

WSX445

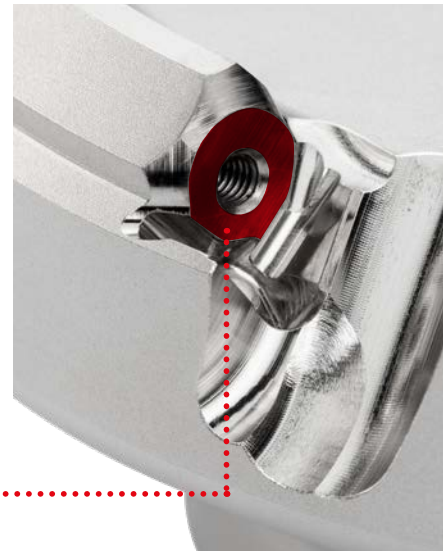
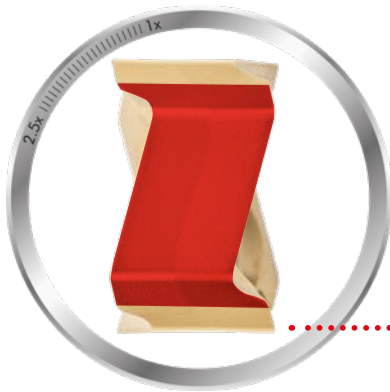
NEW GENERATION OF LOW RESISTANCE MILLING
CUTTERS WITH HIGH PERFORMANCE, DOUBLE-SIDED
INSERTS FOR EFFICIENCY AND ECONOMY



DOUBLE-Z GEOMETRY

LOW CUTTING RESISTANCE AND HIGH WEAR RESISTANCE
FOR RELIABILITY, EFFICIENT CHIP EVACUATION

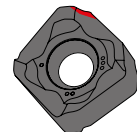
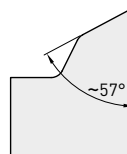
Double sided Z geometry inserts feature sharp cutting edges for low cutting resistance by combining features of conventional positive and negative rake inserts.



CHIPBREAKER SERIES FOR VARIED DEPTHS OF CUT AND FEEDS

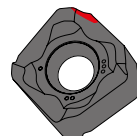
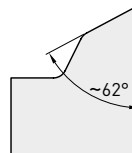
L-BREAKER

Boosts performance with high rake angle.
Positive land retains strength and provides low cutting resistance.



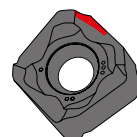
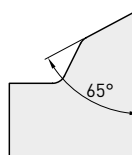
M-BREAKER

Recommended for general applications.
Balance of cutting edge strength and sharpness with optimized positive land and rake angle.



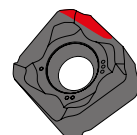
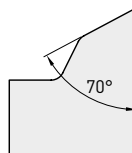
R-BREAKER

For unstable applications.
Enhanced cutting edge strength but retains sharpness with negative land and positive rake angle.



H-BREAKER

For demanding applications.
A stronger land and reduced positive rake angle provides maximum edge strength.



WSX445

INSERT GRADES FOR A WIDE RANGE OF APPLICATIONS

P	CVD	PVD	M	CVD	PVD	K	CVD	PVD	S	PVD	H	PVD
P10	MV1020	MP6120	VP15TF	M10		K10	MC5020		S10	MP9120	H10	
P20	MV1030	MP6130	M20	MV1030	MX3030	K20	MV1020	XC5010	S20	MP9130	H20	VP15TF
P30			M30		MP7130	K30	MV1030		S30		H30	
P40			M40		MP7140	K40		VP20RT	S40		H40	

1. Dry cutting is recommended for machining stainless steel with MV1030.

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 stable milling of stainless steel.

MP7140

For unstable milling of stainless steel.

MC5020

For general milling of cast iron.

MP9120

For general milling of HRSA and titanium alloy.

MP9130

For interrupted general milling of HRSA and titanium alloy.

MX3030

For finishing.

TF15

For general milling of aluminium.

VP15TF

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

VP20RT

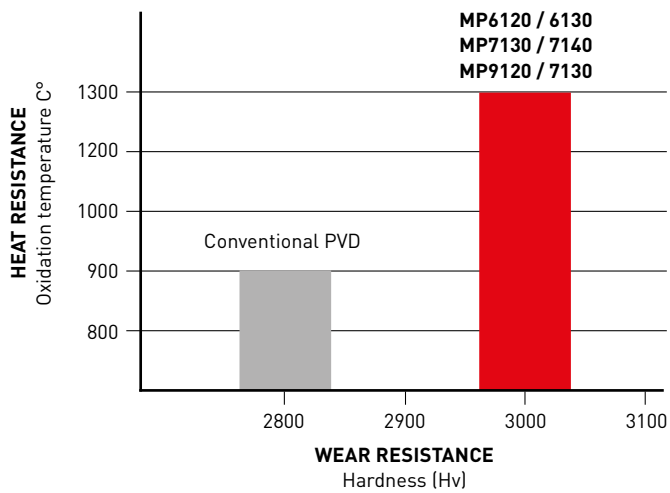
Ideal for heavy interrupted cutting of stainless and general steels because of the excellent fracture resistance properties.

WSX445

COEFFICIENT OF FRICTION

Material	Grade	Coefficient of friction (Measured at 600 degrees)		
		C55	X10CrNi18-9	Ti6Al4V
P Carbon steel, Alloy steel	MP6100	0.4		
M Stainless steel	MP7100		0.5	
S Titanium alloy, Heat resistant alloy	MP9100		0.7	0.3
Conventional		0.7		0.7

TOUGH-Σ



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.

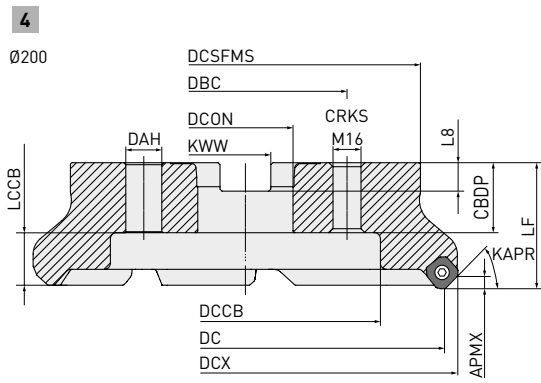
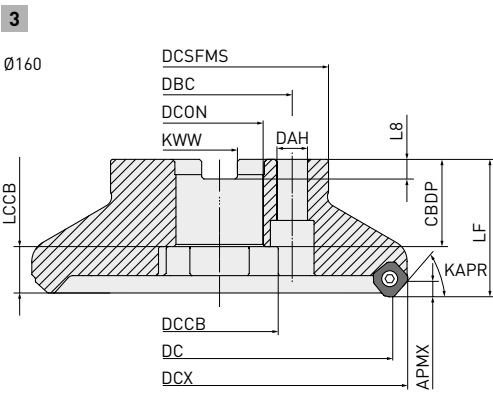
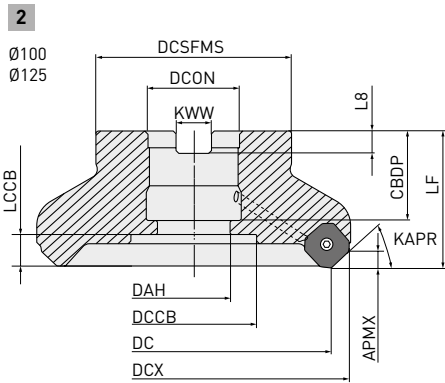
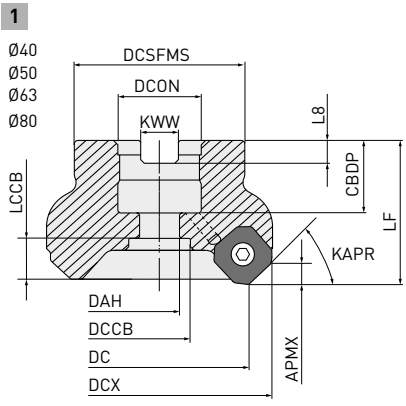
WSX445



P M K N S H



C H: 45°
A.R: +17° T: -7° - -2°
R.R: -6° - +1° I: +16° - +19°



Tool holder type	Set bolt		Geometry
WSX445-040A [] AR	HSC08025H	HSC08040	1
WSX445-050A [] AR	HSC10030H	HSC10035	
WSX445-063A [] AR	HSC10030H	HSC10035	
WSX445-080A [] AR/L	HSC12035H	HSC12035 HSC12045	
WSX445-200C [] NR	◇	—	2
WSX445-100B [] AR/L	MBA16033H	—	
WSX445-125B [] AR/L	MBA20040H	—	
WSX445-160C [] NR/L	◇	—	

1. ◇ Holder without coolant hole.

ARBOR TYPE

Order number	Stock Hand		DC	DCON	LF	WT	ZEFP		Type
	R	L							
NORMAL PITCH									
WSX445-040A03AR	●		40	16	40	0.3	3	○	1
WSX445-050A03AR	●		50	22	40	0.5	3	○	1
WSX445-063A04AR	●		63	22	40	0.6	4	○	1
WSX445-080A04AR/L	●	★	80	27	50	1.3	4	○	1
WSX445-100B05AR/L	●	★	100	32	50	1.8	5	○	2
WSX445-125B06AR/L	●	★	125	40	63	3.2	6	○	2
WSX445-160C07NR/L	●	★	160	40	63	4.9	7	—	3
WSX445-200C08NR	●		200	60	63	8.7	8	—	4
1/2									

WSX445 – ARBOR TYPE

Order number	Stock Hand		DC	DCON	LF	WT	ZEFP		Type
	R	L							
FINE PITCH									
WSX445-040A04AR	●		40	16	40	0.3	4	○	1
WSX445-050A04AR	●		50	22	40	0.4	4	○	1
WSX445-063A05AR	●		63	22	40	0.6	5	○	1
WSX445-080A06AR	●		80	27	50	1.2	6	○	1
WSX445-100B07AR	●		100	32	50	1.7	7	○	2
WSX445-125B08AR	●		125	40	63	3.1	8	○	2
WSX445-160C10NR	●		160	40	63	4.8	10	—	3
WSX445-200C12NR	●		200	60	63	8.6	12	—	4
EXTRA FINE PITCH									
WSX445-050A05AR	●		50	22	40	0.4	5	○	1
WSX445-063A06AR	●		63	22	40	0.6	6	○	1
WSX445-080A08AR	●		80	27	50	1.1	8	○	1
WSX445-100B10AR	●		100	32	50	1.6	10	○	2
WSX445-125B12AR	●		125	40	63	3.0	12	○	2
WSX445-160C16NR	●		160	40	63	4.6	16	—	3
WSX445-200C20NR	●		200	60	63	8.4	20	—	4
									2/2

1. ○ = With through coolant holes



MOUNTING DIMENSIONS

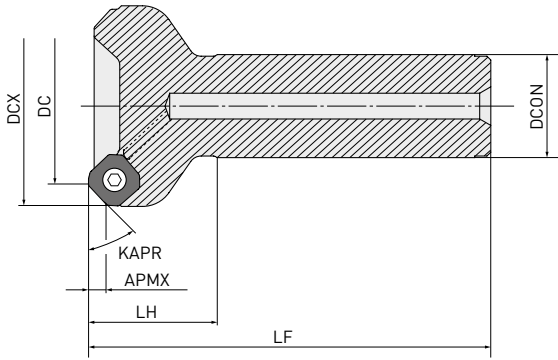
Order number	CBDP	DAH	DCCB	DCSFMS	DCX	KWW	LCCB	L8	Type
NORMAL PITCH									
WSX445-040A03AR	18	9	14	37	52.8	8.4	13.3	5.6	1
WSX445-050A03AR	20	11	17	47	62.9	10.4	11.3	6.3	1
WSX445-063A04AR	20	11	17	50	75.9	10.4	11.3	6.3	1
WSX445-080A04AR / L	23	13	20	56	92.9	12.4	14.3	7	1
WSX445-100B05AR / L	26	26	45	78	112.9	14.4	16.3	8	2
WSX445-125B06AR / L	28	30	56	89	137.9	16.4	21.3	9	2
WSX445-160C07NR / L	40	56	56	100	172.9	16.4	21.3	9	3
WSX445-200C08NR	32	135	135	160	212.9	25.7	29.3	14.22	4
FINE PITCH									
WSX445-040A04AR	18	9	14	37	52.8	8.4	13.3	5.6	1
WSX445-050A04AR	20	11	17	47	62.9	10.4	11.3	6.3	1
WSX445-063A05AR	20	11	17	50	75.9	10.4	11.3	6.3	1
WSX445-080A06AR	23	13	20	56	92.9	12.4	14.3	7	1
WSX445-100B07AR	26	26	45	78	112.9	14.4	16.3	8	2
WSX445-125B08AR	28	30	56	89	137.9	16.4	21.3	9	2
WSX445-160C10NR	40	56	56	100	172.9	16.4	21.3	9	3
WSX445-200C12NR	32	135	135	160	212.9	25.7	29.3	14.22	4
EXTRA FINE PITCH									
WSX445-050A05AR	20	11	17	47	62.9	10.4	11.3	6.3	1
WSX445-063A06AR	20	11	17	50	75.9	10.4	11.3	6.3	1
WSX445-080A08AR	23	13	20	56	92.9	12.4	14.3	7	1
WSX445-100B10AR	26	26	45	78	112.9	14.4	16.3	8	2
WSX445-125B12AR	28	30	56	89	137.9	16.4	21.3	9	2
WSX445-160C16NR	40	56	56	100	172.8	16.4	21.3	9	3
WSX445-200C20NR	32	135	135	160	212.8	25.7	29.3	14.22	4
									1/1

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

WSX445



P M K N S H



SHANK TYPE

Right hand tool holder only.

Order number	Stock	APMX	DC	DCON	DCX	LF	LH	WT	ZEFP	
NORMAL PITCH										
WSX445R-4003SA32M	★	≤ 5	40	32	52.8	125	40	0.8	3	○
WSX445R-5003SA32M	★	≤ 5	50	32	62.9	125	40	1.0	3	○
WSX445R-6304SA32M	★	≤ 5	63	32	75.9	125	40	1.2	4	○
WSX445R-8004SA32M	★	≤ 5	80	32	92.9	125	40	1.6	4	○
FINE PITCH										
WSX445R-4004SA32M	★	≤ 5	40	32	52.8	125	40	0.8	4	○
WSX445R-5004SA32M	★	≤ 5	50	32	62.9	125	40	1.0	4	○
WSX445R-6305SA32M	★	≤ 5	63	32	75.9	125	40	1.2	5	○
WSX445R-8006SA32M	★	≤ 5	80	32	92.9	125	40	1.5	6	○
										1/1

1. ○ = With through coolant holes

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SPARE PARTS

Tool holder type	*	
Arbor Type	Clamp screw	Wrench (Insert)
Shank Type	TPS4R	TIP15W

* Clamp Torque (N•m): TPS4R=3.5

INSERTS

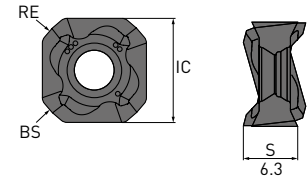
DOUBLE SIDED Z-GEOMETRY 8 CUTTING EDGES

P	Steel		●	✱				●	●	●	●	●	
M	Stainless steel			●	✱			●	●	●	●	●	
K	Cast iron	●						●	●	●	●	●	
N	Aluminium											●	
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	MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	NEW MV1020	NEW MV1030	VP15TF	MX3030	VP20RT	TF15	IC	S	BS	RE	Geometry Right hand insert shown.
SNGU140812ANFL-L*	G	F													★	14	8.4	1.5	1.2	
SNGU140812ANEL-L*	G	E	★	★	★							★	★			14	8.4	1.5	1.2	
SNGU140812ANER-M	G	E	●	●	●	●	●	●	●	●	●	★	●	★		14	8.4	1.5	1.2	
SNMU140812ANER-M	M	E	●	●	●	●	●	●	●	●	●	★	●	★		14	8.4	1.5	1.2	
SNMU140812ANER-R	M	E	●	●	●					●	●	★		★		14	8.4	1.5	1.2	
SNMU140812ANER-H	M	E	●	●	●					●	●	★		★		14	8.4	1.5	1.2	
SNGU140812ANEL-M*	G	E	★	★	★							★	★			14	8.4	1.5	1.2	
SNMU140812ANEL-M*	M	E	★	★	★							★	★			14	8.4	1.5	1.2	
SNMU140812ANEL-R*	M	E	★	★	★							★				14	8.4	1.5	1.2	
SNGU140812ANFR-L	G	F													●	14	8.4	1.5	1.2	
SNGU140812ANER-L	G	E	●	●	●	●	●	●	●	●	●	★	●	★		14	8.4	1.5	1.2	



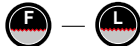
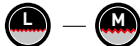
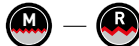
* Left hand insert.



WSX445

RECOMMENDED CUTTING CONDITIONS

DRY CUTTING

Material				Properties		Grade		Vc							
										fz	ap	fz	ap	fz	ap
P	Mild steel	≤ 180HB	MV1020	300 (200 – 400)	0.15 (0.1 – 0.2)	≤ 1.0	0.2 (0.15 – 0.25)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0					
			MV1030	250 (200 – 300)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0					
			MP6120	250 (200 – 300)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0					
			VP15TF												
			MP6130	240 (190 – 290)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0					
			VP20RT												
	MX3030	180 (130 – 230)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0							
	Carbon steel, Alloy steel	180 – 350HB	MV1020	260 (170 – 350)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0					
			MV1030	220 (170 – 270)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0					
			MP6120	220 (170 – 270)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0					
			VP15TF												
			MP6130	200 (150 – 250)	0.15 (0.1 – 0.2)	< 3.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0					
			VP20RT												
	MX3030	150 (120 – 180)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0							
	Alloy steel, Pre-Hardened steel	≤ 350HB	MV1020	180 (100 – 250)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0					
			MV1030	180 (100 – 250)	0.15 (0.1 – 0.2)	≤ 1.0	0.15 (0.1 – 0.2)	≤ 2.0	0.2 (0.15 – 0.25)	≤ 4.0					
			MP6120	140 (100 – 180)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0					
			VP15TF												
			MP6130	120 (90 – 150)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 4.0	0.25 (0.2 – 0.3)	< 5.0					
			VP20RT												
	MX3030	150 (120 – 180)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0							
M	Austenitic, Ferritic and martensitic stainless steel	—	MV1030	200 (150 – 250)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—					
			MP7130												
			MP7140												
			VP15TF												
			VP20RT												
			MX3030	130 (100 – 180)	0.15 (0.1 – 0.2)	< 1.0	0.15 (0.1 – 0.2)	< 2.0	—	—					
	Austenitic stainless steel	≥ 200HB	MP7130	170 (120 – 220)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—					
			MP7140												
			VP15TF												
			VP20RT												
	Two-phase stainless steel	≤ 280MPa	MP7130	160 (110 – 210)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—					
			MP7140												
			VP15TF												
			VP20RT												
	Hardened stainless steel	≤ 450HB	MP7130	150 (100 – 200)	0.15 (0.1 – 0.2)	< 2.0	0.2 (0.15 – 0.25)	< 3.0	—	—					
			MP7140												
			VP15TF												
			VP20RT												
											1/2				

WSX445 – DRY CUTTING

Material	Properties	Grade	Vc						
				fz	ap	fz	ap	fz	ap
K	Gray cast iron	≤ 350MPa	MV1020	240 (130 – 350)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
			MC5020	220 (200 – 270)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			VP15TF	180 (130 – 250)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			VP20RT	180 (130 – 250)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			MV1030	160 (110 – 240)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
	Ductile cast iron	≤ 800MPa	MX3030	150 (120 – 180)	0.15 (0.1 – 0.2) < 1.0	0.15 (0.1 – 0.2) < 2.0	0.2 (0.15 – 0.25) < 3.0	0.2 (0.15 – 0.25) < 3.0	0.2 (0.15 – 0.25) < 3.0
			MV1020	220 (80 – 350)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
			MC5020	200 (180 – 250)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			MV1030	180 (110 – 250)	0.15 (0.1 – 0.2) ≤ 1.0	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0	0.2 (0.15 – 0.25) ≤ 4.0
			VP15TF	160 (110 – 240)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
			VP20RT	160 (110 – 240)	0.15 (0.1 – 0.2) < 3.0	0.2 (0.15 – 0.25) < 4.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0	0.25 (0.2 – 0.3) < 5.0
H	Hardened steel	40 – 55HRC	VP15TF	50 (30 – 70)	0.05 (0.05 – 0.1) < 1.5	0.1 (0.05 – 0.15) < 2.0	—	—	—

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1. Please set the cutting conditions according to the system requirements referring to the above table.
2. Wet cutting is recommended for better surface finishes. (tool life is shorter when compared to dry cutting.)

WSX445 – WET CUTTING

Material	Properties	Grade	Vc						
				fz	ap	fz	ap	fz	ap
P	Mild steel	< 180HB	MV1020	220 (120 – 320)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MP6120	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			MP6130	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP20RT						
	Carbon steel, Alloy steel	180 – 350HB	MV1020	200 (100 – 300)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MP6120	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			MP6130	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP20RT						
	Alloy Steel, Pre-hardened steel	35 – 45HRC	MV1020	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	120 (80 – 160)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MP6120	100 (80 – 120)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			MP6130	100 (80 – 120)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP20RT						
M	Austenitic, Ferritic and martensitic stainless steel	—	MP7130						
			MP7140						
			VP15TF	130 (80 – 180)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 2.0	—	—	—
			VP20RT						
	Austenitic stainless steel	>200HB	MP7130						
			MP7140						
			VP15TF	100 (80 – 150)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 3.0	—	—	—
			VP20RT						
	Two-phase stainless steel	≤ 280MPa	MP7130						
			MP7140						
			VP15TF	100 (80 – 150)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 3.0	—	—	—
			VP20RT						
	Hardened stainless steel	< 450HB	MP7130						
			MP7140						
			VP15TF	90 (50 – 140)	0.15 (0.1 – 0.2) ≤ 2.0	0.2 (0.15 – 0.25) ≤ 3.0	—	—	—
			VP20RT						
K	Gray cast iron	Tensile Strength <350MPa	MV1020	200 (130 – 250)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MC5020	180 (160 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	150 (100 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			VP20RT	130 (100 – 160)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
	Ductile cast iron	Tensile Strength <800MPa	MV1020	220 (80 – 350)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MC5020	180 (160 – 200)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			MV1030	140 (80 – 200)	0.15 (0.1 – 0.2) ≤ 1.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
			VP15TF						
			VP20RT	110 (80 – 140)	0.15 (0.1 – 0.2) ≤ 3.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0	0.2 (0.15 – 0.25) ≤ 4.0	0.25 (0.2 – 0.3) ≤ 5.0
N	Aluminium alloy	—	TF15	500 (200 – 1000)	0.2 (0.1 – 0.3) ≤ 5.0	—	—	—	—

WSX445 – WET CUTTING

										
Material	Properties	Grade	Vc	fz	ap	fz	ap	fz	ap	
S	Titanium alloy	MP9120	50 (40 – 60)	0.05 (0.05 – 0.1)	≤ 1.5	0.1 (0.05 – 0.15)	≤ 2.0	—	—	
		MP9130								
		VP15TF								
		VP20RT								
S	Heat resistant alloy	MP9120	40 (20 – 50)	0.05 (0.05 – 0.1)	≤ 1.5	0.1 (0.05 – 0.15)	≤ 2.0	—	—	
		MP9130								
		VP15TF								
		VP20RT								
H	Hardened steel	40–55HRC	VP15TF	50 (30 – 70)	0.05 (0.05 – 0.1)	≤ 1.5	0.1 (0.05 – 0.15)	≤ 2.0	—	—
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