MBAU75016H	



Mounting Dimensions

(inch)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	Fig.
1.500	**WWX200UR1.5003SA**	.500	.630	.276	.433	1.438	.250	.156	1
1.500	**WWX200UR1.5004SA**	.500	.630	.276	.433	1.438	.250	.156	1
2.000	**WWX200UR2.0004AA**	.750	.748	.413	.630	1.750	.313	.187	1
2.000	**WWX200UR2.0005AA**	.750	.748	.413	.630	1.750	.313	.187	1
2.000	**WWX200UR2.0006AA**	.750	.748	.413	.630	1.750	.313	.187	1
2.500	**WWX200UR2.5005CA**	1.000	.945	.539	.787	2.188	.375	.219	2
2.500	**WWX200UR2.5006CA**	1.000	.945	.539	.787	2.188	.375	.219	2
2.500	**WWX200UR2.5007CA**	1.000	.945	.539	.787	2.188	.375	.219	2
3.000	**WWX200UR3.0005CA**	1.000	.945	.539	.787	2.188	.375	.219	2
3.000	**WWX200UR3.0007CA**	1.000	.945	.539	.787	2.188	.375	.219	2
3.000	**WWX200UR3.0009CA**	1.000	.945	.539	.787	2.188	.375	.219	2
4.000	**WWX200UR4.0006EA**	1.500	1.654	1.500	2.205	3.500	.625	.375	3
4.000	**WWX200UR4.0008EA**	1.500	1.654	1.500	2.205	3.500	.625	.375	3
4.000	**WWX200UR4.0011EA**	1.500	1.654	1.500	2.205	3.500	.625	.375	3
5.000	**WWX200UR5.0007EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	3
5.000	**WWX200UR5.0011EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	3
5.000	**WWX200UR5.0014EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	3
6.000	**WWX200UR6.0009EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	3
6.000	**WWX200UR6.0012EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	3
6.000	**WWX200UR6.0016EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	3

Spare Parts

Tool Holder Type	* 		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3R = 17.7

WWX200



Fig.1

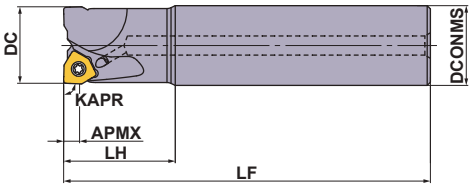


Fig.2

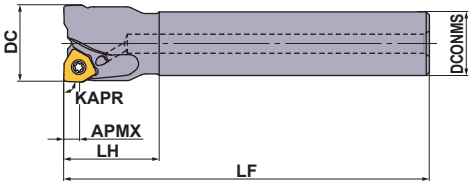


Fig.3

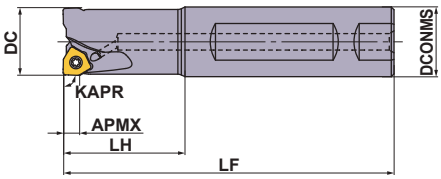
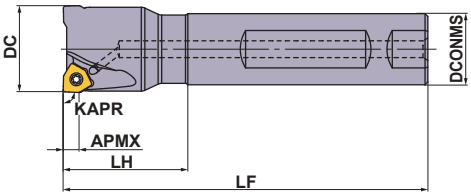


Fig.4



Right hand tool holder only.

Shank Type

With Air / Coolant through

(inch)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (lbs)	APMX	RPMX (min^{-1})	Fig.
1.000	**WWX200UR1602FA16S**	●	2	4.750	1.000	1.750	.9	.197	29600	3
1.000	**WWX200UR1602SA16L**	●	2	8.500	1.000	2.500	1.7	.197	29600	1
1.125	**WWX200UR1802SA16L**	●	2	8.500	1.000	1.750	1.8	.197	27400	2
1.250	**WWX200UR2002FA16S**	●	2	5.125	1.000	1.750	1.1	.197	25100	4
1.250	**WWX200UR2003FA16S**	●	3	5.125	1.000	1.750	1.1	.197	25100	4
1.250	**WWX200UR2003SA16L**	●	3	9.000	1.000	1.750	1.9	.197	25100	2
1.250	**WWX200UR2002FA20S**	●	2	5.125	1.250	2.000	1.5	.197	25100	3
1.250	**WWX200UR2003FA20S**	●	3	5.125	1.250	2.000	1.5	.197	25100	3
1.250	**WWX200UR2003SA20L**	●	3	9.000	1.250	3.000	2.8	.197	25100	1
1.500	**WWX200UR2403FA20S**	●	3	5.125	1.250	2.000	1.7	.197	21600	4
1.500	**WWX200UR2404FA20S**	●	4	5.125	1.250	2.000	1.7	.197	21600	4
1.500	**WWX200UR2404SA20L**	●	4	9.000	1.250	2.000	3.0	.197	21600	2

* Number of Teeth

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3R = 17.7

● : USA Stock ★ : Stocked in Japan

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX200

P M K N S H





Fig.1

ø40
ø50

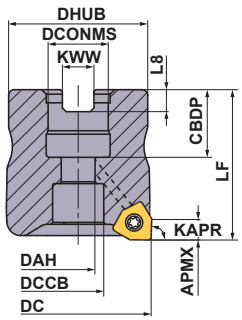
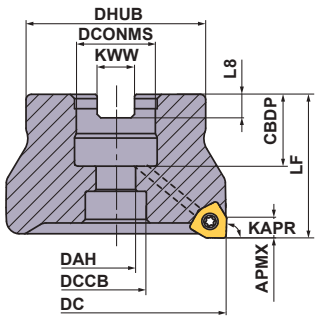


Fig.2

ø63
ø80



Right hand tool holder only.

Metric Standard

Arbor Type

DCONMS = inch size

(mm)

DC	Order Number	Stock R	∗1 Coolant Thru	∗2 No.T	LF	DCONMS	WT (kg)	APMX	RPMX (min^{-1})	Fig.
80	**WWX200R08005CA**	★	Y	5	50	25.4	1.1	5.0	13600	2
80	**WWX200R08007CA**	★	Y	7	50	25.4	1.1	5.0	13600	2
80	**WWX200R08009CA**	★	Y	9	50	25.4	1.0	5.0	13600	2
100	**WWX200R10006DA**	★	Y	6	50	31.75	1.6	5.0	11700	3
100	**WWX200R10008DA**	★	Y	8	50	31.75	1.5	5.0	11700	3
100	**WWX200R10011DA**	★	Y	11	50	31.75	1.5	5.0	11700	3
125	**WWX200R12507EA**	★	Y	7	63	38.1	2.8	5.0	10100	3
125	**WWX200R12511EA**	★	Y	11	63	38.1	2.8	5.0	10100	3
125	**WWX200R12514EA**	★	Y	14	63	38.1	2.8	5.0	10100	3
160	**WWX200R16009FA**	★	Y	9	63	50.8	4.6	5.0	8600	3
160	**WWX200R16012FA**	★	Y	12	63	50.8	4.5	5.0	8600	3
160	**WWX200R16016FA**	★	Y	16	63	50.8	4.5	5.0	8600	3

∗1 Y=Yes, N=No
∗2 Number of Teeth

Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 19, when ordering.
Note2) Please use a set bolt of the FMA type on the cutter body from 80 to 160 in diameter(DC).

WWX200

Fig.3

ø100
ø125
ø160

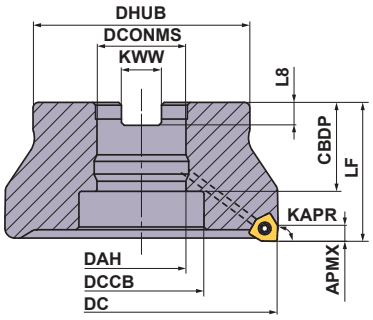
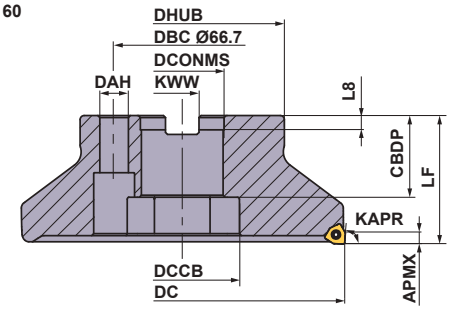


Fig.4

ø160



Right hand tool holder only.

Metric Standard

Arbor Type

DCONMS = mm size

(mm)

DC	Order Number	Stock R	✶1 Coolant Thru	✶2 No.T	LF	DCONMS	WT (kg)	APMX	RPMX (min^{-1})	Fig.
40	**WWX200-040A03AR**	★	Y	3	40	16	0.2	5.0	21600	1
40	**WWX200-040A04AR**	★	Y	4	40	16	0.2	5.0	21600	1
50	**WWX200-050A04AR**	★	Y	4	40	22	0.4	5.0	18600	1
50	**WWX200-050A05AR**	★	Y	5	40	22	0.4	5.0	18600	1
50	**WWX200-050A06AR**	★	Y	6	40	22	0.3	5.0	18600	1
63	**WWX200-063A05AR**	★	Y	5	40	22	0.5	5.0	16000	2
63	**WWX200-063A06AR**	★	Y	6	40	22	0.5	5.0	16000	2
63	**WWX200-063A07AR**	★	Y	7	40	22	0.5	5.0	16000	2
80	**WWX200-080A05AR**	★	Y	5	50	27	1.1	5.0	13600	2
80	**WWX200-080A07AR**	★	Y	7	50	27	1.0	5.0	13600	2
80	**WWX200-080A09AR**	★	Y	9	50	27	1.0	5.0	13600	2
100	**WWX200-100B06AR**	★	Y	6	50	32	1.7	5.0	11700	3
100	**WWX200-100B08AR**	★	Y	8	50	32	1.7	5.0	11700	3
100	**WWX200-100B11AR**	★	Y	11	50	32	1.7	5.0	11700	3
125	**WWX200-125B07AR**	★	Y	7	63	40	3.1	5.0	10100	3
125	**WWX200-125B11AR**	★	Y	11	63	40	3.0	5.0	10100	3
125	**WWX200-125B14AR**	★	Y	14	63	40	3.0	5.0	10100	3
160	**WWX200-160C09NR**	★	N	9	63	40	4.6	5.0	8600	4
160	**WWX200-160C12NR**	★	N	12	63	40	4.6	5.0	8600	4
160	**WWX200-160C16NR**	★	N	16	63	40	4.6	5.0	8600	4

✶1 Y=Yes, N=No
✶2 Number of Teeth

Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 19, when ordering.
Note2) Please use a set bolt of the FMC type on the cutter body from 40 to 100 in diameter(DC).
Note3) Please use a set bolt of the FMA type on the cutter body from 125 to 160 in diameter(DC).

Spare Parts

Tool Holder Type	 ✶ Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

✶ Clamp Torque (N • m) : TPS3R = 2.0

★ : Stocked in Japan

Mounting Dimensions

(mm)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	Fig.
40	**WWX200-040A03AR**	16	18	9	13.6	37	8.4	5.6	1
40	**WWX200-040A04AR**	16	18	9	13.6	37	8.4	5.6	1
50	**WWX200-050A04AR**	22	20	11	17	47	10.4	6.3	1
50	**WWX200-050A05AR**	22	20	11	17	47	10.4	6.3	1
50	**WWX200-050A06AR**	22	20	11	17	47	10.4	6.3	1
63	**WWX200-063A05AR**	22	20	11	17	50	10.4	6.3	2
63	**WWX200-063A06AR**	22	20	11	17	50	10.4	6.3	2
63	**WWX200-063A07AR**	22	20	11	17	50	10.4	6.3	2
80	**WWX200R08005CA**	25.4	26	13	20	56	9.5	6	2
80	**WWX200R08007CA**	25.4	26	13	20	56	9.5	6	2
80	**WWX200R08009CA**	25.4	26	13	20	56	9.5	6	2
80	**WWX200-080A05AR**	27	23	13	20	56	12.4	7	2
80	**WWX200-080A07AR**	27	23	13	20	56	12.4	7	2
80	**WWX200-080A09AR**	27	23	13	20	56	12.4	7	2
100	**WWX200R10006DA**	31.75	37	31.75	45	70	12.7	8	3
100	**WWX200R10008DA**	31.75	37	31.75	45	70	12.7	8	3
100	**WWX200R10011DA**	31.75	37	31.75	45	70	12.7	8	3
100	**WWX200-100B06AR**	32	26	32	45	78	14.4	8	3
100	**WWX200-100B08AR**	32	26	32	45	78	14.4	8	3
100	**WWX200-100B11AR**	32	26	32	45	78	14.4	8	3
125	**WWX200R12507EA**	38.1	42	38.1	56	80	15.9	10	3
125	**WWX200R12511EA**	38.1	42	38.1	56	80	15.9	10	3
125	**WWX200R12514EA**	38.1	42	38.1	56	80	15.9	10	3
125	**WWX200-125B07AR**	40	35	42	56	89	16.4	9	3
125	**WWX200-125B11AR**	40	35	42	56	89	16.4	9	3
125	**WWX200-125B14AR**	40	35	42	56	89	16.4	9	3
160	**WWX200-160C09NR**	40	40	–	56	100	16.4	9	4
160	**WWX200-160C12NR**	40	40	–	56	100	16.4	9	4
160	**WWX200-160C16NR**	40	40	–	56	100	16.4	9	4
160	**WWX200R16009FA**	50.8	45	50.8	72	100	19.1	11	3
160	**WWX200R16012FA**	50.8	45	50.8	72	100	19.1	11	3
160	**WWX200R16016FA**	50.8	45	50.8	72	100	19.1	11	3

Parts Sold Separately
Set Bolt

(mm)

Tool Holder Type	Set Bolt		Fig.	Reference Dimensions							Geometry
	With Coolant Thru	Without Coolant Thru									
	Order Number	Order Number		a	b	c	d	e	f	g	
WWX200R080○○CA	HSC12035H	HSC12035	1	18	M12x1.75	47	12	10	–	–	Fig.1
WWX200R100○○DA	MBA16033H	–	2	40	M16x2	43	10	14	6	23	
WWX200R125○○EA	MBA20040H	–	2	50	M20x2.5	54	14	17	6	27	
WWX200R160○○FA	MBA24045H	–	2	65	M24x3	59	14	17	10	37	
WWX200-040A○○AR	HSC08025H	–	1	13	M8x1.25	33	8	5	–	–	Fig.2
WWX200-050A○○AR	HSC10030H	HSC10035	1	16	M10x1.5	40(45)	10	6	–	–	
WWX200-063A○○AR	HSC10030H	HSC10035	1	16	M10x1.5	40(45)	10	6	–	–	
WWX200-080A○○AR	HSC12035H	HSC12035	1	18	M12x1.75	47	12	10	–	–	
WWX200-100B○○AR	MBA16033H	–	2	40	M16x2	43	10	14	6	23	
WWX200-125B○○AR	MBA20040H	–	2	50	M20x2.5	54	14	17	6	27	
WWX200-160C○○NR	No Coolant Thru	–	2	50	M20x2.5	54	14	17	6	27	

Note 1) Please purchase the appropriate set bolt after confirming the reference dimensions. The items with an order number listed under the Set Bolt columns are also sold by MITSUBISHI MATERIALS.

Note 2) Internal coolant through is necessary with the set bolt.

WWX200



Fig.1

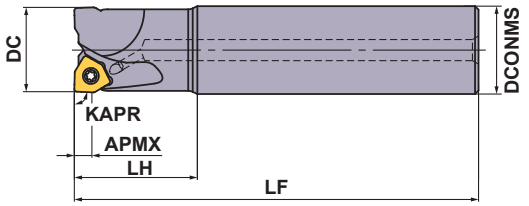
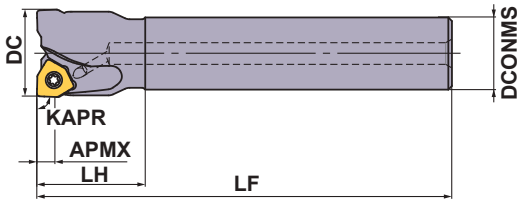


Fig.2



Right hand tool holder only.

Metric Standard

Shank Type

With Air / Coolant through

(mm)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (kg)	APMX	RPMX (min^{-1})	Fig.
25	**WWX200R2502SA20S**	★	2	115	20	30	0.3	5	29600	2
25	**WWX200R2502SA25S**	★	2	115	25	35	0.4	5	29600	1
25	**WWX200R2502SA25L**	★	2	170	25	70	0.6	5	29600	1
28	**WWX200R2802SA25S**	★	2	115	25	35	0.4	5	27400	2
28	**WWX200R2802SA25L**	★	2	170	25	35	0.6	5	27400	2
30	**WWX200R3002SA25S**	★	2	125	25	35	0.5	5	26200	2
32	**WWX200R3202SA32S**	★	2	125	32	45	0.7	5	26200	1
32	**WWX200R3203SA32S**	★	3	125	32	45	0.7	5	26200	1
32	**WWX200R3203SA32L**	★	3	190	32	90	1.0	5	26200	1
35	**WWX200R3503SA32L**	★	3	190	32	45	1.1	5	25100	2
40	**WWX200R4003SA32S**	★	3	125	32	45	0.8	5	21600	2
40	**WWX200R4004SA32S**	★	4	125	32	45	0.8	5	21600	2
50	**WWX200R5004SA32S**	★	4	125	32	45	0.9	5	18600	2
50	**WWX200R5005SA32S**	★	5	125	32	45	0.9	5	18600	2
50	**WWX200R5006SA32S**	★	6	125	32	45	0.9	5	18600	2

* Number of Teeth

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (N • m) : TPS3R = 2.0

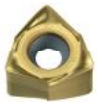
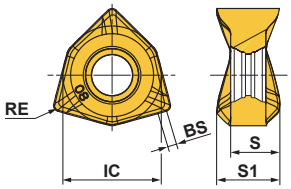
● : USA Stock, ★ : Stocked in Japan (10 inserts in one case)

Inserts

(inch)

Material		
	P	Steel
	M	Stainless Steel
	K	Cast Iron
	N	Non-ferrous Metals
	S	Heat Resistant Alloys, Titanium Alloys
	H	Hardened Steel

This is the selection guideline for WWX200.
Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions.
Edge Preparation :
E : Round **F :** Sharp

Shape	Order Number	Class	Edge Preparation	Coated								Carbide		IC	S	S1	BS	RE	Geometry
				MV1020	MV1030	MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15								
	**6NGU0906040PNER-L**	G	E	●	●	●	●	●	●	●	●	●			.354	.209	.240	.063	.016	
	6NGU0906080PNER-L	G	E	●	●	●	●	●	●	●	●	●			.354	.209	.240	.047	.031	
	6NGU0906040PNFR-L	G	F										●		.354	.209	.240	.063	.016	
	6NGU0906080PNFR-L	G	F										●		.354	.209	.240	.047	.031	
	6NMU0906040PNER-M	M	E	●	●	●	●	●	●	●	●	●			.354	.209	.240	.063	.016	
	6NMU0906080PNER-M	M	E	●	●	●	●	●	●	●	●	●			.354	.209	.240	.047	.031	
	6NMU0906080PNER-R	M	E	●	●	●	●	●		●	●	●			.354	.209	.240	.047	.031	

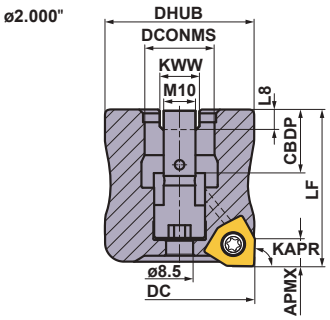
● = NEW

SHOULDER MILLING
<GENERAL CUTTING>

WWX400 2.000"

P M K N S H





Right hand tool holder only.
The set bolt is built in.
Allen wrench (1/4 inch Hex Key size) is used to tighten the set bolt.

Arbor Type

DCONMS = inch size (inch)

DC	Order Number	Stock R	∗1 Coolant Thru	∗2 No.T	LF	DCONMS	WT (lbs)	APMX	RMPX	RPMX (min^{-1})
2.000	**WWX400UR2.0003AA**	●	Y	3	2.125	.750	1.1	.323	.4°	5000
2.000	**WWX400UR2.0004AA**	●	Y	4	2.125	.750	1.1	.323	.4°	5000

∗1 Y=Yes, N=No
∗2 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
Note 3) The milling cutter has a built-in set bolt. The set bolt cannot be replaced.
Therefore, absolutely do not disassemble the milling cutter.

Mounting Dimensions

(inch)

DC	Order Number	DCONMS	CBDP	DHUB	KWW	L8
2.000	**WWX400UR2.0003AA**	.750	.858	1.750	.313	.187
2.000	**WWX400UR2.0004AA**	.750	.858	1.750	.313	.187

Spare Parts

Tool Holder Type	∗ Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

∗ Clamp Torque (lbf-in) : TS5R = 44

● : **USA Stock**

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400

P M K N S H



Fig.1

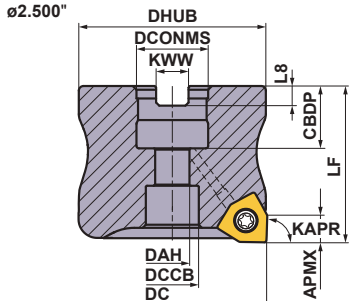
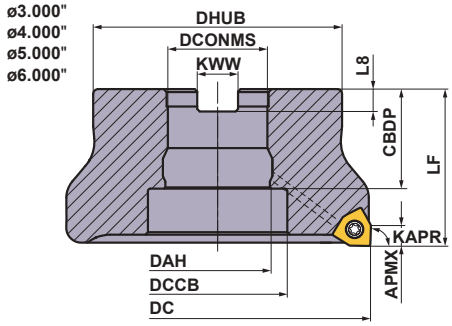


Fig.2



Right hand tool holder only.

Arbor Type

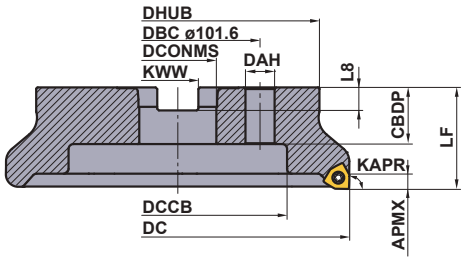
DCONMS = inch size (inch)

DC	Order Number	Stock R	∗1 Coolant thru	∗2 No.T	LF	DCONMS	WT (lbs)	APMX	RMPX	RPMX (min^{-1})	Fig.
2.500	**WWX400UR2.5003CA**	●	Y	3	2.000	1.000	1.6	.323	.26°	14000	1
2.500	**WWX400UR2.5004CA**	●	Y	4	2.000	1.000	1.5	.323	.26°	14000	1
2.500	**WWX400UR2.5005CA**	●	Y	5	2.000	1.000	1.5	.323	.26°	14000	1
3.000	**WWX400UR3.0004CA**	●	Y	4	2.000	1.000	2.1	.323	.16°	12600	2
3.000	**WWX400UR3.0005CA**	●	Y	5	2.000	1.000	2.1	.323	.16°	12600	2
3.000	**WWX400UR3.0007CA**	●	Y	7	2.000	1.000	1.9	.323	.16°	12600	2
4.000	**WWX400UR4.0005EA**	●	Y	5	2.500	1.500	4.9	.323	—	10700	2
4.000	**WWX400UR4.0007EA**	●	Y	7	2.500	1.500	4.8	.323	—	10700	2
4.000	**WWX400UR4.0009EA**	●	Y	9	2.500	1.500	4.7	.323	—	10700	2
5.000	**WWX400UR5.0006EA**	●	Y	6	2.500	1.500	7.6	.323	—	9400	2
5.000	**WWX400UR5.0008EA**	●	Y	8	2.500	1.500	7.5	.323	—	9400	2
5.000	**WWX400UR5.0012EA**	●	Y	12	2.500	1.500	7.3	.323	—	9400	2
6.000	**WWX400UR6.0008EA**	●	Y	8	2.500	1.500	9.9	.323	—	8500	2
6.000	**WWX400UR6.0010EA**	●	Y	10	2.500	1.500	9.8	.323	—	8500	2
6.000	**WWX400UR6.0014EA**	●	Y	14	2.500	1.500	9.7	.323	—	8500	2
8.000	**WWX400UR8.0010MN**	●	N	10	2.500	2.500	17.3	.323	—	7200	3
8.000	**WWX400UR8.0012MN**	●	N	12	2.500	2.500	17.2	.323	—	7200	3
8.000	**WWX400UR8.0016MN**	●	N	16	2.500	2.500	17	.323	—	7200	3
10.000	**WWX400UR10.0012MN**	●	N	12	2.500	2.500	29.3	.323	—	6400	3
10.000	**WWX400UR10.0014MN**	●	N	14	2.500	2.500	29.3	.323	—	6400	3
10.000	**WWX400UR10.0018MN**	●	N	18	2.500	2.500	29	.323	—	6400	3

∗1 Y=Yes, N=No
∗2 Number of Teeth

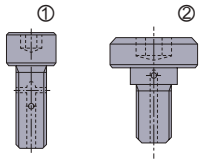
WWX400

Fig.3
ø8.000"
ø10.000"



Right hand tool holder only.

DC	Set Bolt	Geometry
2.500	HSCU50014H	①
3.000	HSCU50014H	
4.000	MBAU75016H	②
5.000	MBAU75016H	
6.000	MBAU75016H	
8.000	—	—
10.000	—	



Mounting Dimensions

(inch)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	Fig.
2.500	**WWX400UR2.5003CA**	1.000	.945	.539	.787	2.190	.375	.219	1
2.500	**WWX400UR2.5004CA**	1.000	.945	.539	.787	2.190	.375	.219	1
2.500	**WWX400UR2.5005CA**	1.000	.945	.539	.787	2.190	.375	.219	1
3.000	**WWX400UR3.0004CA**	1.000	.945	.539	.787	2.190	.375	.219	2
3.000	**WWX400UR3.0005CA**	1.000	.945	.539	.787	2.190	.375	.219	2
3.000	**WWX400UR3.0007CA**	1.000	.945	.539	.787	2.190	.375	.219	2
4.000	**WWX400UR4.0005EA**	1.500	1.654	1.500	2.205	3.500	.625	.375	2
4.000	**WWX400UR4.0007EA**	1.500	1.654	1.500	2.205	3.500	.625	.375	2
4.000	**WWX400UR4.0009EA**	1.500	1.654	1.500	2.205	3.500	.625	.375	2
5.000	**WWX400UR5.0006EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	2
5.000	**WWX400UR5.0008EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	2
5.000	**WWX400UR5.0012EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	2
6.000	**WWX400UR6.0008EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	2
6.000	**WWX400UR6.0010EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	2
6.000	**WWX400UR6.0014EA**	1.500	1.654	1.500	2.205	3.813	.625	.375	2
8.000	**WWX400UR8.0010MN**	2.500	1.378	.709	5.512	6.890	1.000	.560	3
8.000	**WWX400UR8.0012MN**	2.500	1.378	.709	5.512	6.890	1.000	.560	3
8.000	**WWX400UR8.0016MN**	2.500	1.378	.709	5.512	6.890	1.000	.560	3
10.000	**WWX400UR10.0012MN**	2.500	1.378	.709	7.087	8.661	1.000	.560	3
10.000	**WWX400UR10.0014MN**	2.500	1.378	.709	7.087	8.661	1.000	.560	3
10.000	**WWX400UR10.0018MN**	2.500	1.378	.709	7.087	8.661	1.000	.560	3

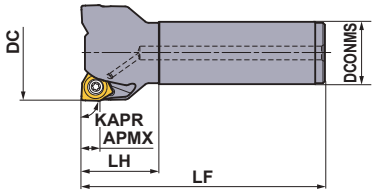
Spare Parts

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

● : **USA Stock**





Right hand tool holder only.

Shank Type

With Air / Coolant through

(inch)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (lbs)	APMX	RMPX	RPMX (min^{-1})
2.000	**WWX400UR3203FA20M**	●	3	4.750	1.250	1.500	1.7	.323	.4°	15800
2.000	**WWX400UR3204FA20M**	●	4	4.750	1.250	1.500	1.7	.323	.4°	15800
2.500	**WWX400UR4003FA20M**	●	3	4.750	1.250	1.500	2.1	.323	.26°	14000
2.500	**WWX400UR4004FA20M**	●	4	4.750	1.250	1.500	2	.323	.26°	14000
2.500	**WWX400UR4005FA20M**	●	5	4.750	1.250	1.500	2	.323	.26°	14000
3.000	**WWX400UR4804FA20M**	●	4	4.750	1.250	1.500	2.5	.323	.16°	12600
3.000	**WWX400UR4805FA20M**	●	5	4.750	1.250	1.500	2.4	.323	.16°	12600
3.000	**WWX400UR4807FA20M**	●	7	4.750	1.250	1.500	2.3	.323	.16°	12600

* Number of Teeth

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400

P M K N S H

ø50





Fig.1

ø50

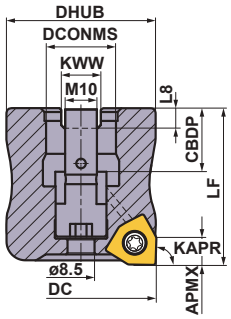
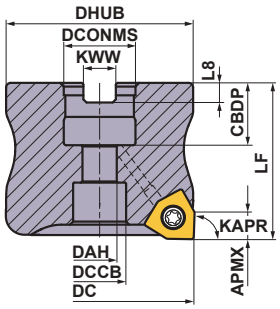


Fig.2

ø63
ø80



Right hand tool holder only.

Metric Standard

Arbor Type

DCONMS = inch size

(mm)

DC	Order Number	Stock R	✶1 Coolant Thru	✶2 No.T	LF	DCONMS	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Fig.
80	**WWX400R08004CA**	★	Y	4	50	25.4	1.0	8.2	0.16°	12200	2
80	**WWX400R08005CA**	★	Y	5	50	25.4	1.0	8.2	0.16°	12200	2
80	**WWX400R08007CA**	★	Y	7	50	25.4	0.9	8.2	0.16°	12200	2
100	**WWX400R10005DA**	★	Y	5	50	31.75	1.4	8.2	—	10700	3
100	**WWX400R10007DA**	★	Y	7	50	31.75	1.4	8.2	—	10700	3
100	**WWX400R10009DA**	★	Y	9	50	31.75	1.3	8.2	—	10700	3
125	**WWX400R12506EA**	★	Y	6	63	38.1	2.8	8.2	—	9500	3
125	**WWX400R12508EA**	★	Y	8	63	38.1	2.8	8.2	—	9500	3
125	**WWX400R12512EA**	★	Y	12	63	38.1	2.7	8.2	—	9500	3
160	**WWX400R16008FA**	★	Y	8	63	50.8	4.5	8.2	—	8300	3
160	**WWX400R16010FA**	★	Y	10	63	50.8	4.4	8.2	—	8300	3
160	**WWX400R16014FA**	★	Y	14	63	50.8	4.3	8.2	—	8300	3
200	**WWX400R20010KN**	★	N	10	63	47.625	8.1	8.2	—	7300	5
200	**WWX400R20012KN**	★	N	12	63	47.625	8.1	8.2	—	7300	5
200	**WWX400R20016KN**	★	N	16	63	47.625	8.0	8.2	—	7300	5
250	**WWX400R25012KN**	★	N	12	63	47.625	12.1	8.2	—	6400	5
250	**WWX400R25014KN**	★	N	14	63	47.625	12.1	8.2	—	6400	5
250	**WWX400R25018KN**	★	N	18	63	47.625	12.0	8.2	—	6400	5

✶1 Y=Yes, N=No
✶2 Number of Teeth
Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 28, when ordering.
Note2) Please use a set bolt of the FMA type on the cutter body from 80 to 250 in diameter(DC).

★ : **Stocked in Japan**

Fig.3

ø100
ø125
ø160

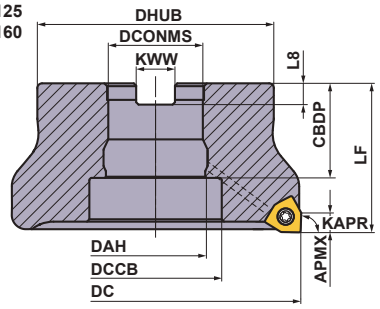


Fig.4

ø160

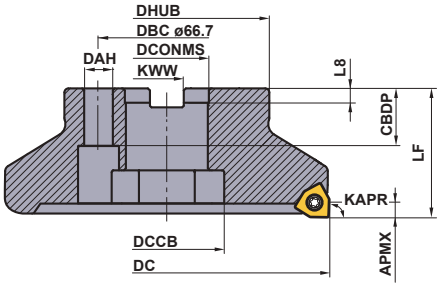
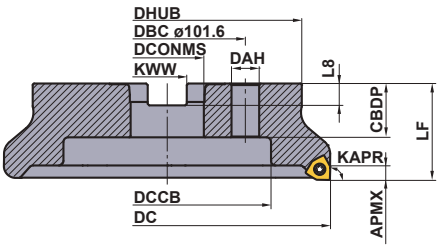


Fig.5

ø200
ø250



Right hand tool holder only.

Metric Standard

Arbor Type

DCONMS = mm size (mm)

DC	Order Number	Stock R	∗1 Coolant Thru	∗2 No.T	LF	DCONMS	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Fig.
50	**WWX400-050A03AR**	★	Y	3	55	22	0.5	8.2	0.4°	5000	1
50	**WWX400-050A04AR**	★	Y	4	55	22	0.5	8.2	0.4°	5000	1
63	**WWX400-063A03AR**	★	Y	3	40	22	0.5	8.2	0.26°	14100	2
63	**WWX400-063A04AR**	★	Y	4	40	22	0.5	8.2	0.26°	14100	2
63	**WWX400-063A05AR**	★	Y	5	40	22	0.5	8.2	0.26°	14100	2
80	**WWX400-080A04AR**	★	Y	4	50	27	1.0	8.2	0.16°	12200	2
80	**WWX400-080A05AR**	★	Y	5	50	27	1.0	8.2	0.16°	12200	2
80	**WWX400-080A07AR**	★	Y	7	50	27	0.9	8.2	0.16°	12200	2
100	**WWX400-100B05AR**	★	Y	5	50	32	1.6	8.2	—	10700	3
100	**WWX400-100B07AR**	★	Y	7	50	32	1.5	8.2	—	10700	3
100	**WWX400-100B09AR**	★	Y	9	50	32	1.5	8.2	—	10700	3
125	**WWX400-125B06AR**	★	Y	6	63	40	3.0	8.2	—	9500	3
125	**WWX400-125B08AR**	★	Y	8	63	40	3.0	8.2	—	9500	3
125	**WWX400-125B12AR**	★	Y	12	63	40	2.9	8.2	—	9500	3
160	**WWX400-160C08NR**	★	N	8	63	40	4.5	8.2	—	8300	4
160	**WWX400-160C10NR**	★	N	10	63	40	4.4	8.2	—	8300	4
160	**WWX400-160C14NR**	★	N	14	63	40	4.4	8.2	—	8300	4
200	**WWX400-200C10NR**	★	N	10	63	60	6.7	8.2	—	7300	5
200	**WWX400-200C12NR**	★	N	12	63	60	6.7	8.2	—	7300	5
200	**WWX400-200C16NR**	★	N	16	63	60	6.6	8.2	—	7300	5
250	**WWX400-250C12NR**	★	N	12	63	60	11.5	8.2	—	6400	5
250	**WWX400-250C14NR**	★	N	14	63	60	11.5	8.2	—	6400	5
250	**WWX400-250C18NR**	★	N	18	63	60	11.4	8.2	—	6400	5

∗1 Y=Yes, N=No
∗2 Number of Teeth
Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 28, when ordering.
Note2) The milling cutter with cutting diameter DC=50 mm has a built-in set bolt. The set bolt cannot be replaced.
Therefore, do not disassemble the milling cutter.
Note3) Please use a set bolt of the FMC type on the cutter body from 63 to 100 in diameter(DC).
Note4) Please use a set bolt of the FMA type on the cutter body from 125 to 250 in diameter(DC).

Spare Parts

Tool Holder Type	 ∗		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

∗ Clamp Torque (N • m) : TS5R = 5.0

Double-Sided Insert Type Shoulder Mill

Mounting Dimensions

(mm)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	DHUB	KWW	L8	Fig.
50	**WWX400-050A03AR**	22	20	–	–	47	10.4	6.3	1
50	**WWX400-050A04AR**	22	20	–	–	47	10.4	6.3	1
63	**WWX400-063A03AR**	22	20	11	17	50	10.4	6.3	2
63	**WWX400-063A04AR**	22	20	11	17	50	10.4	6.3	2
63	**WWX400-063A05AR**	22	20	11	17	50	10.4	6.3	2
80	**WWX400R08004CA**	25.4	26	13	20	56	9.5	6	2
80	**WWX400R08005CA**	25.4	26	13	20	56	9.5	6	2
80	**WWX400R08007CA**	25.4	26	13	20	56	9.5	6	2
80	**WWX400-080A04AR**	27	23	13	20	56	12.4	7	2
80	**WWX400-080A05AR**	27	23	13	20	56	12.4	7	2
80	**WWX400-080A07AR**	27	23	13	20	56	12.4	7	2
100	**WWX400R10005DA**	31.75	37	31.75	45	70	12.7	8	3
100	**WWX400R10007DA**	31.75	37	31.75	45	70	12.7	8	3
100	**WWX400R10009DA**	31.75	37	31.75	45	70	12.7	8	3
100	**WWX400-100B05AR**	32	32	32	45	78	14.4	8	3
100	**WWX400-100B07AR**	32	32	32	45	78	14.4	8	3
100	**WWX400-100B09AR**	32	32	32	45	78	14.4	8	3
125	**WWX400R12506EA**	38.1	42	38.1	56	80	15.9	10	3
125	**WWX400R12508EA**	38.1	42	38.1	56	80	15.9	10	3
125	**WWX400R12512EA**	38.1	42	38.1	56	80	15.9	10	3
125	**WWX400-125B06AR**	40	40	40	56	89	16.4	9	3
125	**WWX400-125B08AR**	40	40	40	56	89	16.4	9	3
125	**WWX400-125B12AR**	40	40	40	56	89	16.4	9	3
160	**WWX400-160C08NR**	40	40	14	56	100	16.4	9	4
160	**WWX400-160C10NR**	40	40	14	56	100	16.4	9	4
160	**WWX400-160C14NR**	40	40	14	56	100	16.4	9	4
160	**WWX400R16008FA**	50.8	45	50.8	72	100	19.1	11	3
160	**WWX400R16010FA**	50.8	45	50.8	72	100	19.1	11	3
160	**WWX400R16014FA**	50.8	45	50.8	72	100	19.1	11	3
200	**WWX400R20010KN**	47.625	35	18	135	175	25.4	14.22	5
200	**WWX400R20012KN**	47.625	35	18	135	175	25.4	14.22	5
200	**WWX400R20016KN**	47.625	35	18	135	175	25.4	14.22	5
200	**WWX400-200C10NR**	60	32	18	135	160	25.7	14.22	5
200	**WWX400-200C12NR**	60	32	18	135	160	25.7	14.22	5
200	**WWX400-200C16NR**	60	32	18	135	160	25.7	14.22	5
250	**WWX400R25012KN**	47.625	35	18	180	210	25.4	14.22	5
250	**WWX400R25014KN**	47.625	35	18	180	210	25.4	14.22	5
250	**WWX400R25018KN**	47.625	35	18	180	210	25.4	14.22	5
250	**WWX400-250C12NR**	60	32	18	180	210	25.7	14.22	5
250	**WWX400-250C14NR**	60	32	18	180	210	25.7	14.22	5
250	**WWX400-250C18NR**	60	32	18	180	210	25.7	14.22	5

Parts Sold Separately
Set Bolt

(mm)

Tool Holder Type	Set Bolt		Fig.	Reference Dimensions							Geometry
	With Coolant Thru	Without Coolant Thru		a	b	c	d	e	f	g	
	Order Number	Order Number									
WWX400R080○○CA	HSC12035H	HSC12035	1	18	M12×1.75	47	12	10	–	–	Fig.1
WWX400R100○○DA	MBA16033H	–	2	40	M16×2	43	10	14	6	23	
WWX400R125○○EA	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
WWX400R160○○FA	MBA24045H	–	2	65	M24×3	59	14	17	10	37	
WWX400R200○○KN	No Coolant Thru	–	1	24	M16×2	43	16	14	–	–	
WWX400R250○○KN	No Coolant Thru	–	1	24	M16×2	43	16	14	–	–	Fig.2
WWX400-063A○○AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	
WWX400-080A○○AR	HSC12035H	HSC12035	1	18	M12×1.75	47	12	10	–	–	
WWX400-100B○○AR	MBA16033H	–	2	40	M16×2	43	10	14	6	23	
WWX400-125B○○AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-160C○○NR	No Coolant Thru	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-200C○○NR	No Coolant Thru	–	1	24	M16×2	43	16	14	–	–	
WWX400-250C○○NR	No Coolant Thru	–	1	24	M16×2	43	16	14	–	–	

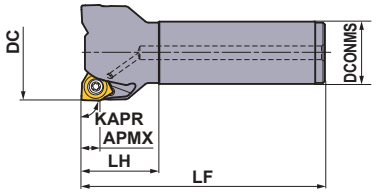
Note 1) Please purchase the appropriate set bolt after confirming the reference dimensions.
The items with an order number listed under the Set Bolt columns are also sold by MITSUBISHI MATERIALS.

Note 2) Internal coolant is necessary with the set bolt.

Note 3) The milling cutter with cutting diameter DC=50 mm has a built-in set bolt. Please use a 7 mm Allen wrench to tighten/loosen the set bolt.

WWX400





Right hand tool holder only.

Metric Standard

Shank Type

With Air / Coolant through

(mm)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (kg)	APMX	RMPX	RPMX (min^{-1})
50	**WWX400R5003SA32M**	★	3	125	32	40	0.8	8.2	0.4°	16000
50	**WWX400R5004SA32M**	★	4	125	32	40	0.8	8.2	0.4°	16000
63	**WWX400R6303SA32M**	★	3	125	32	40	1.0	8.2	0.26°	14100
63	**WWX400R6304SA32M**	★	4	125	32	40	1.0	8.2	0.26°	14100
63	**WWX400R6305SA32M**	★	5	125	32	40	1.0	8.2	0.26°	14100
80	**WWX400R8004SA32M**	★	4	125	32	40	1.3	8.2	0.16°	12200
80	**WWX400R8005SA32M**	★	5	125	32	40	1.3	8.2	0.16°	12200
80	**WWX400R8007SA32M**	★	7	125	32	40	1.2	8.2	0.16°	12200

* Number of Teeth

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (N • m) : TS5R = 5.0

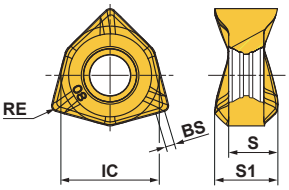
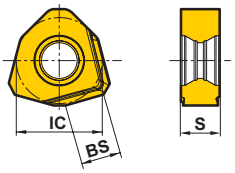
★ : **Stocked in Japan**

Inserts

(inch)

Material		
P	Steel	◆
M	Stainless Steel	◇
K	Cast Iron	◆
N	Non-ferrous Metals	◆
S	Heat Resistant Alloys, Titanium Alloys	◆
H	Hardened Steel	◆

This is the selection guideline for WWX400.
Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions.
Edge Preparation :
E : Round **F :** Sharp

Shape	Order Number	Class	Edge Preparation	Coated									Carbide		IC	S	S1	BS	RE	Geometry
				MV1020	MV1030	MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15							
	6NGU1409040PNER-L	G	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.067	.016	
	6NGU1409080PNER-L	G	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.051	.031	
	6NGU1409040PNFR-L	G	F										●		.551	.276	.354	.067	.016	
	6NGU1409080PNFR-L	G	F										●		.551	.276	.354	.051	.031	
	6NGU1409040PNER-M	G	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.067	.016	
	6NGU1409080PNER-M	G	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.051	.031	
	6NMU1409040PNER-M	M	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.067	.016	
	6NMU1409080PNER-M	M	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.051	.031	
	6NMU1409160PNER-M	M	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.002	.063	
	6NMU1409200PNER-M	M	E	●	●	●	●	●	●	●	●	●			.551	.276	.354	.002	.079	
	6NMU1409080PNER-R	M	E	●	●	●	●	●		●	●	●			.551	.276	.354	.051	.031	
	6NMU1409160PNER-R	M	E	●	●	●	●	●		●	●	●			.551	.276	.354	.002	.063	
	6NMU1409200PNER-R	M	E	●	●	●	●	●		●	●	●			.551	.276	.354	.002	.079	
 Wiper	2NGU1406ZNER6C-M	G	E			●	●					●			.551	.248	–	.256	–	

Instructions for Use of Wiper Inserts

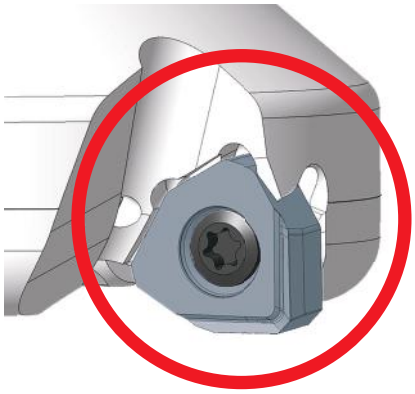


Fig.1

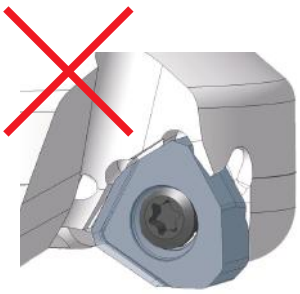


Fig.2

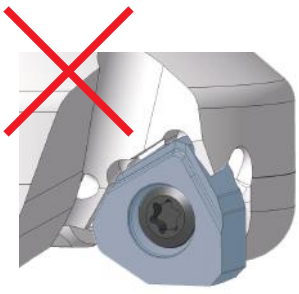


Fig.3

Wiper inserts for WWX400 are two-cornered. Please set as shown in Fig.1.
Excellent surface finish can be achieved with one wiper.
Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than .256 IPR.
When choosing a wiper insert select a general grade that is similar to the ideal cutting conditions.

● : USA Stock (10 inserts in one case)

WWX200/400

Cutting Conditions (Guide) :
● : Stable Cutting ◔ : General Cutting ✣ : Unstable Cutting

Recommended Cutting Conditions

Dry Cutting
Cutting Speed

(inch)

	Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥	Width of Cut **ae** .8DC≥	Width of Cut **ae** DC(Slot)
					Cutting Speed **vc** (SFM)		
P	Mild Steel	Hardness ≤180HB	●	MV1020	985(820—1150)	920(755—1080)	820(655—985)
			●	MP6120	785(655—920)	720(590—850)	655(525—785)
			●	MV1030	755(620—885)	690(560—820)	620(490—755)
			◔	MV1020	950(785—1115)	850(690—1050)	785(620—950)
			◔	MV1030,MP6130	755(620—885)	690(560—820)	620(490—755)
			✣	MP6130,VP15TF	690(560—820)	620(490—755)	560(425—690)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	MV1020	850(690—1015)	785(620—920)	690(525—850)
			●	MP6120	690(560—820)	620(490—755)	560(425—690)
			●	MV1030	655(525—785)	590(460—720)	525(395—655)
			◔	MV1020	820(655—985)	755(590—885)	655(490—820)
			◔	MV1030,MP6130	655(525—785)	590(460—720)	525(395—655)
			✣	MP6130,VP15TF	590(460—720)	525(395—655)	460(330—590)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	MV1020	850(690—1015)	785(620—920)	690(525—850)
			●	MP6120	655(525—785)	590(460—720)	525(395—655)
			●	MV1030	655(525—785)	590(460—720)	525(395—655)
			◔	MV1020	820(655—985)	755(590—885)	655(490—820)
			◔	MV1030,MP6130	620(490—755)	560(425—690)	490(360—620)
			✣	MP6130,VP15TF	560(425—690)	490(360—620)	425(295—560)
	Pre-Hardened Steel	Hardness 35—45HRC	●	MP6120	460(395—525)	—	—
			◔	MP6130	395(330—460)	—	—
			✣	MP6130,VP15TF	360(295—425)	—	—
M	Austenitic Stainless Steel	Hardness ≤200HB	●	MV1030,MP7130	590(525—655)	525(460—590)	—
			◔	MV1030,MP7130,VP15TF	560(490—620)	490(425—560)	—
			✣	MP7130,VP15TF	490(425—560)	425(360—490)	—
	Austenitic Stainless Steel	Hardness >200HB	●	MV1030,MP7130	560(490—620)	490(425—560)	—
			◔	MV1030,MP7130,VP15TF	525(460—590)	460(395—525)	—
			✣	MP7130,VP15TF	460(395—525)	395(330—460)	—
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	●	MV1030,MP7130	590(525—655)	525(460—590)	—
			◔	MV1030,MP7130,VP15TF	560(490—620)	490(425—560)	—
			✣	MP7130,VP15TF	490(425—560)	425(360—490)	—
	Duplex Stainless Steel	Hardness ≤280HB	●	MP7130	525(460—590)	460(395—525)	—
			◔	MP7130,VP15TF	490(425—560)	425(360—490)	—
			✣	MP7130,VP15TF	425(360—490)	360(295—425)	—
	Precipitation Hardening Stainless Steel	Hardness <450HB	●	MP7130	460(395—525)	—	—
			◔	MP7130,VP15TF	425(360—490)	—	—
			✣	MP7130,VP15TF	360(295—425)	—	—
K	Gray Cast Iron	Tensile Strength ≤350MPa	●	MC5020	820(690—950)	755(620—885)	690(560—820)
			◔	MC5020	785(655—920)	720(590—850)	655(525—785)
			◔	VP15TF	785(655—920)	720(590—850)	—
			✣	MC5020,VP15TF	720(590—850)	655(525—785)	590(460—720)
	Ductile Cast Iron	Tensile Strength ≤450MPa	●	MV1020	785(655—1015)	720(560—920)	655(490—850)
			●	MC5020	720(590—850)	655(525—785)	590(460—720)
			●	MV1030	690(560—820)	620(490—755)	560(425—690)
			◔	MV1020	755(620—985)	690(525—885)	620(460—820)
			◔	MV1030,MC5020	690(560—820)	620(490—755)	560(425—690)
			◔	VP15TF	690(560—820)	620(490—755)	—
			✣	MC5020,VP15TF	620(490—755)	560(425—690)	490(360—620)
	Ductile Cast Iron	Tensile Strength ≤800MPa	●	MV1020	690(525—920)	620(460—820)	525(395—690)
			●	MC5020	590(460—720)	525(395—655)	460(330—590)
			●	MV1030	560(425—690)	490(360—620)	425(295—560)
			◔	MV1020	655(490—885)	590(425—785)	490(360—690)
			◔	MV1030,MC5020	560(425—690)	490(360—620)	425(295—560)
			◔	VP15TF	560(425—690)	490(360—620)	—
			✣	MC5020,VP15TF	490(360—620)	425(295—560)	360(230—490)
H	Hardened Steel	Hardness 40—55HRC	● ◔	VP15TF	165(100—230)	—	—
			◔	MP6120	130(100—230)	—	—

Note 1) The recommended cutting speed has been calculated for a depth of cut .079 inch. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

WWX200/400

Recommended Cutting Conditions

Wet Cutting
Cutting Speed

(inch)

	Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥ Cutting Speed **vc** (SFM)	.8DC≥	DC(Slot)
P	Mild Steel	Hardness ≤180HB	●	MV1020	720(690–755)	620(590–690)	590(525–620)
			●	MP6120	490(460–525)	425(395–460)	395(360–425)
			●	MV1030	460(425–490)	395(360–425)	360(330–395)
			◐	MV1020	690(655–720)	590(560–655)	560(490–590)
			◐	MV1030,MP6130	460(425–490)	395(360–425)	360(330–395)
			✣	MP6130,VP15TF	395(360–425)	330(295–360)	295(260–330)
	Carbon Steel Alloy Steel	Hardness 180–280HB	●	MV1020	655(620–690)	560(525–620)	525(490–560)
			●	MP6120	490(460–525)	425(395–460)	395(360–425)
			●	MV1030	460(425–490)	395(360–425)	360(330–395)
			◐	MV1020	620(590–655)	525(490–590)	490(460–525)
			◐	MV1030,MP6130	460(425–490)	395(360–425)	360(330–395)
			✣	MP6130,VP15TF	395(360–425)	330(295–360)	295(260–330)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	●	MV1020	655(620–690)	560(525–620)	525(490–560)
			●	MP6120, MV1030	460(425–490)	395(360–425)	360(330–395)
			◐	MV1020	620(590–655)	525(490–590)	490(460–525)
			◐	MV1030	460(425–490)	395(360–425)	360(330–395)
			◐	MP6130	425(395–460)	360(330–395)	330(295–360)
			✣	MP6130,VP15TF	360(330–395)	295(260–330)	260(230–295)
	Pre-Hardened Steel	Hardness 35–45HRC	●	MP6120	360(330–395)	–	–
			◐	MP6130	330(295–360)	–	–
			✣	MP6130,VP15TF	260(230–295)	–	–
M	Austenitic Stainless Steel	Hardness ≤200HB	●	MP7130	425(395–460)	360(330–395)	–
			◐	MP7130,VP15TF	395(360–425)	330(295–360)	–
			✣	MP7130,VP15TF	330(295–360)	260(230–295)	–
	Austenitic Stainless Steel	Hardness >200HB	●	MP7130	425(395–460)	360(330–395)	–
			◐	MP7130,VP15TF	395(360–425)	330(295–360)	–
			✣	MP7130,VP15TF	330(295–360)	260(230–295)	–
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	●	MP7130	425(395–460)	360(330–395)	–
			◐	MP7130,VP15TF	395(360–425)	330(295–360)	–
			✣	MP7130,VP15TF	330(295–360)	260(230–295)	–
	Duplex Stainless Steel	Hardness ≤280HB	●	MP7130	395(360–425)	330(295–360)	–
			◐	MP7130,VP15TF	360(330–395)	295(260–330)	–
			✣	MP7130,VP15TF	295(260–330)	230(195–260)	–
	Precipitation Hardening Stainless Steel	Hardness <450HB	●	MP7130	395(360–425)	–	–
			◐	MP7130,VP15TF	360(330–395)	–	–
			✣	MP7130,VP15TF	295(260–330)	–	–

Note 1) The recommended cutting speed has been calculated for a depth of cut .079 inch. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

(inch)

	Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥	Width of Cut **ae** .8DC≥	Width of Cut **ae** DC(Slot)
					Cutting Speed **vc** (SFM)		
K	Gray Cast Iron	Tensile Strength ≤350MPa	●	MC5020	560(490—620)	490(425—560)	425(360—490)
			◐	MC5020	525(460—590)	460(395—525)	395(330—460)
			◐	VP15TF	525(460—590)	460(395—525)	—
			✠	MC5020,VP15TF	460(395—525)	395(330—460)	330(260—395)
	Ductile Cast Iron	Tensile Strength ≤450MPa	●	MV1020	655(590—785)	590(490—720)	490(425—655)
			●	MC5020	560(490—620)	490(425—560)	425(360—490)
			●	MV1030	525(460—590)	460(395—525)	395(330—460)
			◐	MV1020	620(560—755)	560(460—690)	460(395—620)
			◐	MV1030,MC5020	525(460—590)	460(395—525)	395(330—460)
			◐	VP15TF	525(460—590)	460(395—525)	—
			✠	MC5020,VP15TF	460(395—525)	395(330—460)	330(260—395)
	Ductile Cast Iron	Tensile Strength ≤800MPa	●	MV1020	590(560—690)	525(490—620)	460(395—525)
			●	MC5020	525(490—560)	460(425—490)	395(360—425)
			●	MV1030	490(460—525)	425(395—460)	360(330—395)
			◐	MV1020	560(525—655)	490(460—590)	395(360—490)
			◐	MV1030,MC5020	490(460—525)	425(395—460)	360(330—395)
			◐	VP15TF	490(460—525)	425(395—460)	—
			✠	MC5020,VP15TF	425(395—460)	360(330—395)	295(260—330)
N	Aliminum Alloys	Content Si<5%	●	TF15	1640(985—2950)	1640(985—2950)	1640(985—2950)
			◐	TF15	1640(985—2950)	1640(985—2950)	1640(985—2950)
			✠	TF15	1310(655—2625)	1310(655—2625)	1310(655—2625)
S	Titanium Alloys	—	●	MP9120	260(195—330)	—	—
			◐	MP9120	230(165—295)	—	—
			✠	MP9130	195(130—260)	—	—
	Heat Resistant Alloys	—	●	MP9120	195(165—230)	—	—
			◐	MP9120	165(100—195)	—	—
			✠	MP9130	130(65—130)	—	—
H	Hardened Steel	Hardness 40—55HRC	● ◐	VP15TF	165(100—230)	—	—
			◐	MP6120	130(100—230)	—	—

Note 1) The recommended cutting speed has been calculated for a depth of cut .079 inch. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

WWX200

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

	Material	Properties	Cutting Conditions	Cutting Mode	Grade	ae 0.5DC≥ Chipbreaker	ap	fz (IPT)
P	Mild Steel	Hardness ≤180HB	●	Dry, Wet	MV1020,MV1030,MP6120	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet	MV1020,MV1030,MP6130	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet		M, R	≤.118	.006(.004–.008)
			✱	Dry, Wet	MP6130,VP15TF	M, R	≤.118	.005(.004–.006)
	Carbon Steel Alloy Steel	Hardness 180–280HB	●	Dry, Wet	MV1020,MV1030,MP6120	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet	MV1020,MV1030,MP6130	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet		M, R	≤.118	.006(.004–.008)
			✱	Dry, Wet	MP6130,VP15TF	M, R	≤.118	.005(.004–.006)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	●	Dry, Wet	MV1020,MV1030,MP6120	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet	MV1020,MV1030,MP6130	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet		M, R	≤.118	.006(.004–.008)
			✱	Dry, Wet	MP6130,VP15TF	M, R	≤.118	.005(.004–.006)
	Pre-hardened Steel	Hardness 35–45HRC	●	Dry, Wet	MP6120	M	≤.079	.005(.004–.006)
			●	Dry, Wet	MP6130	M	≤.079	.005(.004–.006)
			●	Dry, Wet		R	≤.079	.006(.004–.008)
			✱	Dry, Wet	MP6130,VP15TF	R	≤.079	.005(.004–.006)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ●	Dry, Wet	MP7130	L, M	≤.118	.005(.004–.006)
			● ●	Dry, Wet	MV1030	L, M	≤.079	.005(.004–.006)
			●	Dry, Wet	VP15TF	M	≤.118	.006(.004–.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Austenitic Stainless Steel	Hardness >200HB	● ●	Dry	MP7130	L, M	≤.079	.005(.004–.006)
			● ●	Wet		L, M	≤.118	.005(.004–.006)
			●	Dry	MV1030	L, M	≤.079	.005(.004–.006)
			●	Dry, Wet	VP15TF	M	≤.079	.006(.004–.008)
			✱	Dry	MP7130,VP15TF	M	≤.079	.005(.004–.006)
			✱	Wet		M	≤.118	.005(.004–.006)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ●	Dry, Wet	MP7130	L, M	≤.118	.005(.004–.006)
			● ●	Dry	MV1030	L, M	≤.079	.005(.004–.006)
			●	Dry, Wet	VP15TF	M	≤.118	.006(.004–.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Duplex Stainless Steel	Hardness ≤280HB	● ●	Dry	MP7130	L, M	≤.079	.005(.004–.006)
			● ●	Wet		L, M	≤.118	.005(.004–.006)
			●	Dry	VP15TF	M	≤.079	.006(.004–.008)
			●	Wet		M	≤.118	.006(.004–.008)
			✱	Dry	MP7130,VP15TF	M	≤.079	.005(.004–.006)
			✱	Wet		M	≤.118	.005(.004–.006)
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ●	Dry, Wet	MP7130	L, M	≤.079	.005(.004–.006)
			●	Dry, Wet	VP15TF	M	≤.079	.006(.004–.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.079	.005(.004–.006)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ●	Dry, Wet	MC5020	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet	VP15TF	M, R	≤.118	.006(.004–.008)
			✱	Dry, Wet	MC5020,VP15TF	M, R	≤.118	.005(.004–.006)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ●	Dry, Wet	MV1020,MV1030,MC5020	L, M	≤.118	.005(.004–.006)
			●	Dry, Wet	MV1020,MV1030,VP15TF	M, R	≤.118	.006(.004–.008)
			✱	Dry, Wet	MC5020,VP15TF	M, R	≤.118	.005(.004–.006)
N	Aluminum Alloys	Content Si<5%	● ● ✱	Wet	TF15	L	≤.118	.005(.004–.006)
S	Titanium Alloys	–	● ●	Wet	MP9120	L, M	≤.079	.004(.002–.005)
			✱	Wet	MP9130	L, M	≤.079	.004(.002–.005)
	Heat Resistant Alloys	–	● ●	Wet	MP9120	L, M	≤.079	.004(.002–.005)
			✱	Wet	MP9130	L, M	≤.079	.004(.002–.005)
H	Hardened Steel	Hardness 40–55HRC	●	Dry, Wet	VP15TF	M	≤.079	.002(.002–.004)
			●	Dry, Wet	VP15TF,MP6120	M, R	≤.079	.002(.002–.004)

Note 1) Refer to the above table and set up cutting conditions according to the application.

(inch)

	ae 0.8DC≥			ae DC(Slot)		
	Chipbreaker	**ap**	**fz** (IPT)	Chipbreaker	**ap**	**fz** (IPT)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	M, R	≤.118	.006(.004–.008)	–	–	–
	M, R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	M, R	≤.118	.006(.004–.008)	–	–	–
	M, R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	M, R	≤.118	.006(.004–.008)	–	–	–
	M, R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	L, M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.079	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.079	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.079	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.118	.005(.004–.006)	–	–	–
	L, M	≤.118	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	M, R	≤.118	.006(.004–.008)	–	–	–
	M, R	≤.118	.005(.004–.006)	M, R	≤.079	.005(.004–.006)
	L, M	≤.118	.005(.004–.006)	L, M	≤.079	.005(.004–.006)
	M, R	≤.118	.006(.004–.008)	–	–	–
	M, R	≤.118	.005(.004–.006)	M, R	≤.079	.005(.004–.006)
	L	≤.118	.005(.004–.006)	L	≤.079	.005(.004–.006)
		–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–

WWX400

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

	Material	Properties	Cutting Conditions	Cutting Mode	Grade	ae .5DC≥ Chipbreaker	ap	fz (IPT)
P	Mild Steel	Hardness ≤180HB	●	Dry, Wet	MV1020,MV1030,MP6120	L,M	≤.157	.005(.004—.006)
			●	Dry, Wet	MV1020,MV1030,MP6130	L,M	≤.157	.005(.004—.006)
			●	Dry, Wet		M,R	≤.157	.006(.004—.008)
			✱	Dry, Wet	MP6130,VP15TF	M,R	≤.157	.005(.004—.006)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	Dry, Wet	MV1020,MV1030,MP6120	L,M	≤.157	.005(.004—.006)
			●	Dry, Wet	MV1020,MV1030,MP6130	L,M	≤.157	.005(.004—.006)
			●	Dry, Wet		M,R	≤.157	.006(.004—.008)
			✱	Dry, Wet	MP6130,VP15TF	M,R	≤.157	.005(.004—.006)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	Dry, Wet	MV1020,MV1030,MP6120	L,M	≤.118	.005(.004—.006)
			●	Dry, Wet	MV1020,MV1030,MP6130	L,M	≤.118	.005(.004—.006)
			●	Dry, Wet		M,R	≤.118	.006(.004—.008)
			✱	Dry, Wet	MP6130,VP15TF	M,R	≤.118	.005(.004—.006)
	Pre-Hardened Steel	Hardness 35—45HRC	●	Dry, Wet	MP6120	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	MP6130	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet		M,R	≤.079	.006(.004—.008)
			✱	Dry, Wet	MP6130,VP15TF	M,R	≤.079	.005(.004—.006)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ●	Dry, Wet	MP7130	L,M	≤.157	.005(.004—.006)
			● ●	Dry	MV1030	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	VP15TF	M	≤.157	.006(.004—.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.157	.005(.004—.006)
	Austenitic Stainless Steel	Hardness >200HB	●	Dry, Wet	MP7130	L,M	≤.157	.005(.004—.006)
			●	Dry	MV1030	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	MP7130	L,M	≤.118	.005(.004—.006)
			●	Dry	MV1030	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	VP15TF	M	≤.118	.006(.004—.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004—.006)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ●	Dry, Wet	MP7130	L,M	≤.157	.005(.004—.006)
			● ●	Dry	MV1030	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	VP15TF	M	≤.157	.006(.004—.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004—.006)
	Duplex Stainless Steel	Hardness ≤280HB	● ●	Dry	MP7130	L,M	≤.118	.005(.004—.006)
			● ●	Wet	MP7130	L,M	≤.157	.005(.004—.006)
			●	Dry	VP15TF	M	≤.118	.006(.004—.008)
			●	Wet	VP15TF	M	≤.157	.006(.004—.008)
			✱	Dry	MP7130,VP15TF	M	≤.118	.005(.004—.006)
			✱	Wet	MP7130,VP15TF	M	≤.157	.005(.004—.006)
	Precipitation Hardening Stainless Steel	Hardness <450HB	●	Dry, Wet	MP7130	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	MP7130	L,M	≤.079	.005(.004—.006)
			●	Dry, Wet	VP15TF	M	≤.079	.006(.004—.008)
			✱	Dry, Wet	MP7130,VP15TF	M	≤.079	.005(.004—.006)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ●	Dry, Wet	MC5020	L,M	≤.157	.005(.004—.006)
			●	Dry, Wet	VP15TF	M,R	≤.157	.006(.004—.008)
			✱	Dry, Wet	MC5020,VP15TF	M,R	≤.157	.005(.004—.006)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ●	Dry, Wet	MV1020,MV1030,MC5020	L,M	≤.157	.005(.004—.006)
			●	Dry, Wet	MV1020,MV1030,VP15TF	M,R	≤.157	.006(.004—.008)
			✱	Dry, Wet	MC5020,VP15TF	M,R	≤.157	.005(.004—.006)
N	Aluminum Alloys	Content Si<5%	● ● ✱	Wet	TF15	L	≤.157	.005(.004—.006)
S	Titanium Alloys	—	● ●	Wet	MP9120	L,M	≤.079	.004(.002—.005)
			✱	Wet	MP9130	L,M	≤.079	.004(.002—.005)
	Heat Resistant Alloys	—	● ●	Wet	MP9120	L,M	≤.079	.004(.002—.005)
			✱	Wet	MP9130	L,M	≤.079	.004(.002—.005)
H	Hardened Steel	Hardness 40—55HRC	●	Dry, Wet	VP15TF	M	≤.079	.002(.002—.004)
			●	Dry, Wet	VP15TF	M,R	≤.079	.002(.002—.004)

Note 1) Refer to the above table and set up cutting conditions according to the application.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

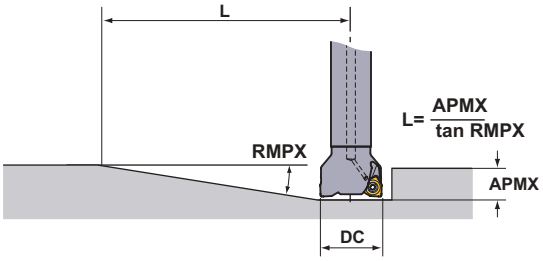
(inch)

	ae			ae		
	.8DC≥			DC(Slot)		
	Chipbreaker	**ap**	**fz** (IPT)	Chipbreaker	**ap**	**fz** (IPT)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)
	M,R	≤.118	.006(.004–.008)	–	–	–
	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)
	M,R	≤.118	.006(.004–.008)	–	–	–
	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)
	M,R	≤.118	.006(.004–.008)	–	–	–
	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	L,M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.079	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.079	.005(.004–.006)	–	–	–
	L,M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.079	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.079	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.118	.005(.004–.006)	–	–	–
	L,M	≤.118	.005(.004–.006)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.006(.004–.008)	–	–	–
	M	≤.118	.005(.004–.006)	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.130(.100–.150)
	M,R	≤.118	.006(.004–.008)	–	–	–
	M,R	≤.118	.005(.004–.006)	M,R	≤.079	.130(.100–.150)
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.130(.100–.150)
	M,R	≤.118	.006(.004–.008)	–	–	–
	M,R	≤.118	.005(.004–.006)	M,R	≤.079	.130(.100–.150)
	L	≤.118	.005(.004–.006)	L	≤.079	.130(.100–.150)
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–

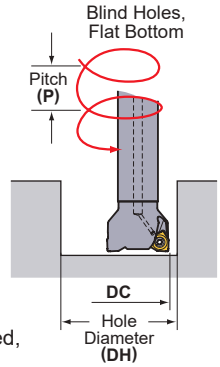
WWX400

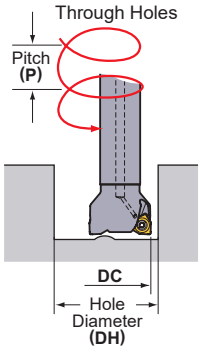
Ramping / Helical Milling

● **Ramping**



● **Helical Milling**





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(inch)

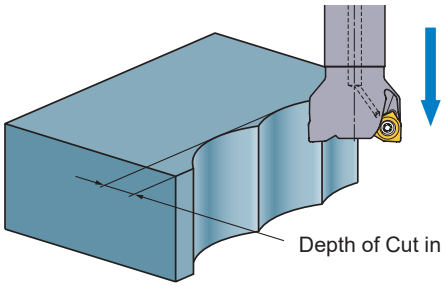
DC		RE	APMX	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
inch	mm			Maximum Ramping Angle **RMPX**	Minimum Distance * **L**	Maximum Hole Diameter **DH max.**	Maximum Pitch **P max.**	Minimum Hole Diameter **DH min.**	Maximum Pitch **P max.**	Minimum Hole Diameter **DH min.**	Maximum Pitch **P max.**
1.969	50	.016	.315	.40°	46.260	3.878	.042	3.748	.039	3.248	.028
1.969	50	.031	.315	.40°	46.260	3.846	.041	3.748	.039	3.248	.028
2.000	—	.016	.315	.40°	46.260	3.929	.042	3.811	.040	3.295	.028
2.000	—	.031	.315	.40°	46.260	3.898	.042	3.811	.040	3.295	.028
2.480	63	.016	.315	.26°	71.142	4.902	.035	4.772	.033	4.276	.024
2.480	63	.031	.315	.26°	71.142	4.870	.034	4.772	.033	4.276	.024
2.500	—	.016	.315	.26°	71.142	4.929	.035	4.811	.033	4.299	.026
2.500	—	.031	.315	.26°	71.142	4.898	.034	4.811	.033	4.299	.026
3.000	—	.016	.315	.16°	115.591	5.929	.026	5.811	.025	5.299	.020
3.000	—	.031	.315	.16°	115.591	5.898	.026	5.811	.025	5.299	.020
3.150	80	.016	.315	.16°	115.591	6.240	.027	6.110	.026	5.614	.020
3.150	80	.031	.315	.16°	115.591	6.209	.027	6.114	.026	5.614	.020

Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping and helical milling, long continuous chips may be scattered so please be careful.
Note 3) WWX200 cannot be used for ramping or helical machining.

<Helical Milling>
To obtain a flat bottom surface when helical milling, it requires to remove “the uncut part” in the center of the workpiece material at a final pass. When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (**APMX**).

WWX200/400

● **Plunging**



Depth of Cut in the Radius Direction : **ae** = WWX200 .197 inch
WWX400 .315 inch

Memo

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FOR YOUR SAFETY

- Don't handle inserts and chips without gloves.
- Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage.
- Please use safety covers and wear safety glasses.
- When using compounded cutting oils, please take fire precautions.
- When attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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Tools specifications subject to change without notice.

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