
WWX SERIES

A NEW LEVEL OF VERSATILITY



WWX SERIES

STABLE AND RELIABLE

High performance 90° face milling cutter with double-sided trigon inserts for shoulder, face and copy milling.

The indexable inserts with 6 usable cutting edges offer lower cost per cutting edge and excellent process reliability thanks to a special negative geometry but with a positive, sharp cutting action.

Precise locating of the inserts ensures a true 90° corner milling operation, eliminating the need for secondary operations, thereby saving valuable production time and costs.

PRODUCT RANGE WWX200

- Arbor type: DC Ø 40 – 160 mm
- Shank type: DC Ø 25 – 50 mm
- Inserts with radii: 0.4 – 0.8
- Depth of cut: APMX 5 mm

PRODUCT RANGE WWX400

- Arbor type: DC Ø 50 – 250 mm
- Shank type: DC Ø 50 – 80 mm
- Inserts with radii: 0.4 / 0.8 / 1.6 / 2.0
- Depth of cut: APMX 8 mm

APPLICATION

- General machining
- Face milling
- Shoulder milling



FEATURES

- Low cutting force
- Good chip evacuation
- Large variety of grades and breakers available
- Double-sided trigon inserts with 6 cutting edges
- Superior surface finishing

WWX SERIES

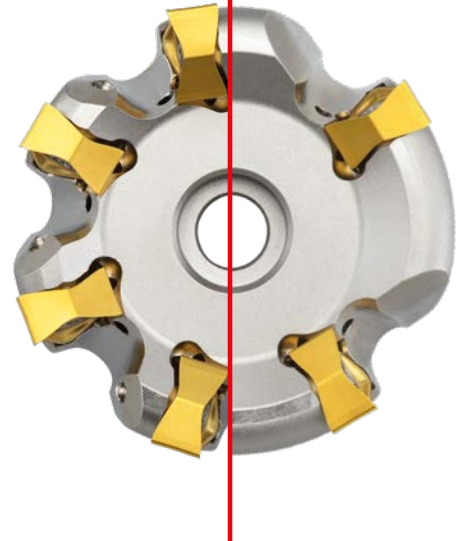
UNIQUE PROPERTIES

CHOICE AND AVAILABILITY

Diameters 25 – 160 mm (WWX200) / 50 – 250 mm (WWX400) are all available in coarse, fine and extra-fine pitch geometries. Providing a wide choice of sizes means the ideal milling body can be selected for a huge range of applications.

Additionally, each cutter body has an internal through coolant supply directed at each insert.

Extra fine pitch Coarse pitch



PERFECT 90° WALL MACHINING AND INSERTS WITH MAXIMUM DEPTH OF CUT UP TO 5 MM (WWX200) / 8 MM (WWX400)

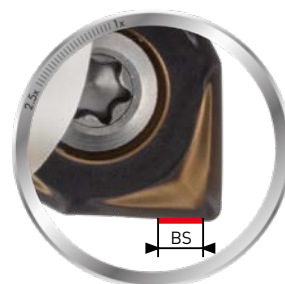
Clever positioning of the insert generates extremely low cutting resistance and helps to generate accurate 90° walls under all machining conditions.

LOW CUTTING FORCE

Innovative geometry generates low cutting forces. The increased insert thickness provides excellent resistance to breakage.

LARGE RADIUS OF MINOR CUTTING EDGE

To meet the modern expectations regarding surface finish quality, a specially defined radius (R = 100 μm) with a cutting width BS of 0.5 – 1.7 mm, is used as a wiper geometry across all L, M and R chipbreakers.



WWX SERIES

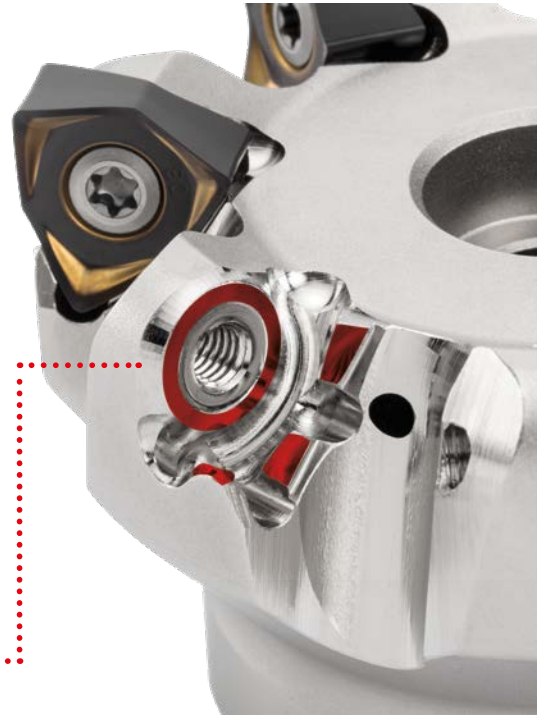
INSERTS

PRECISE INSERT POSITIONING IN COMBINATION WITH STRONG INSERT CLAMPING

Four contact surfaces inside the insert pocket, plus use of a large clamping screw provides precise, but stable and secure clamping of the inserts. Therefore, WWX200 / WWX400 can be recommended for both semi-roughing and finish machining.



Strong X geometry



SHOULDER AND WALL MACHINING WITHOUT CHIP INTERFERENCE

Use of a convex main cutting edge allows for precise 90° shoulder machining and reduces contact between ejected chips and the workpiece.

WWX200 / WWX400



Conventional



WWX SERIES

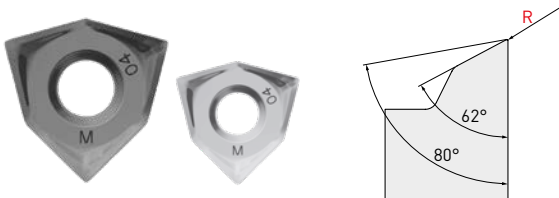
GRADES AND CHIPBREAKERS

An extensive choice of grades and chipbreakers ensures the optimal choice is available for stable and efficient machining over a wide range of applications.



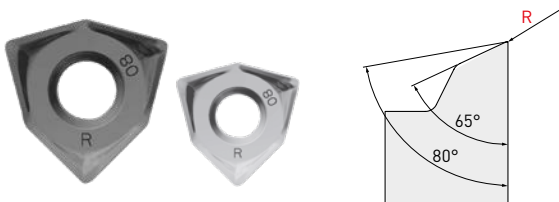
L-BREAKER

Recommended for machining that requires reduced cutting loads, or for machining HRSA materials.



M-BREAKER

Outstanding balance of cutting edge sharpness and stability. First choice all-rounder, suitable for a variety of materials and applications.



R-BREAKER

First recommendation for interrupted cutting conditions.

WWX SERIES

GRADES FOR MACHINING A WIDE RANGE OF MATERIALS

P	CVD	PVD	M	CVD	PVD	K	CVD	PVD	S	PVD	H	PVD
P10	MV1020	MP6120	VP15TF	M10		K10			S10		H10	
P20	MV1030	MP6130	M20	MV1030	MP7130	K20	MC5020	VP15TF	S20	MP9120	H20	VP15TF
P30			M30		MP7140	K30	MV1020		S30	MP9130	H30	
P40			M40		MP7030	K40	MV1030	VP15TF	S40		H40	

MV1020

This grade has advanced wear and thermal shock resistance and also achieves stable cutting at unprecedented cutting speeds, especially when machining steel and ductile cast iron, thus greatly reducing work time.

MV1030

The new Al-Rich coating also provides excellent wear resistance. An unprecedented performance against sudden breakage was also realised especially during problematic wet cutting and when machining stainless steels.

MP6120

For general milling of steel.

MP6130

For interrupted milling of steel.

MP7130

For general milling of stainless steel.

MC5020

For general milling of cast iron.

MP9120

For general milling of HRSA and titanium alloy.

MP9130

For interrupted and general milling of HRSA and Titanium alloy.

TF15

For general milling of aluminium.

VP15TF

For stable machining when the coating is combined with a high wear and fracture resistant carbide substrate.

MV1000 SERIES

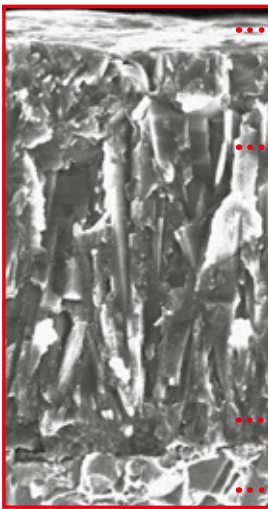
COATED CARBIDE GRADE FOR MILLING

ADVANCED WEAR RESISTANCE

By adopting the newly developed Al-Rich coating technology, the (Al,Ti)N with a high Al content ratio displays very high hardness. This greatly improves oxidation and wear resistance.

ADVANCED THERMAL SHOCK 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.



Graphical representation

EXCELLENT WELDING RESISTANCE

Smooth surface.

OUTSTANDING WEAR RESISTANCE

Newly developed Al-Rich coating.

EXCELLENT CHIPPING RESISTANCE FOR STABLE MACHINING

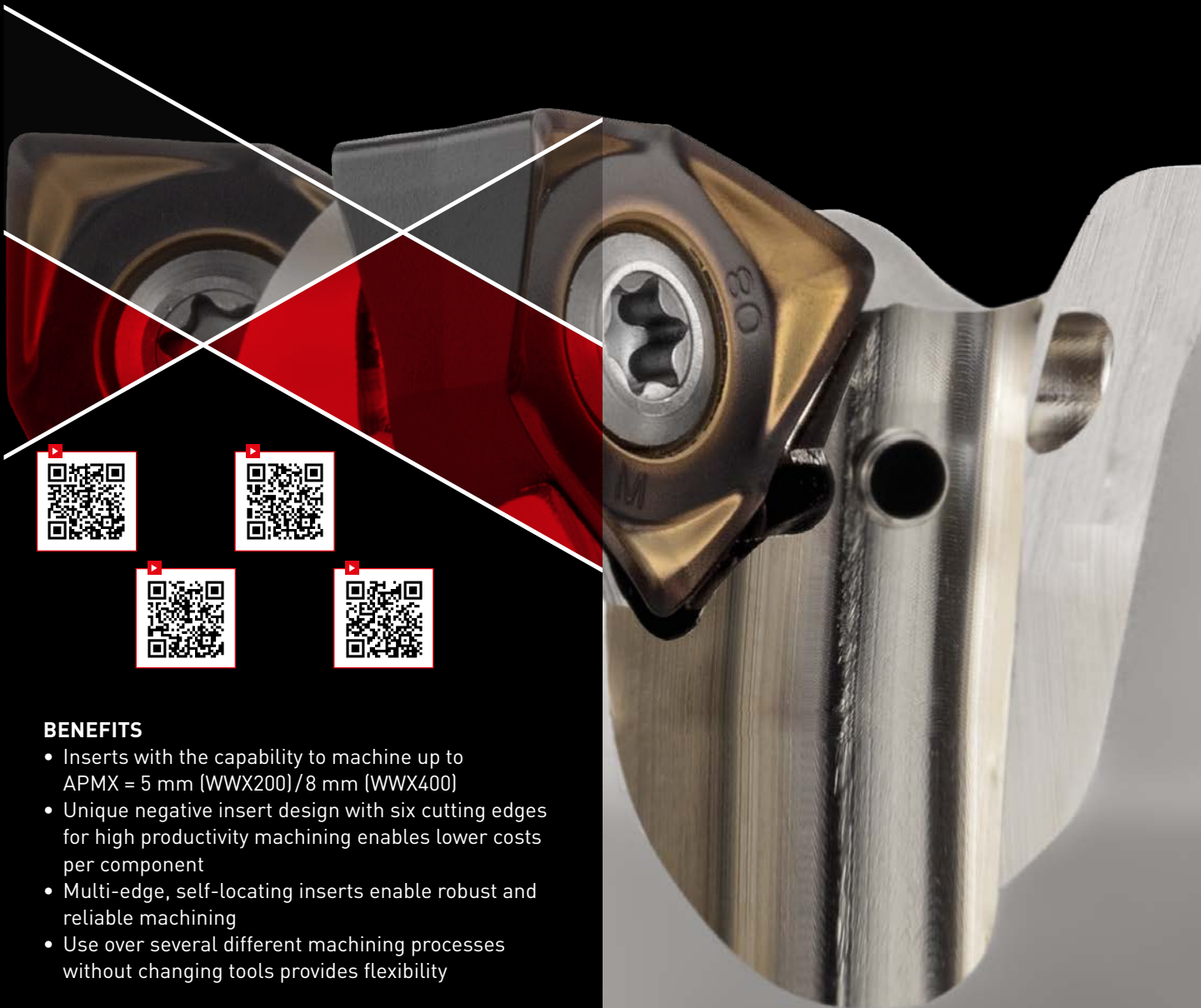
Newly developed bonding layer.

FRACTURE RESISTANCE FOR THE ULTIMATE STABILITY

Exclusive cemented carbide substrate.



NEW LEVEL OF VERSATILITY



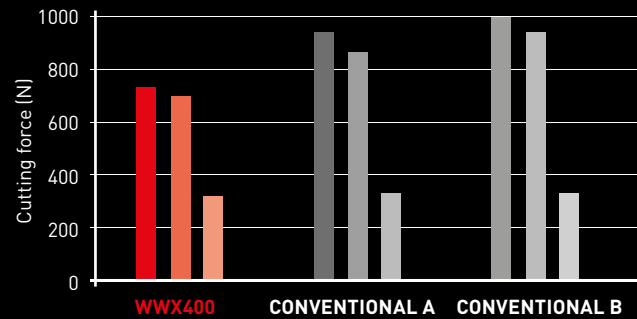
BENEFITS

- Inserts with the capability to machine up to APMX = 5 mm (WWX200)/8 mm (WWX400)
- Unique negative insert design with six cutting edges for high productivity machining enables lower costs per component
- Multi-edge, self-locating inserts enable robust and reliable machining
- Use over several different machining processes without changing tools provides flexibility

WWX400

CUTTING FORCE

Material	1.7225 / 42CrM04
Tool	WWX400 Ø 80
Vc (m/min)	160
fz (mm/t.)	0.2
ap (mm)	2.0
ae (mm)	64
Cutting mode	Single insert

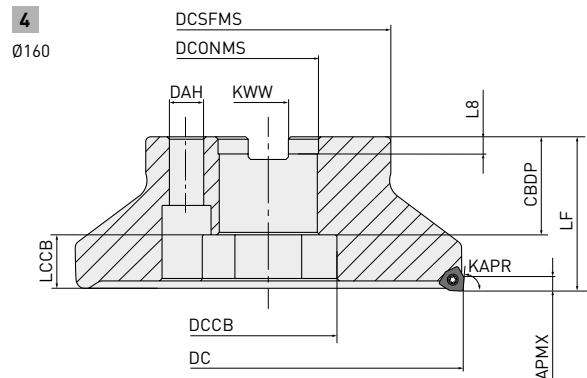
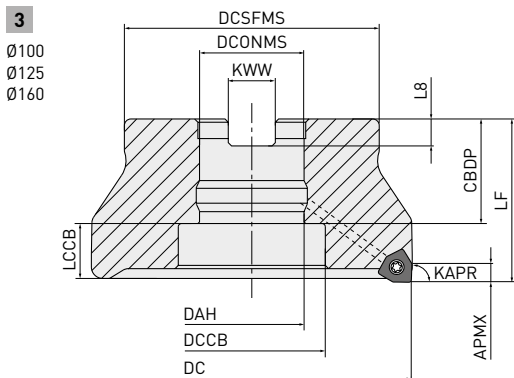
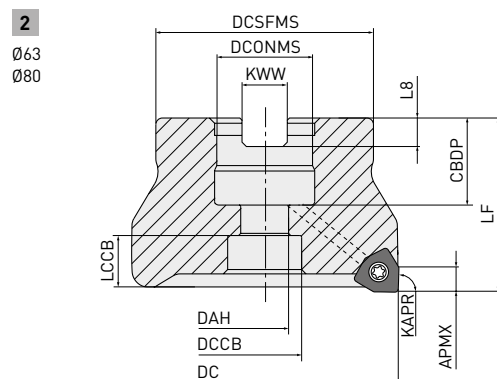
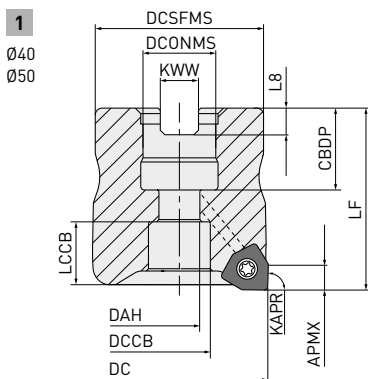


WWX200



90° FACE MILLING CUTTER

P M K N S H




Right hand tool holder only.

ARBOR TYPE

Order number	Stock	APMX	DC	DCONMS	LF	RPMX	WT	ZEFP		Type
WWX200-040A03AR	●	5	40	16	40	21600	0.2	3	○	1
WWX200-040A04AR	●	5	40	16	40	21600	0.2	4	○	1
WWX200-050A04AR	●	5	50	22	40	18600	0.4	4	○	1
WWX200-050A05AR	●	5	50	22	40	18600	0.4	5	○	1
WWX200-050A06AR	●	5	50	22	40	18600	0.3	6	○	1
WWX200-063A05AR	●	5	63	22	40	16000	0.5	5	○	2
WWX200-063A06AR	●	5	63	22	40	16000	0.5	6	○	2
WWX200-063A07AR	●	5	63	22	40	16000	0.5	7	○	2
WWX200-080A05AR	●	5	80	27	50	13600	1.1	5	○	2
WWX200-080A07AR	●	5	80	27	50	13600	1.0	7	○	2

WWX200 – 90° FACE MILLING CUTTER – ARBOR TYPE

Order number	Stock	APMX	DC	DCONMS	LF	RPMX	WT	ZEFP		Type
WWX200-080A09AR	●	5	80	27	50	13600	1.0	9	○	2
WWX200-100B06AR	●	5	100	32	50	11700	1.7	6	○	3
WWX200-100B08AR	●	5	100	32	50	11700	1.7	8	○	3
WWX200-100B11AR	●	5	100	32	50	11700	1.7	11	○	3
WWX200-125B07AR	●	5	125	40	63	10100	3.1	7	○	3
WWX200-125B11AR	●	5	125	40	63	10100	3.0	11	○	3
WWX200-125B14AR	●	5	125	40	63	10100	3.0	14	○	3
WWX200-160C09NR	●	5	160	40	63	8600	4.6	9	—	4
WWX200-160C12NR	●	5	160	40	63	8600	4.6	12	—	4
WWX200-160C16NR	●	5	160	40	63	8600	4.6	16	—	4

2/2

1. The maximum spindle speeds RPMX are set to ensure tool and insert stability.
2. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
3. ○ = With through coolant holes
4. A set bolt to the arbor is not supplied with the body. Please refer to page 13, when ordering.
5. Please use a set bolt of the FMC type on the cutter body from 40 to 100 in diameter [DC].
6. Please use a set bolt of the FMA type on the cutter body from 125 to 160 in diameter [DC].



MOUNTING DIMENSIONS

Order number	CBDP	DAH	DCCB	DCONMS	DCSFMS	KWW	LCCB	L8	Type
WWX200-040A03AR	18	9	13.6	16	37	8.4	13.8	5.6	1
WWX200-040A04AR	18	9	13.6	16	37	8.4	13.8	5.6	1
WWX200-050A04AR	20	11	17	22	47	10.4	11.8	6.3	1
WWX200-050A05AR	20	11	17	22	47	10.4	11.8	6.3	1
WWX200-050A06AR	20	11	17	22	47	10.4	11.8	6.3	1
WWX200-063A05AR	20	11	17	22	50	10.4	11.8	6.3	2
WWX200-063A06AR	20	11	17	22	50	10.4	11.8	6.3	2
WWX200-063A07AR	20	11	17	22	50	10.4	11.8	6.3	2
WWX200-080A05AR	23	13	20	27	56	12.4	11.8	7	2
WWX200-080A07AR	23	13	20	27	56	12.4	11.8	7	2
WWX200-080A09AR	23	13	20	27	56	12.4	11.8	7	2
WWX200-100B06AR	26	32	45	32	78	14.4	16.8	8	3
WWX200-100B08AR	26	32	45	32	78	14.4	16.8	8	3
WWX200-100B11AR	26	32	45	32	78	14.4	16.8	8	3
WWX200-125B07AR	35	42	56	40	89	16.4	21.8	9	3
WWX200-125B11AR	35	42	56	40	89	16.4	21.8	9	3
WWX200-125B14AR	35	42	56	40	89	16.4	21.8	9	3
WWX200-160C09NR	40	—	56	40	100	16.4	21.8	9	4
WWX200-160C12NR	40	—	56	40	100	16.4	21.8	9	4
WWX200-160C16NR	40	—	56	40	100	16.4	21.8	9	4

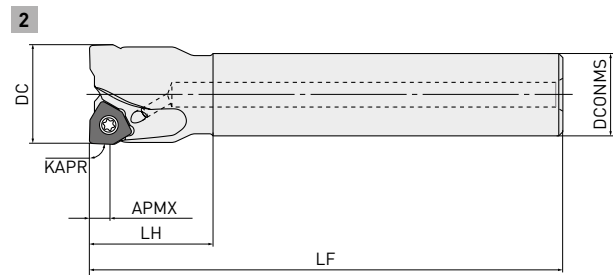
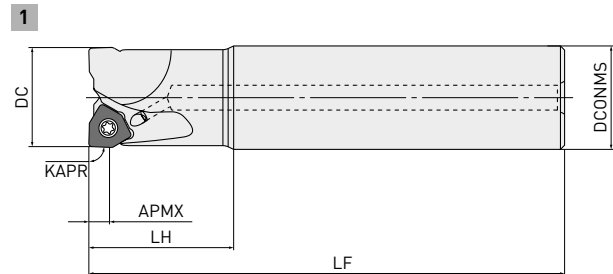
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WWX200



90° FACE MILLING CUTTER

P M K N S H



Right hand tool holder only.

SHANK TYPE

Order number	Stock	APMX	DC	DCONMS	LF	RPMX	WT	LH	ZEFP		Type
WWX200R2502SA20S	●	5	25	20	115	29600	0.3	30	2	○	2
WWX200R2502SA25S	●	5	25	25	115	29600	0.4	35	2	○	1
WWX200R2502SA25L	●	5	25	25	170	29600	0.6	70	2	○	1
WWX200R2502WA25S	●	5	25	25	91	29600	0.3	35	2	○	1
WWX200R2802SA25S	●	5	28	25	115	27400	0.4	35	2	○	2
WWX200R2802SA25L	●	5	28	25	170	27400	0.6	35	2	○	2
WWX200R3002SA25S	●	5	30	25	125	26200	0.5	35	2	○	2
WWX200R3202SA32S	●	5	32	32	125	26200	0.7	45	2	○	1
WWX200R3202WA32S	●	5	32	32	105	26200	0.6	45	2	○	1
WWX200R3203SA32S	●	5	32	32	125	26200	0.7	45	3	○	1
WWX200R3203SA32L	●	5	32	32	190	26200	1.0	90	3	○	1
WWX200R3203WA32S	●	5	32	32	105	26200	0.6	45	3	○	1
WWX200R3503SA32L	●	5	35	32	190	25100	1.1	45	3	○	2
WWX200R4003SA32S	★	5	40	32	125	21600	0.8	45	3	○	2
WWX200R4004SA32S	★	5	40	32	125	21600	0.8	45	4	○	2
WWX200R5004SA32S	★	5	50	32	125	18600	0.9	45	4	○	2
WWX200R5005SA32S	★	5	50	32	125	18600	0.9	45	5	○	2
WWX200R5006SA32S	★	5	50	32	125	18600	0.9	45	6	○	2

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1. The maximum spindle speeds RPMX are set to ensure tool and insert stability.
2. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
3. ○ = With through coolant holes






WWX200

PARTS SOLD SEPARATELY – SET BOLT

Tool holder type	Set bolt		Type	Reference dimensions							Geometry
	With coolant hole	Without coolant hole		a	b	c	d	e	f	g	
	Order number										
WWX200-040A [○] AR	HSC08025H	—	1	13	M8x1.25	33	8	5	—	—	
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	—	—	2	50	M20x2.5	54	14	17	6	27	

1. Internal coolant is necessary with the set bolt.

SPARE PARTS

Tool holder type	 *		
	Clamp screw	Wrench (Insert)	Anti-seize lubricant
WWX200 Arbor type	TPS3R	TIP10D	MK1KS
WWX200 Shank type			

* Clamp torque (N • m): TPS3R = 2.0

INSERTS

Order number	Class	Honing	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15	MC5020	NEW MV1020	IC	S	S1	BS	RE	Geometry
NEW 6NGU0906040PNFR-L	G	F							●			9.0	4.5	5.3	1.3	0.4	
NEW 6NGU0906080PNFR-L	G	F							●			9.0	4.5	5.3	1.3	0.8	
6NMU0906040PNER-M	M	E	●	●	●	●	●	●		●	●	9.0	5.3	6.1	1.6	0.4	
6NMU0906080PNER-M	M	E	●	●	●	●	●	●		●	●	9.0	5.3	6.1	1.2	0.8	
6NMU0906080PNER-R	M	E	●	●		●	●	●		●	●	9.0	5.3	6.1	1.2	0.8	

(10 inserts in one case)

● : Inventory maintained. ★ : Inventory maintained in Japan.

WWX400

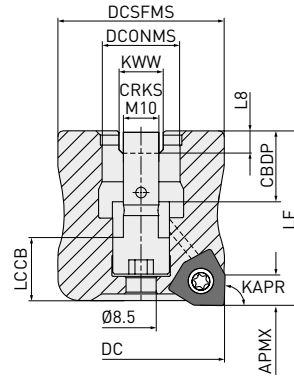


90° FACE MILLING CUTTER

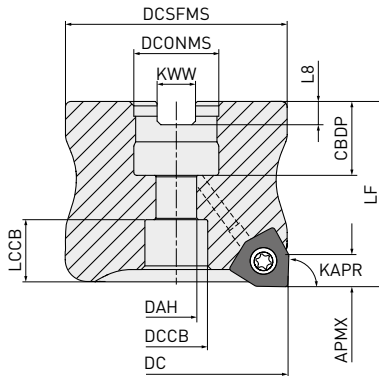
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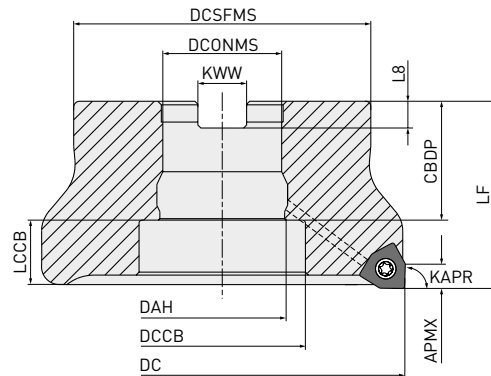
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Ø50



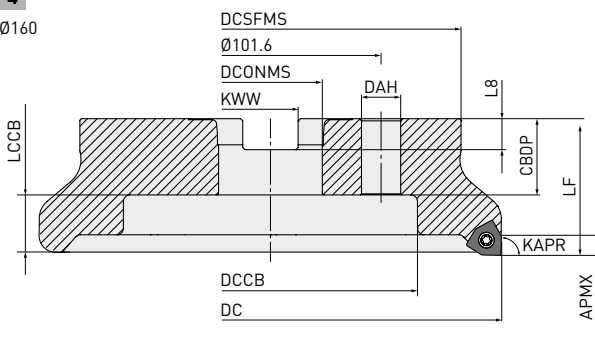
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Ø63
Ø80



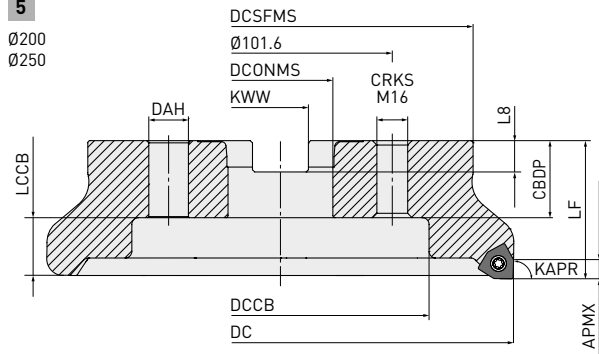
3
Ø100
Ø125



4
Ø160




5
Ø200
Ø250



Right hand tool holder only.

DC	Set bolt	Geometry
Ø50, Ø63	HSC10030H	
Ø80	HSC12035H	
Ø100	MBA16033H	
Ø125	MBA20040H	
Ø160, Ø200, Ø250	—	

WWX400 – 90° FACE MILLING CUTTER – ARBOR TYPE

Order number	Stock	APMX	DC	DCONMS	GAMF	LF	RMPX	RPMX	WT	ZEFP		Type
WWX400-050A03AR	★	8	50	22	-12.8°	55	0.4°	5000	0.5	3	○	1
WWX400-050A04AR	●	8	50	22	-12.8°	55	0.4°	5000	0.5	4	○	1
WWX400-063A03AR	★	8	63	22	-11°	40	0.26°	14100	0.5	3	○	2
WWX400-063A04AR	●	8	63	22	-11°	40	0.26°	14100	0.5	4	○	2
WWX400-063A05AR	●	8	63	22	-11°	40	0.26°	14100	0.5	5	○	2
WWX400-080A04AR	★	8	80	27	-9.2°	50	0.16°	12200	1	4	○	2
WWX400-080A05AR	●	8	80	27	-9.2°	50	0.16°	12200	1	5	○	2
WWX400-080A07AR	●	8	80	27	-9.2°	50	0.16°	12200	0.9	7	○	2
WWX400-100B05AR	★	8	100	32	-8.5°	50	—	10700	1.6	5	○	3
WWX400-100B07AR	●	8	100	32	-8.5°	50	—	10700	1.5	7	○	3
WWX400-100B09AR	●	8	100	32	-8.5°	50	—	10700	1.5	9	○	3
WWX400-125B06AR	★	8	125	40	-7.8°	63	—	9500	3	6	○	3
WWX400-125B08AR	●	8	125	40	-7.8°	63	—	9500	3	8	○	3
WWX400-125B12AR	★	8	125	40	-7.8°	63	—	9500	2.9	12	○	3
WWX400-160C08NR	★	8	160	40	-7.3°	63	—	8300	4.5	8	—	4
WWX400-160C10NR	★	8	160	40	-7.3°	63	—	8300	4.4	10	—	4
WWX400-160C14NR	★	8	160	40	-10°	63	—	8300	4.4	14	—	4
WWX400-200C10NR	★	8	200	60	-7.2°	63	—	7300	6.7	10	—	5
WWX400-200C12NR	★	8	200	60	-7.2°	63	—	7300	6.7	12	—	5
WWX400-200C16NR	★	8	200	60	-8.5°	63	—	7300	6.6	16	—	5
WWX400-250C12NR	★	8	250	60	-7.2°	63	—	6400	11.5	12	—	5
WWX400-250C14NR	★	8	250	60	-7.2°	63	—	6400	11.5	14	—	5
WWX400-250C18NR	★	8	250	60	-7.2°	63	—	6400	11.4	18	—	5

1/1

1. The maximum spindle speeds RPMX are set to ensure tool and insert stability.
2. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
3. ○ = With through coolant holes
4. A set bolt to the arbor is not supplied with the body. Please refer to page 17, when ordering.
5. Please use a set bolt of the FMC type on the cutter body from 63 to 100 in diameter [DC].
6. Please use a set bolt of the FMA type on the cutter body from 125 to 250 in diameter [DC].



WWX400 – 90° FACE MILLING CUTTER – ARBOR TYPE**MOUNTING DIMENSIONS**

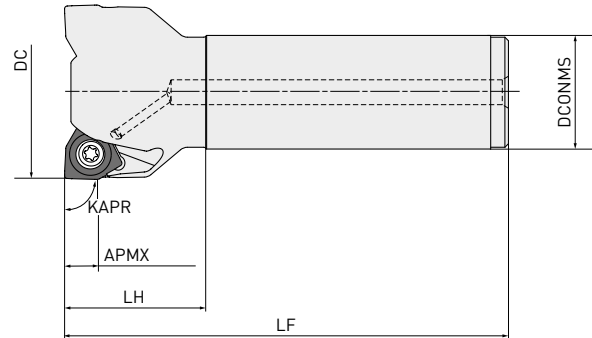
Order number	CBDP	DAH	DCCB	DCONMS	DCSFMS	KWW	LCCB	L8	Type
WWX400-050A03AR	20	—	—	22	47	10.4	12.2	6.3	1
WWX400-050A04AR	20	—	—	22	47	10.4	12.2	6.3	1
WWX400-063A03AR	20	11	17	22	50	10.4	11.2	6.3	2
WWX400-063A04AR	20	11	17	22	50	10.4	11.2	6.3	2
WWX400-063A05AR	20	11	17	22	50	10.4	11.2	6.3	2
WWX400-080A04AR	23	13	20	27	56	12.4	14.2	7.0	2
WWX400-080A05AR	23	13	20	27	56	12.4	14.2	7.0	2
WWX400-080A07AR	23	13	20	27	56	12.4	14.2	7.0	2
WWX400-100B05AR	32	32	45	32	78	14.4	16.2	8.0	3
WWX400-100B07AR	32	32	45	32	78	14.4	16.2	8.0	3
WWX400-100B09AR	32	32	45	32	78	14.4	16.2	8.0	3
WWX400-125B06AR	40	40	56	40	89	16.4	21.2	9.0	3
WWX400-125B08AR	40	40	56	40	89	16.4	21.2	9.0	3
WWX400-125B12AR	40	40	56	40	89	16.4	21.2	9.0	3
WWX400-160C08NR	40	14	56	40	100	16.4	21.2	9.0	4
WWX400-160C10NR	40	14	56	40	100	16.4	21.2	9.0	4
WWX400-160C14NR	40	14	56	40	100	16.4	21.2	9.0	4
WWX400-200C10NR	32	18	135	60	160	25.7	29.2	14.22	5
WWX400-200C12NR	32	18	135	60	160	25.7	29.2	14.22	5
WWX400-200C16NR	32	18	135	60	160	25.7	29.2	14.22	5
WWX400-250C12NR	32	18	180	60	210	25.7	29.2	14.22	5
WWX400-250C14NR	32	18	180	60	210	25.7	29.2	14.22	5
WWX400-250C18NR	32	18	180	60	210	25.7	29.2	14.22	5

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WWX400



90° FACE MILLING CUTTER



Right hand tool holder only.

SHANK TYPE

Order number	Stock	APMX	DC	DCONMS	GAMF	LF	RMPX	RPMX	WT	LH	ZEFP	
WWX400R5003SA32M	★	8	50	32	-12.8°	125	0.45°	16000	0.83	40	3	○
WWX400R5004SA32M	★	8	50	32	-12.8°	125	0.45°	16000	0.81	40	4	○
WWX400R6303SA32M	★	8	63	32	-11.0°	125	0.31°	14100	1.00	40	3	○
WWX400R6304SA32M	★	8	63	32	-11.0°	125	0.31°	14100	0.97	40	4	○
WWX400R6305SA32M	★	8	63	32	-11.0°	125	0.31°	14100	0.95	40	5	○
WWX400R8004SA32M	★	8	80	32	-9.2°	125	0.21°	12200	1.27	40	4	○
WWX400R8005SA32M	★	8	80	32	-9.2°	125	0.21°	12200	1.24	40	5	○
WWX400R8007SA32M	★	8	80	32	-9.2°	125	0.21°	12200	1.19	40	7	○

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1. The maximum spindle speeds RPMX are set to ensure tool and insert stability.
2. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
3. ○ = With through coolant holes



SPARE PARTS

Tool holder type	Clamp screw	Wrench (Insert)	Anti-seize lubricant
WWX400 Arbor type	TS5R	TKY20T	MK1KS
WWX400 Shank type			

* Clamp torque (N • m): TS5R = 5.0

● : Inventory maintained. ★ : Inventory maintained in Japan.

WWX400

INSERTS

P	Steel	●	●			★		●	●
M	Stainless steel		●			●		●	●
K	Cast iron					★	●	●	●
N	Non-ferrous material						●		
S	Heat resistant alloy, Titanium alloy			●	●				
H	Hardened steel	●					●		

Cutting conditions :

●: Stable cutting ●: General cutting

★: Unstable cutting

Honing:

E: Round F: Sharp edge S: Chamfer + round

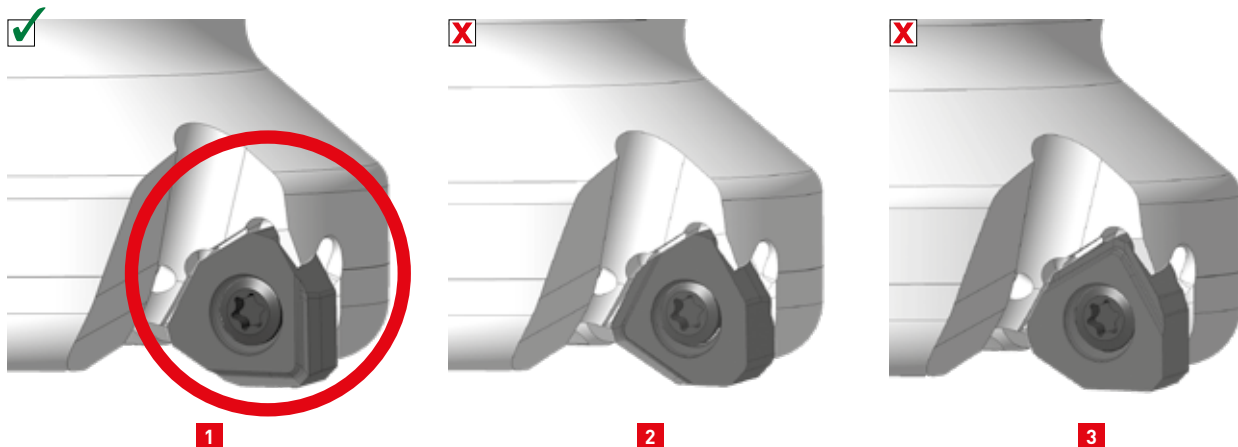
T: Chamfer Z: Stable

Order number	Class	Honing	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15	MC5020	NEW MV1020	NEW MV1030	IC	S	S1	BS	RE	Geometry
6NGU1409040PNER-L	G	E	●	●	●	●	●	●		●	●	●	14	7	9	1.7	0.4	
6NGU1409080PNER-L	G	E	●	●	●	●	●			●	●	●	14	7	9	1.3	0.8	
6NGU1409040PNFR-L	G	F							●				14	7	9	1.7	0.4	
6NGU1409080PNFR-L	G	F							●				14	7	9	1.3	0.8	
6NGU1409040PNER-M	G	E	●	●	●	●	●	●		●	●	●	14	7	9	1.7	0.4	
6NGU1409080PNER-M	G	E	●	●	●	●	●	●		●	●	●	14	7	9	1.3	0.8	
6NMU1409040PNER-M	M	E	●	●	●	●	●	●		●	●	●	14	7	9	1.7	0.4	
6NMU1409080PNER-M	M	E	●	●	●	●	●	●		●	●	●	14	7	9	1.3	0.8	
6NMU1409160PNER-M	M	E	●	●	●	●	●	●		●	●	●	14	7	9	0.5	1.6	
6NMU1409200PNER-M	M	E	●	●	●	●	●	●		●	●	●	14	7	9	0.5	2.0	
6NMU1409080PNER-R	M	E	●	●		●	●	●		●	●	●	14	7	9	1.3	0.8	
6NMU1409160PNER-R	M	E	●	●		●	●	●		●	●	●	14	7	9	0.5	1.6	
6NMU1409200PNER-R	M	E	●	●		●	●	●		●	●	●	14	7	9	0.5	2.0	
2NGU1406ZNER6C-M	G	E	●					●		●			14	6.3	—	6.5	—	

(10 inserts in one case)



INSTRUCTIONS FOR USE OF WIPER INSERTS



Wiper inserts for WWX400 are two-cornered. Please set as shown in picture 1.

Excellent surface finishes can be achieved with one wiper.

Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than 6.5 mm/rev.

When choosing a wiper insert select a general grade that is similar to the ideal cutting conditions.

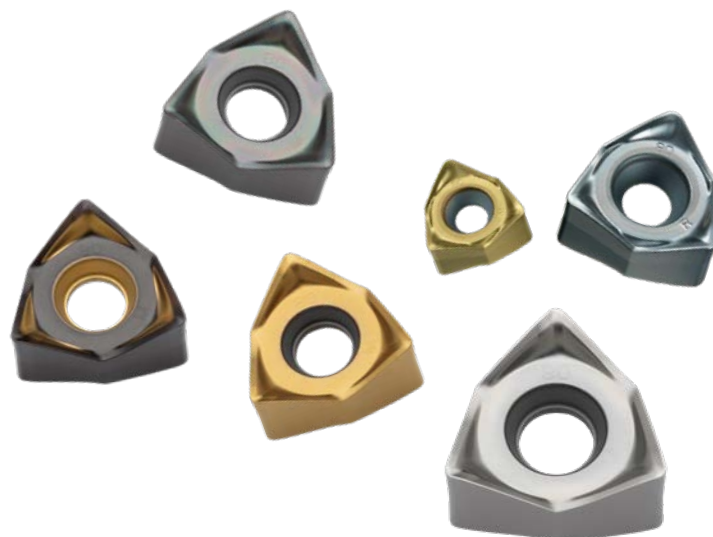
WWX200/400

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED / DRY CUTTING

Material	Properties	Cutting conditions	Grade	Vc		
				ae ≤ 0.5 DC	ae ≤ 0.8 DC	ae = DC
Mild steel	≤180HB	●	MV1020	300 (250 – 350)	280 (230 – 330)	250 (200 – 300)
		●	MP6120	240 (200 – 280)	220 (180 – 260)	200 (160 – 240)
		●	MV1030	230 (190 – 270)	210 (170 – 250)	190 (150 – 230)
		●	MV1020	290 (240 – 340)	260 (210 – 320)	240 (190 – 290)
		●	MV1030	230 (190 – 270)	210 (170 – 250)	190 (150 – 230)
		●	MP6130	230 (190 – 270)	210 (170 – 250)	190 (150 – 230)
		✘	MP6130	210 (170 – 250)	190 (150 – 230)	170 (130 – 210)
		✘	VP15TF	210 (170 – 250)	190 (150 – 230)	170 (130 – 210)
Carbon steel Alloy steel	180 – 280HB	●	MV1020	260 (210 – 310)	240 (190 – 280)	210 (160 – 260)
		●	MP6120	210 (170 – 250)	190 (150 – 230)	170 (130 – 210)
		●	MV1030	200 (160 – 240)	180 (140 – 220)	160 (120 – 200)
		●	MV1020	250 (200 – 300)	230 (180 – 270)	200 (150 – 250)
		●	MV1030	200 (160 – 240)	180 (140 – 220)	160 (120 – 200)
		●	MP6130	200 (160 – 240)	180 (140 – 220)	160 (120 – 200)
		✘	MP6130	180 (140 – 220)	160 (120 – 200)	140 (100 – 180)
		✘	VP15TF	180 (140 – 220)	160 (120 – 200)	140 (100 – 180)
Carbon steel Alloy steel Alloy tool steel	280 – 350HB ≤350HB	●	MP6120	200 (160 – 240)	180 (140 – 220)	160 (120 – 200)
		●	MP6130	190 (150 – 230)	170 (130 – 210)	150 (110 – 190)
		✘	MP6130	170 (130 – 210)	150 (110 – 190)	130 (90 – 170)
		✘	VP15TF	170 (130 – 210)	150 (110 – 190)	130 (90 – 170)
Pre-hardened steel	35 – 45HRC	●	MP6120	140 (120 – 160)	–	–
		●	MP6130	120 (100 – 140)	–	–
		✘	MP6130	110 (90 – 130)	–	–
		✘	VP15TF	110 (90 – 130)	–	–

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WWX200/400 – CUTTING SPEED/DRY CUTTING

Material	Properties	Cutting conditions	Grade	Vc		
				ae ≤ 0.5 DC	ae ≤ 0.8 DC	ae = DC
M Austenitic stainless steel	≤200HB	●	MV1030	180 (160 – 200)	160 (140 – 180)	—
		●	MP7130	180 (160 – 200)	160 (140 – 180)	—
		●	MV1030	170 (150 – 190)	150 (130 – 170)	—
		●	MP7130	170 (150 – 190)	150 (130 – 170)	—
		●	VP15TF	170 (150 – 190)	150 (130 – 170)	—
		✘	MP7130	150 (130 – 170)	130 (110 – 150)	—
	>200HB	●	MP7130	170 (150 – 190)	150 (130 – 170)	—
		●	MP7130	160 (140 – 180)	140 (120 – 160)	—
		●	VP15TF	160 (140 – 180)	140 (120 – 160)	—
		✘	MP7130	140 (120 – 160)	120 (100 – 140)	—
		✘	VP15TF	140 (120 – 160)	120 (100 – 140)	—
		●	MP7130	180 (160 – 200)	160 (140 – 180)	—
Ferritic and martensitic Stainless steel	≤200HB	●	MP7130	170 (150 – 190)	150 (130 – 170)	—
		●	VP15TF	170 (150 – 190)	150 (130 – 170)	—
		✘	MP7130	150 (130 – 170)	130 (110 – 150)	—
		✘	VP15TF	150 (130 – 170)	130 (110 – 150)	—
		●	MP7130	160 (140 – 180)	140 (120 – 160)	—
Duplex stainless steel	≤280HB	●	MP7130	150 (130 – 170)	130 (110 – 150)	—
		●	VP15TF	150 (130 – 170)	130 (110 – 150)	—
		✘	MP7130	130 (110 – 150)	110 (90 – 130)	—
		✘	VP15TF	130 (110 – 150)	110 (90 – 130)	—
		●	MP7130	140 (120 – 160)	—	—
Precipitation hardening Stainless steel	<450HB	●	MP7130	130 (110 – 150)	—	—
		●	VP15TF	130 (110 – 150)	—	—
		✘	MP7130	110 (90 – 130)	—	—
		✘	VP15TF	110 (90 – 130)	—	—
		●	MC5020	250 (210 – 290)	230 (190 – 270)	210 (170 – 250)
Gray cast iron	≤350MPa	●	MC5020	240 (200 – 280)	220 (180 – 260)	200 (160 – 240)
		●	VP15TF	240 (200 – 280)	220 (180 – 260)	—
		✘	MC5020	220 (180 – 260)	200 (160 – 240)	180 (140 – 220)
		✘	VP15TF	220 (180 – 260)	200 (160 – 240)	180 (140 – 220)
		●	MV1020	240 (200 – 310)	220 (170 – 280)	200 (150 – 260)
Ductile cast iron	≤450MPa	●	MV1030	210 (170 – 250)	190 (150 – 230)	170 (130 – 210)
		●	MC5020	220 (180 – 260)	200 (160 – 240)	180 (140 – 220)
		●	MV1020	230 (190 – 300)	210 (160 – 270)	190 (140 – 250)
		●	MV1030	210 (170 – 250)	190 (150 – 230)	170 (130 – 210)
		●	MC5020	210 (170 – 250)	190 (150 – 230)	170 (130 – 210)
		●	VP15TF	210 (170 – 250)	190 (150 – 230)	—
		✘	MC5020	190 (150 – 230)	170 (130 – 210)	150 (110 – 190)
		✘	VP15TF	190 (150 – 230)	170 (130 – 210)	150 (110 – 190)
		●	MV1020	210 (160 – 280)	190 (140 – 250)	160 (120 – 210)
Ductile cast iron	≤800MPa	●	MC5020	180 (140 – 220)	160 (120 – 200)	140 (100 – 180)
		●	MV1030	170 (130 – 210)	150 (110 – 190)	130 (90 – 170)
		●	MV1020	200 (150 – 270)	180 (130 – 240)	150 (110 – 200)
		●	MV1030	170 (130 – 210)	150 (110 – 190)	130 (90 – 170)
		●	MC5020	170 (130 – 210)	150 (110 – 190)	130 (90 – 170)
		●	VP15TF	170 (130 – 210)	150 (110 – 190)	—
		✘	MC5020	150 (110 – 190)	130 (90 – 170)	110 (70 – 150)
		✘	VP15TF	150 (110 – 190)	130 (90 – 170)	110 (70 – 150)
		●	VP15TF	50 (30 – 70)	—	—
H Hardened steel	40 – 55HRC	●	MP6120	40 (30 – 70)	—	—

WWX200/400

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED/WET CUTTING

Material	Properties	Cutting conditions	Grade	Vc				
				ae ≤ 0.5 DC	ae ≤ 0.8 DC	ae = DC		
P Mild steel	≤180HB	●	MV1020	220 (210 – 230)	190 (180 – 210)	180 (160 – 190)		
		●	MP6120	150 (140 – 160)	130 (120 – 140)	120 (110 – 130)		
		●	MV1030	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)		
		●	MV1020	210 (200 – 220)	180 (170 – 200)	170 (150 – 180)		
		●	MV1030	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)		
		●	MP6130	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)		
		✘	MP6130	120 (110 – 130)	100 (90 – 110)	90 (80 – 100)		
		✘	VP15TF	120 (110 – 130)	100 (90 – 110)	90 (80 – 100)		
		Carbon steel Alloy steel	180 – 280HB	●	MV1020	200 (190 – 210)	170 (160 – 190)	160 (150 – 170)
				●	MP6120	150 (140 – 160)	130 (120 – 140)	120 (110 – 130)
				●	MV1030	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)
				●	MV1020	190 (180 – 200)	160 (150 – 180)	150 (140 – 160)
				●	MV1030	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)
				●	MP6130	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)
✘	MP6130			120 (110 – 130)	100 (90 – 110)	90 (80 – 100)		
✘	VP15TF			120 (110 – 130)	100 (90 – 110)	90 (80 – 100)		
Carbon steel Alloy steel Alloy tool steel	280 – 350HB ≤350HB	●	MP6120	140 (130 – 150)	120 (110 – 130)	110 (100 – 120)		
		●	MP6130	130 (120 – 140)	110 (100 – 120)	100 (90 – 110)		
		✘	MP6130	110 (100 – 120)	90 (80 – 100)	80 (70 – 90)		
		✘	VP15TF	110 (100 – 120)	90 (80 – 100)	80 (70 – 90)		
Pre-hardened steel	35 – 45HRC	●	MP6120	110 (100 – 120)	–	–		
		●	MP6130	100 (90 – 110)	–	–		
		✘	MP6130	80 (70 – 90)	–	–		
		✘	VP15TF	80 (70 – 90)	–	–		
M Austenitic stainless steel	≤200HB	●	MP7130	130 (120 – 140)	110 (100 – 120)	–		
		●	MP7130	120 (110 – 130)	100 (90 – 110)	–		
		●	VP15TF	120 (110 – 130)	100 (90 – 110)	–		
		✘	MP7130	100 (90 – 110)	80 (70 – 90)	–		
		✘	VP15TF	100 (90 – 110)	80 (70 – 90)	–		
		>200HB	●	MP7130	130 (120 – 140)	110 (100 – 120)	–	
			●	MP7130	120 (110 – 130)	100 (90 – 110)	–	
			●	VP15TF	120 (110 – 130)	100 (90 – 110)	–	
	✘		MP7130	100 (90 – 110)	80 (70 – 90)	–		
	✘		VP15TF	100 (90 – 110)	80 (70 – 90)	–		
	Ferritic and martensitic Stainless steel		≤200HB	●	MP7130	130 (120 – 140)	110 (100 – 120)	–
		●		MP7130	120 (110 – 130)	100 (90 – 110)	–	
		●		VP15TF	120 (110 – 130)	100 (90 – 110)	–	
		✘		MP7130	100 (90 – 110)	80 (70 – 90)	–	
✘		VP15TF		100 (90 – 110)	80 (70 – 90)	–		

WWX200/400 – CUTTING SPEED/WET CUTTING

Material	Properties	Cutting conditions	Grade	Vc		
				ae ≤ 0.5 DC	ae ≤ 0.8 DC	ae = DC
Duplex stainless steel	≤280HB	●	MP7130	120 (110 – 130)	100 (90 – 110)	—
		●	MP7130	110 (100 – 120)	90 (80 – 100)	—
		●	VP15TF	110 (100 – 120)	90 (80 – 100)	—
		✘	MP7130	90 (80 – 100)	70 (60 – 80)	—
		✘	VP15TF	90 (80 – 100)	70 (60 – 80)	—
Precipitation hardening Stainless steel	<450HB	●	MP7130	120 (110 – 130)	—	—
		●	MP7130	110 (100 – 120)	—	—
		●	VP15TF	110 (100 – 120)	—	—
		✘	MP7130	90 (80 – 100)	—	—
		✘	VP15TF	90 (80 – 100)	—	—
Gray cast iron		●	MC5020	170 (150 – 190)	150 (130 – 170)	130 (110 – 150)
		●	MC5020	160 (140 – 180)	140 (120 – 160)	120 (100 – 140)
		●	VP15TF	160 (140 – 180)	140 (120 – 160)	—
		✘	MC5020	140 (120 – 160)	120 (100 – 140)	100 (80 – 120)
		✘	VP15TF	140 (120 – 160)	120 (100 – 140)	100 (80 – 120)
Ductile cast iron	≤450MPa	●	MV1020	200 (180 – 240)	180 (150 – 220)	150 (130 – 200)
		●	MC5020	170 (150 – 190)	150 (130 – 170)	130 (110 – 150)
		●	MV1030	160 (140 – 180)	140 (120 – 160)	120 (100 – 140)
		●	MV1020	190 (170 – 230)	170 (140 – 210)	140 (120 – 190)
		●	MV1030	160 (140 – 180)	140 (120 – 160)	120 (100 – 140)
		●	MC5020	160 (140 – 180)	140 (120 – 160)	120 (100 – 140)
		●	VP15TF	160 (140 – 180)	140 (120 – 160)	—
		✘	MC5020	140 (120 – 160)	120 (100 – 140)	100 (80 – 120)
Ductile cast iron	≤800MPa	●	MV1020	180 (170 – 210)	160 (150 – 190)	140 (120 – 160)
		●	MC5020	160 (150 – 170)	140 (130 – 150)	120 (110 – 130)
		●	MV1030	150 (140 – 160)	130 (120 – 140)	110 (100 – 120)
		●	MV1020	170 (160 – 200)	150 (140 – 180)	120 (110 – 150)
		●	MV1030	150 (140 – 160)	130 (120 – 140)	110 (100 – 120)
		●	MC5020	150 (140 – 160)	130 (120 – 140)	110 (100 – 120)
		●	VP15TF	150 (140 – 160)	130 (120 – 140)	—
		✘	MC5020	130 (120 – 140)	110 (100 – 120)	90 (80 – 100)
Aluminium alloy	Si<5%	●	TF15	500 (300 – 900)	500 (300 – 900)	500 (300 – 900)
		●	TF15	500 (300 – 900)	500 (300 – 900)	500 (300 – 900)
		✘	TF15	400 (200 – 800)	400 (200 – 800)	400 (200 – 800)
Titanium alloy	—	●	MP9120	80 (60 – 100)	—	—
		●	MP9120	70 (50 – 90)	—	—
		✘	MP9130	60 (40 – 80)	—	—
Heat resistant alloy	—	●	MP9120	60 (50 – 70)	—	—
		●	MP9120	50 (30 – 60)	—	—
		✘	MP9130	40 (20 – 40)	—	—
Hardened steel	40 – 55HRC	●	VP15TF	50 (30 – 70)	—	—
		●	MP6120	40 (30 – 70)	—	—

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1. To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
2. When large vibration occurs, reduce the cutting conditions.
3. For interrupted cutting, reduce the cutting speed and feed rate by 20 %.

WWX200

RECOMMENDED CUTTING CONDITIONS

DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting conditions	Coolant	Grade	ae ≤ 0.5 DC		ae ≤ 0.8 DC		ae = DC				
					ap	fz	ap	fz	ap	fz			
Mild steel	≤180HB	●	✗	MV1020	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MP6120	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MV1020	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MP6130	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MV1020	R	≤ 3.0	0.16 [0.10-0.20]	R	≤ 3.0	0.16 [0.10-0.20]	—	—	—
		●	✗	MP6130	R	≤ 3.0	0.16 [0.10-0.20]	R	≤ 3.0	0.16 [0.10-0.20]	—	—	—
		✚	✗	MP6130	R	≤ 3.0	0.13 [0.10-0.15]	R	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		✚	✗	VP15TF	R	≤ 3.0	0.13 [0.10-0.15]	R	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
Carbon steel Alloy steel Alloy tool steel	180 – 280HB	●	✗	MV1020	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MP6120	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MV1020	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MP6130	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MV1020	R	≤ 3.0	0.16 [0.10-0.20]	R	≤ 3.0	0.16 [0.10-0.20]	—	—	—
		●	✗	MP6130	R	≤ 3.0	0.16 [0.10-0.20]	R	≤ 3.0	0.16 [0.10-0.20]	—	—	—
		✚	✗	MP6130	R	≤ 3.0	0.13 [0.10-0.15]	R	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		✚	✗	VP15TF	R	≤ 3.0	0.13 [0.10-0.15]	R	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
Carbon steel Alloy steel Alloy tool steel	280 – 350HB ≤350HB	●	✗	MV1020	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MP6120	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MV1020	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MP6130	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		●	✗	MV1020	R	≤ 3.0	0.16 [0.10-0.20]	R	≤ 3.0	0.16 [0.10-0.20]	—	—	—
		●	✗	MP6130	R	≤ 3.0	0.16 [0.10-0.20]	R	≤ 3.0	0.16 [0.10-0.20]	—	—	—
		✚	✗	MP6130	R	≤ 3.0	0.13 [0.10-0.15]	R	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
		✚	✗	VP15TF	R	≤ 3.0	0.13 [0.10-0.15]	R	≤ 3.0	0.13 [0.10-0.15]	M	≤ 2.0	0.13 [0.10-0.15]
Pre-hardened steel	35 – 45HRC	●	✗	MP6120	M	≤ 2.0	0.13 [0.10-0.15]	—	—	—	—	—	—
		●	✗	MP6130	M	≤ 2.0	0.13 [0.10-0.15]	—	—	—	—	—	—
		●	✗	MP6130	R	≤ 2.0	0.16 [0.10-0.20]	—	—	—	—	—	—
		✚	✗	MP6130	R	≤ 2.0	0.13 [0.10-0.15]	—	—	—	—	—	—
		✚	✗	VP15TF	R	≤ 2.0	0.13 [0.10-0.15]	—	—	—	—	—	—

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WWX200 – DEPTH OF CUT/FEED PER TOOTH

Material	Properties	Cutting conditions	Coolant	Grade	ae ≤ 0.5 DC		ae ≤ 0.8 DC		ae = DC							
					ap	fz	ap	fz	ap	fz						
M	Austenitic stainless steel	≤200HB		MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				VP15TF	M	≤ 3.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—			
				MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				VP15TF	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
		>200HB		MP7130	M	≤ 2.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				MP7130	M	≤ 2.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				VP15TF	M	≤ 3.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—			
	Ferritic and martensitic Stainless steel	≤200HB		MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				VP15TF	M	≤ 3.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—			
				MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				VP15TF	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
				Duplex stainless steel	≤280HB		MP7130	M	≤ 2.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
							MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
VP15TF	M	≤ 2.0	0.16 [0.10–0.20]				M	≤ 3.0	0.16 [0.10–0.20]	—	—	—				
VP15TF	M	≤ 3.0	0.16 [0.10–0.20]				M	≤ 3.0	0.16 [0.10–0.20]	—	—	—				
MP7130	M	≤ 2.0	0.13 [0.10–0.15]				M	≤ 3.0	0.16 [0.10–0.20]	—	—	—				
VP15TF	M	≤ 2.0	0.13 [0.10–0.15]				M	≤ 3.0	0.16 [0.10–0.20]	—	—	—				
Precipitation Hardening stainless steel	<450HB		MP7130	M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—				
			VP15TF	M	≤ 2.0	0.16 [0.10–0.20]	—	—	—	—	—	—				
			MP7130	M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—				
			VP15TF	M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—				
K	Gray cast iron	≤350MPa		MC5020	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 2.0	0.13 [0.10–0.15]			
				VP15TF	R	≤ 3.0	0.16 [0.10–0.20]	R	≤ 3.0	0.16 [0.10–0.20]	—	—	—			
				MC5020	R	≤ 3.0	0.13 [0.10–0.15]	R	≤ 3.0	0.13 [0.10–0.15]	R	≤ 2.0	0.13 [0.10–0.15]			
				VP15TF	R	≤ 3.0	0.13 [0.10–0.15]	R	≤ 3.0	0.13 [0.10–0.15]	R	≤ 2.0	0.13 [0.10–0.15]			
	Ductile cast iron	≤800MPa		MV1020	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 2.0	0.13 [0.10–0.15]			
				MC5020	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 2.0	0.13 [0.10–0.15]			
				MV1020	R	≤ 3.0	0.16 [0.10–0.20]	R	≤ 3.0	0.16 [0.10–0.20]	—	—	—			
				VP15TF	R	≤ 3.0	0.16 [0.10–0.20]	R	≤ 3.0	0.16 [0.10–0.20]	—	—	—			
N	Aluminium alloy	Si<5%		TF15	L	≤ 2.0	0.13 [0.10–0.15]	L	≤ 2.0	0.13 [0.10–0.15]	L	≤ 2.0	0.13 [0.10–0.15]			
				TF15	L	≤ 3.0	0.13 [0.10–0.15]	L	≤ 3.0	0.13 [0.10–0.15]	—	—	—			
S	Titanium alloy	—		MP9120	M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—				
				MP9130	M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—				
	Heat resistant alloy	—		MP9120	M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—				
				MP9130	M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—				
H	Hardened steel	40 – 55HRC		VP15TF	M	≤ 2.0	0.05 [0.05–0.10]	—	—	—	—	—				
				VP15TF	R	≤ 2.0	0.05 [0.05–0.10]	—	—	—	—	—				
				MP6120	R	≤ 2.0	0.05 [0.05–0.10]	—	—	—	—	—				

WWX400

RECOMMENDED CUTTING CONDITIONS

DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting conditions	Coolant	Grade	ae ≤ 0.5 DC		ae ≤ 0.8 DC		ae = DC		
					ap	fz	ap	fz	ap	fz	
Mild steel	≤180HB	●	✗	MV1020	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1030	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MP6120	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1020	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1030	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MP6130	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1020	M,R	≤ 4.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		●	✗	MV1030	M,R	≤ 4.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		●	✗	MP6130	M,R	≤ 4.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		✚	✗	MP6130	M,R	≤ 4.0 0.13 [0.10-0.15]	M,R	≤ 3.0 0.13 [0.10-0.15]	M	≤ 2.0 0.13 [0.10-0.15]	
✚	✗	VP15TF	M,R	≤ 4.0 0.13 [0.10-0.15]	M,R	≤ 3.0 0.13 [0.10-0.15]	M	≤ 2.0 0.13 [0.10-0.15]			
Carbon steel Alloy steel Alloy tool steel	180 – 280HB	●	✗	MV1020	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1030	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MP6120	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1020	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1030	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MP6130	L,M	≤ 4.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1020	M,R	≤ 4.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		●	✗	MV1030	M,R	≤ 4.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		●	✗	MP6130	M,R	≤ 4.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		✚	✗	MP6130	M,R	≤ 4.0 0.13 [0.10-0.15]	M,R	≤ 3.0 0.13 [0.10-0.15]	M	≤ 2.0 0.13 [0.10-0.15]	
✚	✗	VP15TF	M,R	≤ 4.0 0.13 [0.10-0.15]	M,R	≤ 3.0 0.13 [0.10-0.15]	M	≤ 2.0 0.13 [0.10-0.15]			
Carbon steel Alloy steel Alloy tool steel	280 – 350HB ≤350HB	●	✗	MV1020	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	
		●	✗	MV1030	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	
		●	✗	MP6120	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	
		●	✗	MV1020	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1030	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MP6130	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 3.0 0.13 [0.10-0.15]	L,M	≤ 2.0 0.13 [0.10-0.15]	
		●	✗	MV1020	M,R	≤ 3.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		●	✗	MV1030	M,R	≤ 3.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		●	✗	MP6130	M,R	≤ 3.0 0.16 [0.10-0.20]	M,R	≤ 3.0 0.16 [0.10-0.20]	—	—	—
		✚	✗	MP6130	M,R	≤ 3.0 0.13 [0.10-0.15]	M,R	≤ 3.0 0.13 [0.10-0.15]	M	≤ 2.0 0.13 [0.10-0.15]	
✚	✗	VP15TF	M,R	≤ 3.0 0.13 [0.10-0.15]	M,R	≤ 3.0 0.13 [0.10-0.15]	M	≤ 2.0 0.13 [0.10-0.15]			
Pre-hardened steel	35 – 45HRC	●	✗	MP6120	L,M	≤ 2.0 0.13 [0.10-0.15]	—	—	—	—	
		●	✗	MP6130	L,M	≤ 2.0 0.13 [0.10-0.15]	—	—	—	—	
		●	✗	MP6130	M,R	≤ 2.0 0.16 [0.10-0.20]	—	—	—	—	
		✚	✗	MP6130	M,R	≤ 2.0 0.13 [0.10-0.15]	—	—	—	—	
		✚	✗	VP15TF	M,R	≤ 2.0 0.13 [0.10-0.15]	—	—	—	—	

WWX400 – DEPTH OF CUT/FEED PER TOOTH

Material	Properties	Cutting conditions	Coolant	Grade	ae ≤ 0.5 DC			ae ≤ 0.8 DC			ae = DC		
						ap	fz		ap	fz		ap	fz
M	Austenitic stainless steel	≤200HB		MV1030	L,M	≤ 2.0	0.13 [0.10–0.15]	L,M	≤ 2.0	0.13 [0.10–0.15]	—	—	—
				MP7130	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
				VP15TF	M	≤ 4.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—
				MP7130	M	≤ 4.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
				VP15TF	M	≤ 4.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
				MP7130	M	≤ 4.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
	Ferritic and martensitic Stainless steel	≤200HB		MV1030	L,M	≤ 2.0	0.13 [0.10–0.15]	L,M	≤ 2.0	0.13 [0.10–0.15]	—	—	—
				MP7130	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
				VP15TF	M	≤ 4.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—
				MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
				VP15TF	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
				MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—
Duplex stainless steel	≤280HB		MP7130	L,M	≤ 3.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	—	—	—	
			MP7130	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	—	—	—	
			VP15TF	M	≤ 3.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—	
			VP15TF	M	≤ 4.0	0.16 [0.10–0.20]	M	≤ 3.0	0.16 [0.10–0.20]	—	—	—	
			MP7130	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—	
			VP15TF	M	≤ 3.0	0.13 [0.10–0.15]	M	≤ 3.0	0.13 [0.10–0.15]	—	—	—	
Precipitation Hardening stainless steel	<450HB		MP7130	L,M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—	
			MP7130	L,M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—	
			VP15TF	M	≤ 2.0	0.16 [0.10–0.20]	—	—	—	—	—	—	
			MP7130	M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—	
			VP15TF	M	≤ 2.0	0.13 [0.10–0.15]	—	—	—	—	—	—	
K	Gray cast iron	≤350MPa		MC5020	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	L,M	≤ 2.0	0.13 [0.10–0.15]
				VP15TF	M,R	≤ 4.0	0.16 [0.10–0.20]	M,R	≤ 3.0	0.16 [0.10–0.20]	—	—	—
				MC5020	M,R	≤ 4.0	0.13 [0.10–0.15]	M,R	≤ 3.0	0.13 [0.10–0.15]	M,R	≤ 2.0	0.13 [0.10–0.15]
				VP15TF	M,R	≤ 4.0	0.13 [0.10–0.15]	M,R	≤ 3.0	0.13 [0.10–0.15]	M,R	≤ 2.0	0.13 [0.10–0.15]
	Ductile cast iron	≤800MPa		MV1020	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	L,M	≤ 2.0	0.13 [0.10–0.15]
				MV1030	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	L,M	≤ 2.0	0.13 [0.10–0.15]
				MC5020	L,M	≤ 4.0	0.13 [0.10–0.15]	L,M	≤ 3.0	0.13 [0.10–0.15]	L,M	≤ 2.0	0.13 [0.10–0.15]
				MV1020	M,R	≤ 4.0	0.16 [0.10–0.20]	M,R	≤ 3.0	0.16 [0.10–0.20]	—	—	—
N	Aluminium alloy	Si<5%		MP9120	L,M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—	
				MP9130	L,M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—	
				MP9120	L,M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—	
				MP9130	L,M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—	
S	Heat resistant alloy	—		MP9120	L,M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—	
				MP9130	L,M	≤ 2.0	0.10 [0.05–0.13]	—	—	—	—	—	
H	Hardened steel	40 – 55HRC		VP15TF	M	≤ 2.0	0.05 [0.05–0.10]	—	—	—	—	—	
				VP15TF	M,R	≤ 2.0	0.05 [0.05–0.10]	—	—	—	—	—	

1. To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
2. When large vibration occurs, reduce the cutting conditions.
3. For interrupted cutting, reduce the cutting speed and feed rate by 20 %.

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