
WWX400

A NEW LEVEL OF VERSATILITY



WWX400

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

- Arbor type: DC Ø 50 – 250 mm
- Shank type: DC Ø 50 – 80 mm
- Inserts with radii: 0.4 – 0.8
- 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

WWX400

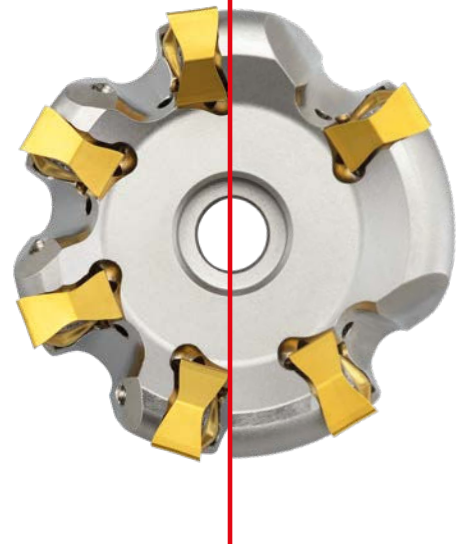
UNIQUE PROPERTIES

CHOICE AND AVAILABILITY

Diameters 50 – 250 mm 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 UP TO 8 MM

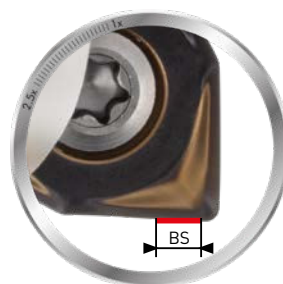
Clever positioning of the insert generates extremely low cutting resistance and helps to generate accurate 90° walls under all machining conditions.

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 1.3 – 1.7 mm, is used as a wiper geometry across all L, M and R chipbreakers.



WWX400

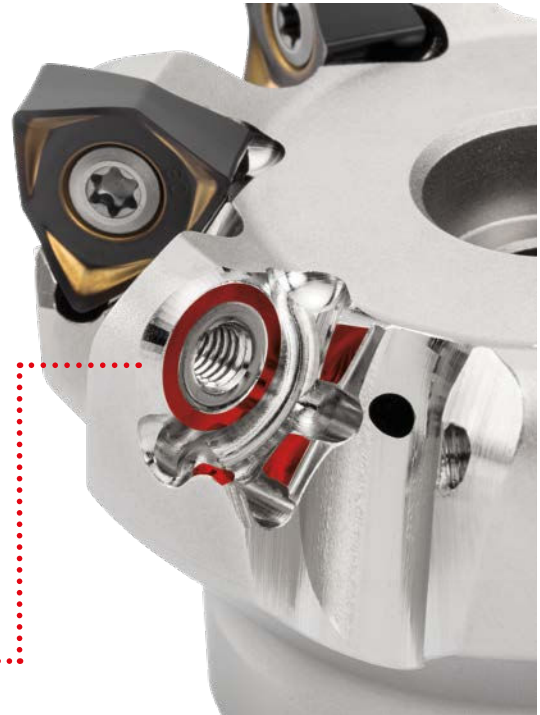
INSERTS

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, 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.

WWX400




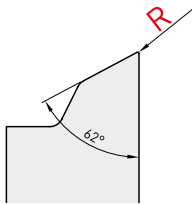

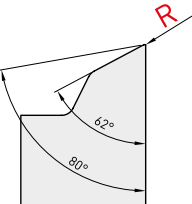

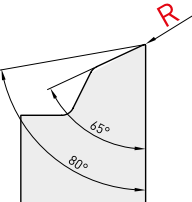
Conventional



WWX400

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.

 <p>L</p>		<p>L-BREAKER Recommended for machining that requires reduced cutting loads, or for machining HRSA materials.</p>
 <p>M</p>		<p>M-BREAKER Outstanding balance of cutting edge sharpness and stability. First choice all-rounder, suitable for a variety of materials and applications.</p>
 <p>R</p>		<p>R-BREAKER First recommendation for interrupted cutting conditions.</p>

GRADES FOR MACHINING A WIDE RANGE OF MATERIALS

P	M	K	N	S	H
P10	M10	K10	N10	S10	H10
P20	M20	K20	N20	S20	H20
P30	M30	K30	N30	S30	H30
P40	M40	K40	N40	S40	H40

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

NEW LEVEL OF VERSATILITY



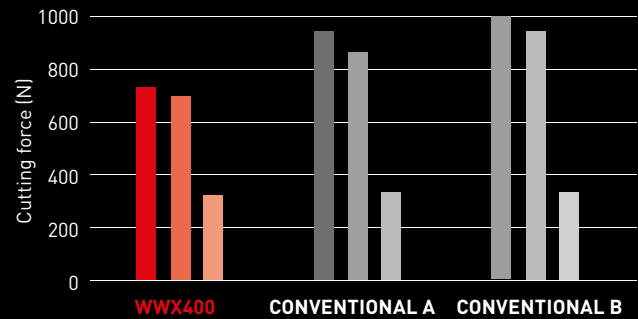
BENEFITS

- Inserts with the capability to machine up to $ap_{mx} = 8 \text{ mm}$
- 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

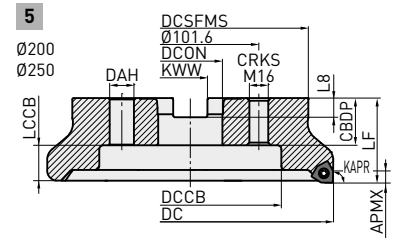
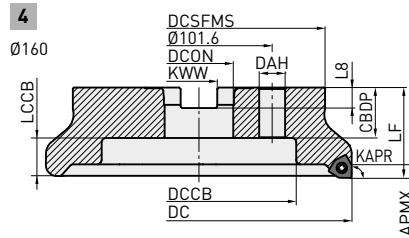
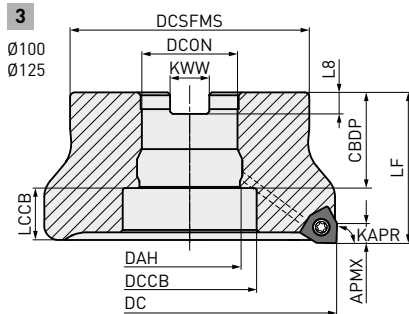
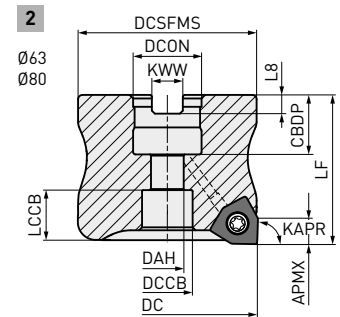
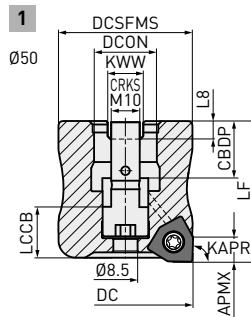


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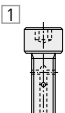
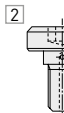


90° FACE MILLING CUTTER


P M K N S H



Right hand tool holder only.


DC	Set bolt	Geometry
Ø50, Ø63	HSC10030H	1 
Ø80	HSC12035H	
Ø100	MBA16033H	2 
Ø125	MBA20040H	
Ø160, Ø200, Ø250	—	

ARBOR TYPE

Order number	Stock	APMX	DC	DCON	GAMF	LF	RMPX	RPMX	WT	ZEPF		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

Order number	Stock	APMX	DC	DCON	GAMF	LF	RMPX	RPMX	WT	ZEFP		Type
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. 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

12-16 

MOUNTING DIMENSIONS

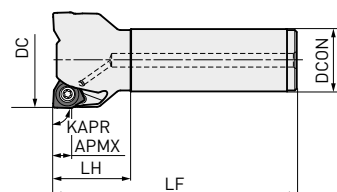
Order number	CBDP	DAH	DCCB	DCON	DCSFMS	KWW	LCCB	L8	Type
WWX400-050A03AR	20	—	—	22	47	10.4	12.2	6.3	1
WWX400-050A04AR	20	—	—	22	47	10.4	12.2	6.3	1
WWX400-063A03AR	20	11	17	22	50	10.4	11.2	6.3	2
WWX400-063A04AR	20	11	17	22	50	10.4	11.2	6.3	2
WWX400-063A05AR	20	11	17	22	50	10.4	11.2	6.3	2
WWX400-080A04AR	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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Right hand tool holder only.

SHANK TYPE

Order number	Stock	APMX	DC	DCON	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	○

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

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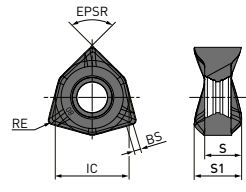
INSERTS

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

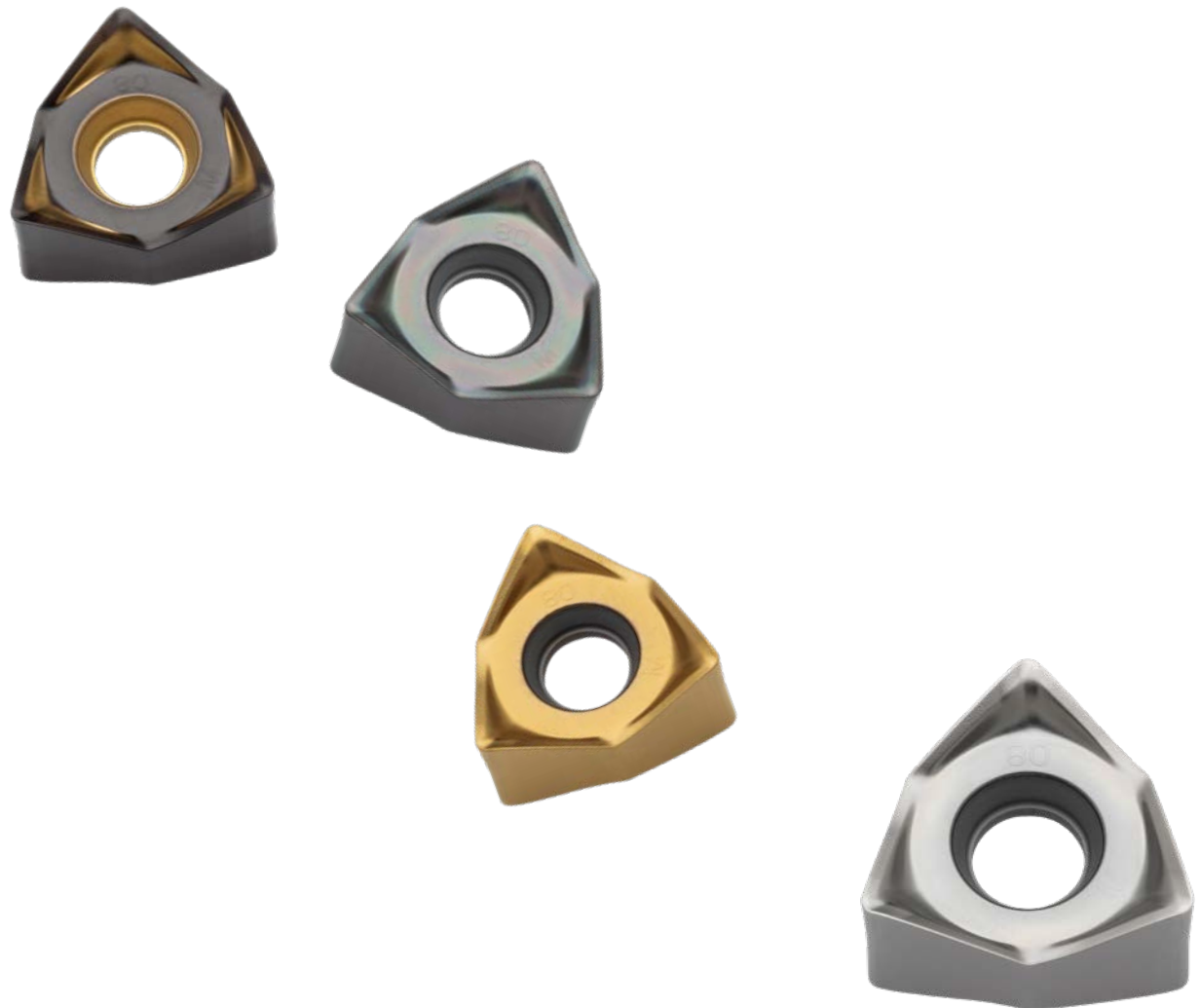
Cutting conditions :
 ●: Stable cutting ●: General cutting
 ✱: Unstable cutting

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	IC	S	S1	BS	RE	Geometry	
																Right hand insert only.	
6NGU1409040PNER-L	G	E	★	★	●	●	★	★		★	14	7	9	1.7	0.4		
6NGU1409040PNFR-L	G	F								●	14	7	9	1.7	0.4		
6NGU1409080PNER-L	G	E	●	●	●	●	●	●		★	14	7	9	1.3	0.8		
6NGU1409080PNFR-L	G	F								●	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		
6NMU1409080PNER-R	M	E	●	●		●	●	●		●	14	7	9	1.3	0.8		



[10 inserts in one case]



WWX400

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED / DRY CUTTING




Material	Properties	Cutting conditions	Grade	Vc		
				ae≥0.5 DC	ae≥0.8 DC	ae=DC
P	Mild steel	≤180HB	● MP6120	240 (200—280)	220 (180—260)	200 (160—240)
			● 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	● MP6120	210 (170—250)	190 (150—230)	170 (130—210)
			● 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)	—	—	
M	Austenitic stainless steel	≤200HB	● MP7130	180 (160—200)	160 (140—180)	—
			● MP7130	170 (150—190)	150 (130—170)	—
			● VP15TF	170 (150—190)	150 (130—170)	—
			✚ MP7130	150 (130—170)	130 (110—150)	—
		>200HB	✚ VP15TF	150 (130—170)	130 (110—150)	—
			● MP7130	170 (150—190)	150 (130—170)	—
			● MP7130	160 (140—180)	140 (120—160)	—
			● VP15TF	160 (140—180)	140 (120—160)	—
	Ferritic and martensitic Stainless steel	≤200HB	✚ MP7130	140 (120—160)	—	—
			● MP7130	180 (160—200)	160 (140—180)	—
			● MP7130	170 (150—190)	150 (130—170)	—
			● VP15TF	170 (150—190)	150 (130—170)	—
Duplex stainless steel	≤280HB	✚ MP7130	150 (130—170)	130 (110—150)	—	
		● MP7130	160 (140—180)	140 (120—160)	—	
		● 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)	—	
Precipitation hardening Stainless steel	<450HB	● MP7130	140 (120—160)	—	—	
		● MP7130	130 (110—150)	—	—	
		● VP15TF	130 (110—150)	—	—	
		✚ MP7130	110 (90—130)	—	—	
		✚ VP15TF	110 (90—130)	—	—	

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CUTTING SPEED/DRY CUTTING







Material	Properties	Cutting conditions	Grade	Vc		
				ae≥0.5 DC	ae≥0.8 DC	ae=DC
Gray cast iron	≤350MPa	●	MC5020	250 (210—290)	230 (190—270)	210 (170—250)
		●	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)
Ductile cast iron	≤450MPa	●	MC5020	220 (180—260)	200 (160—240)	180 (140—220)
		●	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)
Ductile cast iron	≤800MPa	●	MC5020	180 (140—220)	160 (120—200)	140 (100—180)
		●	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)
H Hardened steel	40 — 55HRC	●	VP15TF	50 (30— 70)	—	—
		●	VP15TF	50 (30— 70)	—	—

DEPTH OF CUT/FEED PER TOOTH

Material	Properties	Cutting conditions	Grade	ae≥0.5 DC		ae≥0.8 DC		ae=DC			
				 ap	fz	 ap	fz	 ap	fz		
Mild steel	≤180HB	●	MP6120 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		●	MP6130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		●	MP6130 M,R	≤ 4.0	0.16 [0.1—0.2]	M,R	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✚	MP6130 M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M	≤ 2.0	0.13 [0.1—0.15]
		✚	VP15TF M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M	≤ 2.0	0.13 [0.1—0.15]
Carbon steel Alloy steel Alloy tool steel	180 — 280HB	●	MP6120 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		●	MP6130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		●	MP6130 M,R	≤ 4.0	0.16 [0.1—0.2]	M,R	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✚	MP6130 M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M	≤ 2.0	0.13 [0.1—0.15]
		✚	VP15TF M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M	≤ 2.0	0.13 [0.1—0.15]
Carbon steel Alloy steel Alloy tool steel	280 — 350HB ≤350HB	●	MP6120 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]
		●	MP6130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		●	MP6130 M,R	≤ 3.0	0.16 [0.1—0.2]	M,R	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✚	MP6130 M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M	≤ 2.0	0.13 [0.1—0.15]
		✚	VP15TF M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M	≤ 2.0	0.13 [0.1—0.15]
Pre-hardened steel	35 — 45HRC	●	MP6120 L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—	—	—	—
		●	MP6130 L,M	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—
		●	MP6130 M,R	≤ 2.0	0.16 [0.1—0.2]	—	—	—	—	—	—
		✚	MP6130 M,R	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—
		✚	VP15TF M,R	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—

WWX400

DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting conditions	Grade	ae≥0.5 DC		ae≥0.8 DC		ae=DC			
				 ap	 fz	 ap	 fz	 ap	 fz		
Austenitic stainless steel	≤200HB	● ●	MP7130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		● ●	VP15TF M	≤ 4.0	0.16 [0.1—0.2]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	MP7130 M	≤ 4.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		✦	VP15TF M	≤ 4.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
	>200HB	● ●	MP7130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		● ●	MP7130 L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		● ●	VP15TF M	≤ 3.0	0.16 [0.1—0.2]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	MP7130 M	≤ 3.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
Ferritic and martensitic Stainless steel	≤200HB	● ●	MP7130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		● ●	VP15TF M	≤ 4.0	0.16 [0.1—0.2]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	MP7130 M	≤ 3.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		✦	VP15TF M	≤ 3.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
	>200HB	● ●	MP7130 L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		● ●	MP7130 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
Duplex stainless steel	≤280HB	● ●	VP15TF M	≤ 3.0	0.16 [0.1—0.2]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		● ●	VP15TF M	≤ 4.0	0.16 [0.1—0.2]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	MP7130 M	≤ 3.0	0.13 [0.1—0.15]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	VP15TF M	≤ 3.0	0.13 [0.1—0.15]	M	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	MP7130 M	≤ 4.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
		✦	VP15TF M	≤ 4.0	0.13 [0.1—0.15]	M	≤ 3.0	0.13 [0.1—0.15]	—	—	—
Precipitation Hardening stainless steel	<450HB	●	MP7130 L,M	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—
		●	MP7130 L,M	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—
		●	VP15TF M	≤ 2.0	0.16 [0.1—0.2]	—	—	—	—	—	—
		✦	MP7130 M	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—
		✦	VP15TF M	≤ 2.0	0.13 [0.1—0.15]	—	—	—	—	—	—
Gray cast iron	≤350MPa	● ●	MC5020 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		● ●	VP15TF M,R	≤ 4.0	0.16 [0.1—0.2]	M,R	≤ 3.0	0.16 [0.1—0.2]	—	—	—
		✦	MC5020 M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 2.0	0.13 [0.1—0.15]
		✦	VP15TF M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 2.0	0.13 [0.1—0.15]
	>350MPa	● ●	MC5020 L,M	≤ 4.0	0.13 [0.1—0.15]	L,M	≤ 3.0	0.13 [0.1—0.15]	L,M	≤ 2.0	0.13 [0.1—0.15]
		● ●	VP15TF M,R	≤ 4.0	0.16 [0.1—0.2]	M,R	≤ 3.0	0.16 [0.1—0.2]	—	—	—
Ductile cast iron	≤800MPa	✦	MC5020 M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 2.0	0.13 [0.1—0.15]
		✦	MC5020 M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 2.0	0.13 [0.1—0.15]
		✦	VP15TF M,R	≤ 4.0	0.13 [0.1—0.15]	M,R	≤ 3.0	0.13 [0.1—0.15]	M,R	≤ 2.0	0.13 [0.1—0.15]
Aluminium alloy	—	● ●	TF15 L	≤ 4.0	0.13 [0.1—0.15]	L	≤ 3.0	0.13 [0.1—0.15]	L	≤ 2.0	0.13 [0.1—0.15]
Titanium alloy	—	● ●	MP9120 L,M	≤ 2.0	0.1 [0.05—0.13]	—	—	—	—	—	—
		✦	MP9130 L,M	≤ 2.0	0.1 [0.05—0.13]	—	—	—	—	—	—
Heat resistant alloy	—	● ●	MP9120 L,M	≤ 2.0	0.1 [0.05—0.13]	—	—	—	—	—	—
		✦	MP9130 L,M	≤ 2.0	0.1 [0.05—0.13]	—	—	—	—	—	—
Hardened steel	40 — 55HRC	●	VP15TF M	≤ 2.0	0.05 [0.05—0.1]	—	—	—	—	—	—
		●	VP15TF M,R	≤ 2.0	0.05 [0.05—0.1]	—	—	—	—	—	—

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 %.

WWX400

CUTTING SPEED/WET CUTTING

Material	Properties	Cutting conditions	Grade	Vc		
				ae≥0.5 DC	ae≥0.8 DC	ae=DC
P	Mild steel	≤180HB	● MP6120	150 (140—160)	130 (120—140)	120 (110—130)
			● 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	● MP6120	150 (140—160)	130 (120—140)	120 (110—130)
			● 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)	—
		>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)	—
	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)	—
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)	—	—	

WWX400

CUTTING SPEED/WET CUTTING

Material	Properties	Cutting conditions	Grade	Vc		
				ae≥0.5 DC	ae≥0.8 DC	ae=DC
K	Gray cast iron	≤350MPa	● 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)
			● MC5020	170 (150—190)	150 (130—170)	130 (110—150)
K	Ductile cast iron	≤450MPa	● 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)
			● MC5020	160 (150—170)	140 (130—150)	120 (110—130)
			● MC5020	150 (140—160)	130 (120—140)	110 (100—120)
K	Ductile cast iron	≤800MPa	● VP15TF	150 (140—160)	130 (120—140)	—
			✘ MC5020	130 (120—140)	110 (100—120)	90 (80—100)
			✘ VP15TF	130 (120—140)	110 (100—120)	90 (80—100)
			● 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)
S	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)	—	—
H	Hardened steel	40 — 55HRC	● VP15TF	50 (30— 70)	—	—
			● VP15TF	50 (30— 70)	—	—

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