

WJX SERIES

SHARPNESS WITH STABILITY
FOR HIGH EFFICIENCY MACHINING



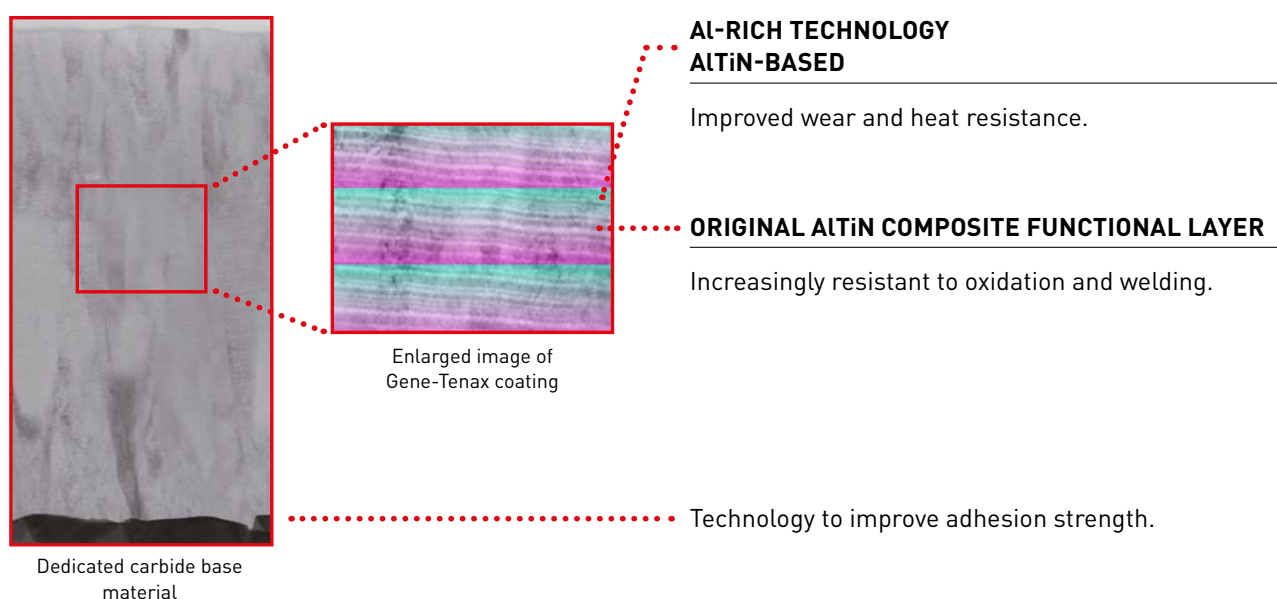
MP1220 / MP1230 / MP1240

MULTI-LAYER PVD COATING FOR MILLING

ONE INSERT SERIES TO SOLVE ALL PROBLEMS WHEN MACHINING STEELS, STAINLESS STEELS, HEAT RESISTANT AND TITANIUM ALLOYS.

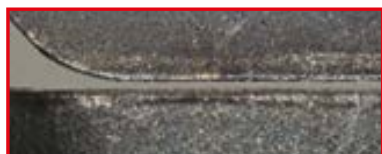
GENE-TENAX COATING

By controlling the coating structure at the nano level, damage to the coating has been vastly reduced compared to conventional lamination. By successfully laminating multiple films, simultaneous strengthening of heat, wear and welding resistance is achieved. Additionally the coating is now much less prone to cracking and with the increased adhesive strength, the most stable grade for milling has been created.



ACHIEVES TOUGHNESS FOR A WIDE RANGE OF WORK MATERIALS

STEEL MACHINING DAMAGE



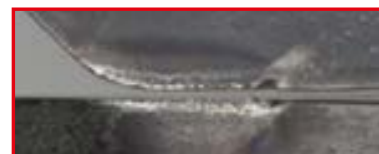
Cutting edge that is resistant to wear when machining steel

STAINLESS STEEL MACHINING DAMAGE



Cutting edge that is less susceptible to notching when machining stainless steel

HEAT RESISTANT AND TITANIUM ALLOYS MACHINING DAMAGE



Cutting edge that is resistant to chipping when machining heat resistant and titanium alloys



Thermal cracking



Notching

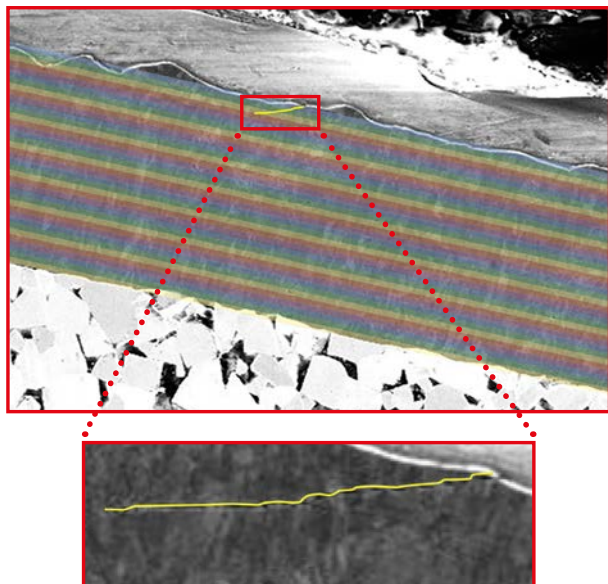


Chipped cutting edge

NEW MULTILAYER TECHNOLOGY

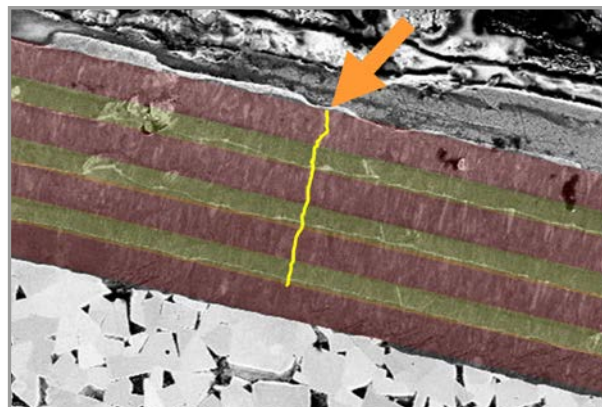
The adoption of a new multi-layer technology has succeeded in suppressing crack propagation and dramatically improved fracture resistance when compared to conventional technology.

MP1200 SERIES MULTI-LAYER TECHNOLOGY



Prevents cracks

CONVENTIONAL LAYER TECHNOLOGY



MULTI-GRADE SYSTEM

Using simulation technology, precise analysis of the cutting edge load and temperature when machining different workpiece materials was carried out. This led to the creation of different substrates for three different grades and ensures optimal performance for each type of workpiece material. Ensuring the best performance over a wide range of applications.

MP1220



MP1230



MP1240



2μm

SELECTION GUIDELINES

Steel, Carbon steel

Stainless steel

**Titanium alloys,
Heat resistant alloys**



- Hard grade
- Stable cutting
- Emphasis on wear resistance and mechanical properties

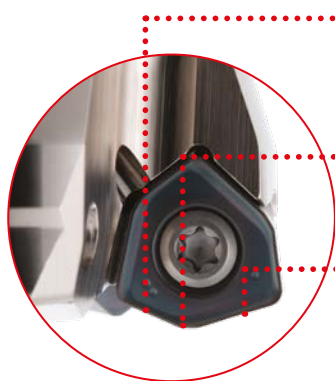
- Tough grade
- Unstable cutting
- Emphasis on fracture resistance and thermal properties

RELIABILITY EVEN IN HIGH EFFICIENCY CONDITIONS



Innovative cutting edge design for stable milling

- WJX series – developed for reliability and economy even at high feed rates and high depths of cut
- Economical double-sided insert provides the capability for multi-functionality
- Excellent sharpness enables reduced cutting noise and provides long tool life

**MINOR CUTTING EDGE**

Stable chip formation, even at high ramping angles, is made possible with the straight cutting edge.

WIPER CUTTING EDGE

The wiper edge enables surface finishes that are more than sufficient for rough machining.

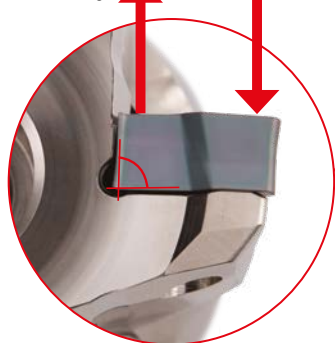
STRAIGHT CUTTING EDGE

The straight cutting edge extending to the maximum depth of cut (APMX) allows for high feed machining even at larger depths of cut.

HIGHLY RELIABLE CLAMPING SYSTEM

Prevents the insert from lifting

Cutting force



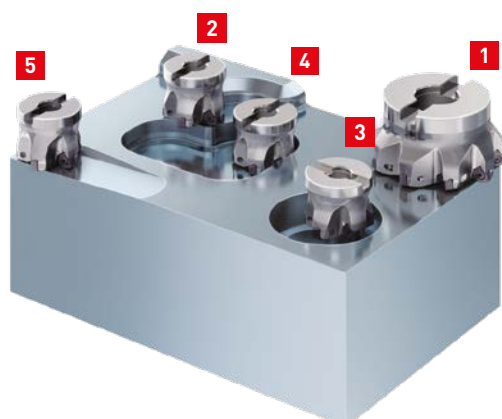
The dovetail pocket geometry prevents the insert from lifting and provides stable clamping without the use of a clamp bridge.

COMPLEX SHAPE FLANK FACE SUITABLE FOR RAMPING**SINGLE-SIDED**

Positive insert, Ramping performance, Sharpness

DOUBLE-SIDED

Negative insert, Cost efficiency, Insert strength, Fracture resistance



1 Face milling

2 Shoulder milling

3 Helical milling

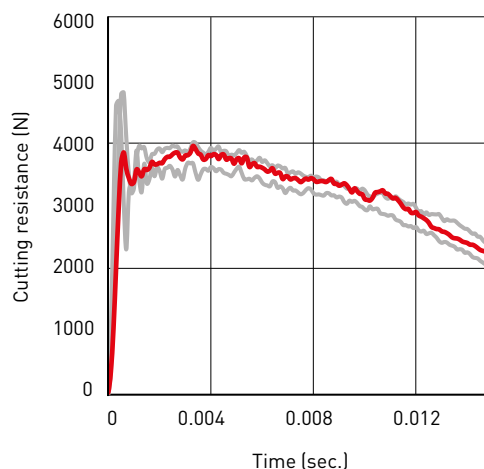
4 Pocket milling

5 Ramping

DOUBLE-SIDED INSERT HIGH FEED MILLING CUTTER

High feed radius milling cutter, with strong double-sided inserts. Exhibits low cutting resistance on workpiece entry. Maintains stability even during interrupted machining and at large depths of cut.

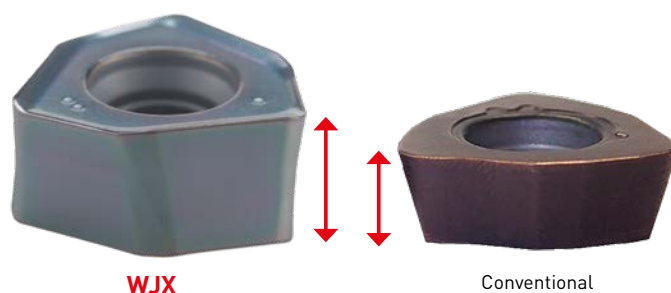
Material	DIN 41CrMo4
DCX	63
Vc (m/min)	150
fz (mm/t.)	1.5
ap (mm)	1.5
ae (mm)	31.5
Cutting mode	Single insert



WJX produces low cutting resistance when entering the workpiece.

HIGH STRENGTH DUE TO INCREASED INSERT THICKNESS

Material	DIN 41CrMo4
DCX	63
Vc (m/min)	150
fz (mm/t.)	2.0
ap (mm)	2
ae (mm)	45
Cutting mode	Dry cutting Single insert



Cutting length 4.8 m



Cutting length 3.6 m

GOOD CHIP FORMATION

The cutting edge forms short chips that prevents chip jammin and tangling, as well as facilitating easy removal of the chips after machining.

Material	DIN 41CrMo4
DCX	63
Vc (m/min)	150
fz (mm/t.)	2.0
ap (mm)	2
ae (mm)	45
Cutting mode	Dry cutting Single insert



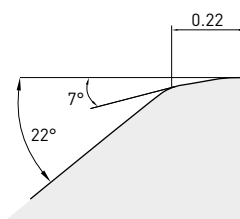
WJX



Conventional

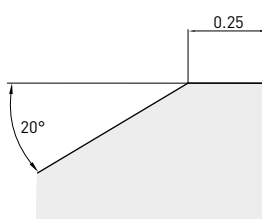
WJX

GRADES AND CHIPBREAKERS



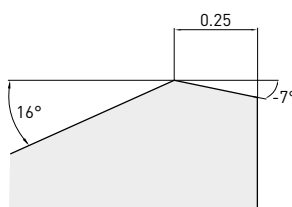
L-BREAKER

Recommended for machining that requires reduced cutting loads or under unstable clamping situations.



M-BREAKER

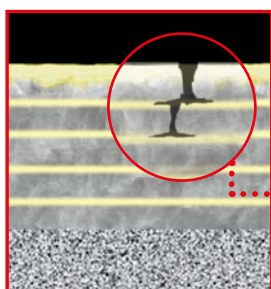
Outstanding balance of cutting edge sharpness and stability. First choice all-rounder, suitable for a variety of materials and applications.



R-BREAKER

Increased fracture resistance due to tougher cutting edges for reliable machining, even for interrupted cutting conditions.

TOUGH-Σ TECHNOLOGY



[Graphical representation]

Base layer high Al-(Al, Ti)N

The new technology Al-(Al, Ti)N coating provides stabilisation 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.

WJX

INSERT GRADES FOR A WIDE RANGE OF MATERIALS

P	CVD	PVD	M	CVD	PVD	K	CVD	PVD	S	PVD	H	PVD
P10			M10			K10			S10		H10	
P20	MC7020	MV1020	M20	MC7020	MV1030	K20	MV1020		S20	MP1220	H20	VP15TF
P30	MV1030	MP1220	M30	MV1030	MP1220	K30	MV1030	VP15TF	S30	MP9120	H30	
P40	NEW	MP6120		NEW	MP1230					VP15TF		
P50		VP15TF	M40		MP7130				S40	MP1230	H40	
		MP6130	M50		VP15TF					NEW	H50	
		MP1240			MP1240				S50			
		VP30RT			MP7140							
		NEW			VP30RT	K50						

MP1220

For stable machining operations with an emphasis on wear resistance.

MP1230

Ideal for medium machining applications and for light interrupted cutting.

MP1240

The toughest grade for heavy machining and rough interrupted applications.

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.

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 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.



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.

Graphical representation

WJX09

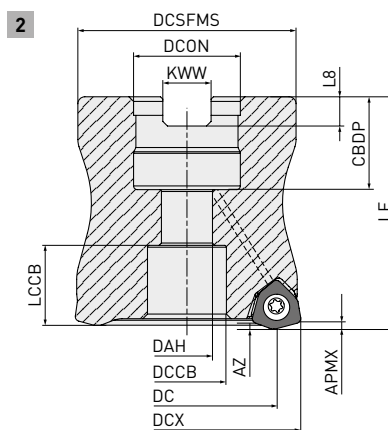
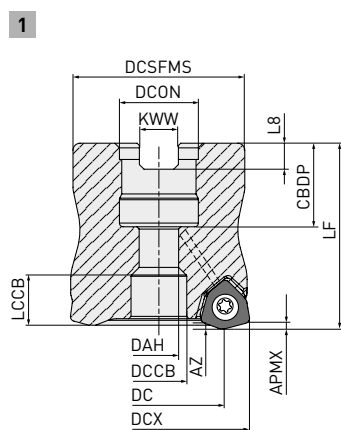


MULTI-FUNCTIONAL MILLING

P M K S H



GAMP : -6°
GAMF : -10°



DCX	Set bolt	Geometry
Ø40	HFF08033H	1
Ø50-63	HSC10030H	
Ø63.66	HSC12035H	

ARBOR TYPE

Order number	Stock	APMX	DC	DCON	DCX	LF	RMPX	RPMX [*]	WT	ZNF	Type
WJX09-040A04AR	●	1.2	28.8	16	40	40	2.9°	23200	0.21	4	2
WJX09-040A05AR	●	1.2	28.8	16	40	40	2.9°	23200	0.21	5	2
WJX09-050A04AR	●	1.2	38.8	22	50	50	2.0°	20000	0.42	4	1
WJX09-050A06AR	●	1.2	38.8	22	50	50	2.0°	20000	0.42	6	1
WJX09-052A06AR	●	1.2	40.8	22	52	50	1.9°	19500	0.45	6	1
WJX09-063A05AR	●	1.2	51.8	22	63	50	1.4°	19500	0.79	5	1
WJX09-063A07AR	●	1.2	51.8	22	63	50	1.4°	17300	0.79	7	1
WJX09-063X07AR	●	1.2	51.8	27	63	50	1.4°	17300	0.73	7	1
WJX09-066X07AR	●	1.2	54.8	27	66	50	1.4°	16800	0.79	7	1

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* The maximum spindle speeds RPMX are set to ensure tool and insert stability.

1. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

WJX09 – ARBOR TYPE

MOUNTING DIMENSIONS

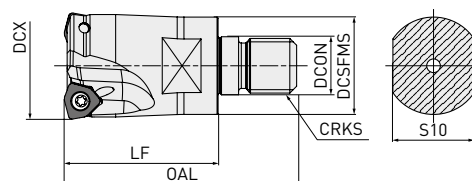
Order number	CBDP	DAH	DCCB	DCON	DCSFMS	DCX	KWW	LCCB	L8	Type
WJX09-040A04AR	18	8.5	12	16	37	40	8.4	-	5.6	2
WJX09-040A05AR	18	8.5	12	16	37	40	8.4	-	5.6	2
WJX09-050A04AR	20	11	17	22	47	50	10.4	17.2	6.3	1
WJX09-050A06AR	20	11	17	22	47	50	10.4	17.2	6.3	1
WJX09-052A06AR	20	11	17	22	47	52	10.4	17.2	6.3	1
WJX09-063A05AR	20	11	17	22	60	63	10.4	17.2	6.3	1
WJX09-063A07AR	20	11	17	22	60	63	10.4	17.2	6.3	1
WJX09-063X07AR	23	13	20	27	60	63	12.4	16.2	7.0	1
WJX09-066X07AR	23	13	20	27	60	66	12.4	16.2	7.0	1

2/2

SCREW-IN TYPE



P M K S H



Order number	Stock	APMX	DC	DCON	DCX	LF	OAL	RMPX	AZ	WT	ZNF
WJX09R2502AM1235	●	1.2	14.0	12.5	25	35	57	4.7	0.89	0.10	2
WJX09R2503AM1235	●	1.2	14.0	12.5	25	35	57	4.7	0.89	0.10	3
WJX09R2802AM1235	●	1.2	16.9	12.5	28	35	57	5.6	1.2	0.12	2
WJX09R2803AM1235	●	1.2	16.9	12.5	28	35	57	5.6	1.2	0.11	3
WJX09R3202AM1645	●	1.2	20.9	17	32	45	68	4.2	1.2	0.23	2
WJX09R3203AM1645	●	1.2	20.9	17	32	45	68	4.2	1.2	0.21	3
WJX09R3502AM1645	●	1.2	23.8	17	35	45	68	3.6	1.2	0.25	2
WJX09R3503AM1645	●	1.2	23.8	17	35	45	68	3.6	1.2	0.24	3
WJX09R3504AM1645	●	1.2	23.8	17	35	45	68	3.6	1.2	0.23	4
WJX09R4003AM1645	●	1.2	28.8	17	40	45	68	2.9	1.2	0.27	3
WJX09R4004AM1645	●	1.2	28.8	17	40	45	68	2.9	1.2	0.27	4
WJX09R4005AM1645	●	1.2	28.8	17	40	45	68	2.9	1.2	0.27	5

1/2

WJX09 – SCREW-IN TYPE

MOUNTING DIMENSIONS

Order number	CRKS	S10	DCON	DCSFMS	DCX
WJX09R2502AM1235	M12	19	12.5	23.5	25
WJX09R2503AM1235	M12	19	12.5	23.5	25
WJX09R2802AM1235	M12	19	12.5	23.5	28
WJX09R2803AM1235	M12	19	12.5	23.5	28
WJX09R3202AM1645	M16	24	17.0	28.5	32
WJX09R3203AM1645	M16	24	17.0	28.5	32
WJX09R3502AM1645	M16	24	17.0	28.5	35
WJX09R3503AM1645	M16	24	17.0	28.5	35
WJX09R3504AM1645	M16	24	17.0	28.5	35
WJX09R4003AM1645	M16	24	17.0	28.5	40
WJX09R4004AM1645	M16	24	17.0	28.5	40
WJX09R4005AM1645	M16	24	17.0	28.5	40

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SHANK TYPE

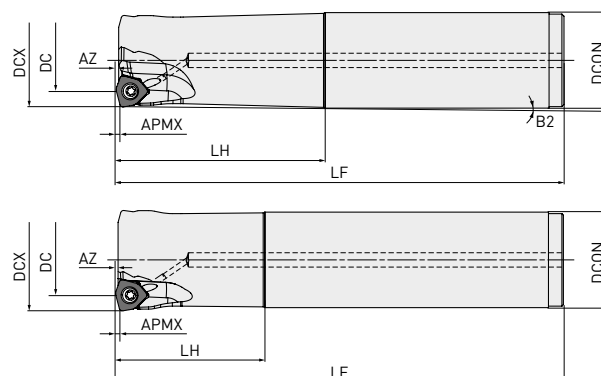


P M K S H

1



2



Order number	Stock	APMX	DC	DCON	DCX	LF	LH	B2	RMPX	AZ	ZNF	Type
WJX09R2502SA25S	●	1.2	14.0	25	25	140	60	1.09	4.7	0.89	2	1
WJX09R2503SA25S	●	1.2	14.0	25	25	140	60	1.09	4.7	0.89	3	1
WJX09R2802SA25S	★	1.2	16.9	25	28	140	40	—	5.6	1.2	2	2
WJX09R2803SA25S	●	1.2	16.9	25	28	140	40	—	5.6	1.2	3	2
WJX09R3202SA32S	★	1.2	20.9	32	32	150	70	0.93	4.2	1.2	2	1
WJX09R3203SA32S	●	1.2	20.9	32	32	150	70	0.93	4.2	1.2	3	1
WJX09R3503SA32S	★	1.2	23.8	32	35	150	50	—	3.6	1.2	3	2
WJX09R3504SA32S	★	1.2	23.8	32	35	150	50	—	3.6	1.2	4	2
WJX09R4003SA32S	★	1.2	28.8	32	40	150	50	—	2.9	1.2	3	2
WJX09R4004SA32S	●	1.2	28.8	32	40	150	50	—	2.9	1.2	4	2
WJX09R2502SA25L	●	1.2	14.0	25	25	200	120	0.54	4.7	0.89	2	1
WJX09R2503SA25L	★	1.2	14.0	25	25	200	120	0.54	4.7	0.89	3	1
WJX09R2802SA25L	●	1.2	16.9	25	28	200	40	—	5.6	1.2	2	2
WJX09R2803SA25L	★	1.2	16.9	25	28	200	40	—	5.6	1.2	3	2

1/2

WJX09 – SHANK TYPE

Order number	Stock	APMX	DC	DCON	DCX	LF	LH	B2	RMPX	AZ	ZNF	Type
WJX09R3202SA32L	★	1.2	20.9	32	32	200	120	0.54	4.2	1.2	2	1
WJX09R3203SA32L	●	1.2	20.9	32	32	200	120	0.54	4.2	1.2	3	1
WJX09R3503SA32L	★	1.2	23.8	32	35	200	50	—	3.6	1.2	3	2
WJX09R3504SA32L	★	1.2	23.8	32	35	200	50	—	3.6	1.2	4	2
WJX09R4003SA32L	★	1.2	28.8	32	40	250	50	—	2.9	1.2	3	2
WJX09R4004SA32L	★	1.2	28.8	32	40	250	50	—	2.9	1.2	4	2
WJX09R2502SA25EL	★	1.2	14.0	25	25	300	180	0.35	4.7	0.89	2	1
WJX09R2802SA25EL	★	1.2	16.9	25	28	300	40	—	5.6	1.2	2	2
WJX09R3202SA32EL	★	1.2	20.9	32	32	300	180	0.35	4.2	1.2	2	1
WJX09R3502SA32EL	★	1.2	23.8	32	35	300	50	—	3.6	1.2	2	2
WJX09R4003SA32EL	★	1.2	28.8	32	40	300	50	—	2.9	1.2	3	2

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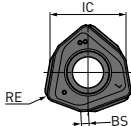
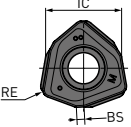
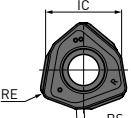
SPARE PARTS

Tool holder type	 *		
	Clamp screw	Wrench (Insert)	Anti-seize lubricant
WJX09	TPS3R	TIP10D	MK1KS

* Clamp torque (N • m) : TPS3R = 2.0

INSERTS

P	Steel	●	●		●	✱	●				●	●	●	✱	Cutting conditions : ●: Stable cutting ●: General cutting ✱: Unstable cutting Honing: E: Round F: Sharp edge S: Chamfer + round T: Chamfer Z: Stable				
M	Stainless steel	●	●	✱				●	●	✱			●	●					
K	Cast iron												●	●	✱				
S	Heat resistant alloy, Titanium	●	●	✱						●	✱			●					
H	Hardened steel													●					

Order number	Class	Edge preparation	NEW MP1220	NEW MP1230	NEW MP1240	MP6120	MP6130	MC7020	MP7130	MP7140	MP9120	MP9130	MV1020	MV1030	VP15TF	VP30RT	IC	S	BS	RE	Geometry <i>Right hand insert only.</i>	
JOMU090512ZZER-L	M	E	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9.525	4.73	0.8	1.2	 	
JOMU090512ZZER-M	M	E	●	●	●	●	●	●	●	●	●	●	●	●	●	●	9.525	4.75	0.8	1.2	 	
JOMU090512ZZER-R	M	E	●	●	●	●	●	●					●	●	●	●	9.525	4.83	0.8	1.2	 	

(10 inserts in one case)



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

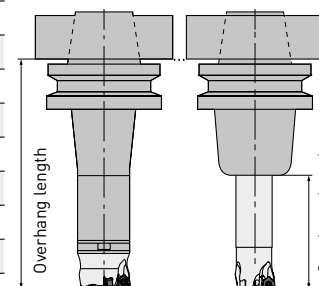
WJX09

RECOMMENDED CUTTING CONDITIONS

ADJUSTMENT ACCORDING TO THE LENGTH OF OVERHANG

Multiply the recommended cutting conditions on pages 15–18 by the adjustment factor below.

	DCX	Overhang length	Adjustment value		
			Vc	ap	fz
Shank type Screw-in type	25–50	< 2.5×DCON	100 %	100 %	100 %
		3.0×DCON	90 %	100 %	90 %
		4.0×DCON	85 %	90 %	85 %
		5.0×DCON	80 %	85 %	80 %
		7.5×DCON	70 %	75 %	75 %
Arbor type	40–80	< 2.5×DCX	100 %	100 %	100 %
		3.0×DCX	85 %	100 %	90 %
		4.0×DCX	80 %	80 %	80 %
		5.0×DCX	75 %	75 %	60 %
		6.0×DCX	70 %	70 %	40 %
	≥100	8.0	100 %	100 %	100 %
		12.0	85 %	100 %	90 %
		16.0	80 %	80 %	80 %



WJX09

RECOMMENDED CUTTING CONDITIONS

CUTTING SPEED (DRY CUTTING)

Material	Properties	Grade	Vc	
P	Mild steel	≤180HB	MV1020	230 (180 – 280)
			MP1220	170 (120 – 220)
			MP6120	170 (120 – 220)
			MV1030	160 (100 – 220)
			MP1230	160 (110 – 200)
			MP6130	160 (110 – 200)
			VP15TF	170 (120 – 220)
			VP30RT	140 (100 – 180)
			MC7020	230 (180 – 280)
	Carbon steel	180–280HB	MV1020	220 (170 – 270)
			MP1220	160 (100 – 220)
			MP6120	160 (100 – 220)
			MV1030	150 (80 – 220)
			MP1230	140 (90 – 200)
			MP6130	140 (90 – 200)
			VP15TF	160 (100 – 220)
			VP30RT	120 (80 – 170)
			MC7020	220 (170 – 270)
	Alloy steel	280–350HB	MV1020	220 (170 – 270)
			MP1220	160 (100 – 220)
			MP6120	160 (100 – 220)
			MV1030	150 (80 – 220)
			MP1230	140 (90 – 200)
			MP6130	140 (90 – 200)
			VP15TF	160 (100 – 220)
			VP30RT	120 (80 – 170)
			MC7020	220 (170 – 270)
Alloy tool steel	≤350HB (Annealing)	MP1220	160 (100 – 220)	
		MP6120	160 (100 – 220)	
		MP1230	140 (90 – 200)	
		MP6130	140 (90 – 200)	
		VP15TF	160 (100 – 220)	
		VP30RT	120 (80 – 170)	
		MC7020	220 (170 – 270)	
Pre-hardened steel	35–45HRC	MP1220	120 (80 – 160)	
		MP6120	120 (80 – 160)	
		MP1230	100 (60 – 140)	
		MP6130	100 (60 – 140)	
		VP15TF	120 (80 – 160)	
		VP30RT	90 (50 – 130)	
		MC7020	—	

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WJX09 – CUTTING SPEED (DRY CUTTING)

Material	Properties	Grade	Vc	
M	Austenitic stainless steel	MC7020	220 (170 – 270)	
		MV1030	160 (130 – 200)	
		MP1230	160 (130 – 200)	
		MP7130	160 (130 – 200)	
		MP1240	150 (120 – 180)	
		MP7140	150 (120 – 180)	
		VP30RT	150 (120 – 180)	
		>200HB	MC7020	190 (140 – 240)
			MV1030	140 (80 – 200)
			MP1230	140 (100 – 200)
			MP7130	140 (100 – 200)
			MP1240	130 (80 – 180)
			MP7140	130 (80 – 180)
			VP30RT	130 (80 – 180)
	Ferritic and martensitic stainless steel	MC7020	220 (170 – 270)	
		MP1220	150 (100 – 200)	
		MP1230	150 (100 – 200)	
		MP7130	150 (100 – 200)	
		MP1240	130 (80 – 180)	
		MP7140	130 (80 – 180)	
		VP30RT	130 (80 – 180)	
	Duplex stainless steel	MC7020	180 (130 – 230)	
		MP1230	130 (80 – 180)	
		MP7130	130 (80 – 180)	
		MP1240	110 (60 – 160)	
		MP7140	110 (60 – 160)	
		VP30RT	110 (60 – 160)	
Precipitation hardening stainless steel		MC7020	170 (120 – 220)	
	MP1230	110 (60 – 160)		
	MP7130	110 (60 – 160)		
	MP1240	90 (50 – 130)		
	MP7140	90 (50 – 130)		
	VP30RT	90 (50 – 130)		
	K	Gray cast iron	MV1020	210 (160 – 260)
VP15TF			180 (140 – 220)	
MV1030			160 (120 – 210)	
Ductile cast iron		MV1020	190 (140 – 240)	
		VP15TF	160 (120 – 210)	
		MV1030	130 (90 – 170)	
		VP15TF	130 (90 – 170)	
S	Titanium alloy	MP1220	50 (30 – 65)	
		MP9120	50 (30 – 65)	
		MP1230	40 (30 – 60)	
		MP9130	40 (30 – 60)	
		MP1240	40 (30 – 60)	
		VP15TF	50 (30 – 65)	
		Heat resistant alloy	MP1220	40 (20 – 50)
	MP9120		30 (20 – 40)	
	MP1230		30 (20 – 40)	
	MP9130		40 (20 – 50)	
	MP1240		30 (20 – 40)	
	VP15TF		40 (20 – 50)	
	H	Hardened steel	40–55HRC	VP15TF

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WJX09 – DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting mode	ap		DCX 25.28(Z=2)	DCX 25.28(Z=3)	DCX 32~66
					fz	fz	fz
P	Mild steel	Dry	≤0.5	M, R	1.3 [0.4 – 2.0]	1.3 [0.4 – 2.0]	1.5 [0.5 – 2.0]
				L	1.2 [0.4 – 1.6]	1.2 [0.4 – 1.6]	1.2 [0.4 – 1.6]
			≤1.0	M, R	1.0 [0.3 – 1.3]	0.8 [0.3 – 1.0]	1.2 [0.4 – 1.5]
				L	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.2]
			≤1.5	M, R	0.6 [0.3 – 1.0]	—	0.8 [0.4 – 1.2]
				L	—	—	—
	Carbon steel Alloy steel		≤0.5	M, R	1.3 [0.4 – 1.7]	1.3 [0.4 – 1.7]	1.5 [0.4 – 2.0]
				L	1.2 [0.3 – 1.5]	1.2 [0.3 – 1.5]	1.2 [0.3 – 1.5]
			≤1.0	M, R	0.8 [0.3 – 1.0]	0.7 [0.3 – 0.9]	1.0 [0.3 – 1.3]
				L	0.7 [0.2 – 1.0]	0.7 [0.2 – 0.9]	0.7 [0.2 – 1.0]
			≤1.5	M, R	0.5 [0.3 – 0.7]	—	0.7 [0.3 – 1.0]
				L	—	—	—
	Carbon steel Alloy steel Alloy tool steel		≤0.5	M, R	1.3 [0.4 – 1.7]	1.3 [0.4 – 1.7]	1.5 [0.4 – 2.0]
				L	1.2 [0.3 – 1.5]	1.2 [0.3 – 1.5]	1.2 [0.3 – 1.5]
			≤1.0	M, R	0.8 [0.3 – 1.0]	0.7 [0.3 – 0.9]	1.0 [0.3 – 1.3]
				L	0.7 [0.2 – 1.0]	0.7 [0.2 – 0.9]	0.7 [0.2 – 1.0]
			≤1.5	M, R	0.5 [0.3 – 0.7]	—	0.7 [0.3 – 1.0]
				L	—	—	—
Pre-hardened steel	≤0.5	M, R	1.0 [0.3 – 1.3]	1.0 [0.3 – 1.3]	1.2 [0.3 – 1.5]		
		L	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]		
	≤1.0	M, R	0.6 [0.2 – 0.8]	0.6 [0.2 – 0.8]	0.8 [0.2 – 1.0]		
		L	0.5 [0.2 – 0.8]	0.5 [0.2 – 0.8]	0.5 [0.2 – 0.8]		
	≤1.5	M, R	0.5 [0.3 – 0.7]	—	0.7 [0.3 – 1.0]		
		L	—	—	—		
M	Austenitic stainless steel	Dry	≤0.5	L	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]
				M	1.0 [0.4 – 1.2]	1.0 [0.4 – 1.2]	1.0 [0.4 – 1.2]
			≤1.0	L	0.6 [0.2 – 0.8]	0.6 [0.2 – 0.8]	0.6 [0.2 – 0.8]
				M	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]
			≤1.5	L	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]
				M	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]
	Ferritic and martensitic stainless steel		≤0.5	L	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]
				M	1.0 [0.4 – 1.2]	1.0 [0.4 – 1.2]	1.0 [0.4 – 1.2]
			≤1.0	L	0.6 [0.2 – 0.8]	0.6 [0.2 – 0.8]	0.6 [0.2 – 0.8]
				M	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]
			≤1.5	L	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]
				M	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]
	Duplex stainless steel		≤0.5	L	0.6 [0.3 – 0.8]	0.6 [0.3 – 0.8]	0.6 [0.3 – 0.8]
				M	0.7 [0.3 – 1.0]	0.7 [0.3 – 1.0]	0.7 [0.3 – 1.0]
			≤1.0	L	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]
				M	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]
			≤1.5	L	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]
				M	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]
Precipitation hardening stainless steel	≤0.5	L	0.6 [0.3 – 0.8]	0.6 [0.3 – 0.8]	0.6 [0.3 – 0.8]		
		M	0.7 [0.3 – 1.0]	0.7 [0.3 – 1.0]	0.7 [0.3 – 1.0]		
	≤1.0	L	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]		
		M	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]		
	≤1.5	L	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]	0.5 [0.2 – 0.7]		
		M	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]	0.6 [0.3 – 0.7]		

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WJX09 – DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting mode	ap		DCX 25.28(Z=2)	DCX 25.28(Z=3)	DCX 32~66		
					fz	fz	fz		
K	Gray cast iron	≤350MPa	Dry	≤0.5	M,R	1.3 [0.4 – 2.0]	1.3 [0.4 – 2.0]	1.5 [0.5 – 2.0]	
					L	1.2 [0.4 – 1.6]	1.2 [0.4 – 1.6]	1.2 [0.4 – 1.6]	
				≤1.0	M,R	1.0 [0.3 – 1.3]	0.8 [0.3 – 1.0]	1.2 [0.4 – 1.5]	
					L	1.0 [0.3 – 1.3]	0.8 [0.3 – 1.0]	1.0 [0.3 – 1.3]	
				≤1.5	M,R	0.6 [0.3 – 1.0]	—	0.8 [0.4 – 1.2]	
				Ductile cast iron	≤450MPa	≤0.5	M,R	1.3 [0.4 – 1.7]	1.3 [0.4 – 1.7]
	L						1.0 [0.3 – 1.3]	1.0 [0.3 – 1.3]	1.0 [0.3 – 1.3]
	≤1.0					M,R	0.8 [0.3 – 1.0]	0.7 [0.3 – 0.9]	1.0 [0.3 – 1.3]
						L	0.8 [0.2 – 1.0]	0.7 [0.2 – 0.9]	0.8 [0.2 – 1.2]
	≤1.5					M,R	0.5 [0.3 – 0.7]	—	0.7 [0.3 – 1.0]
	≤800MPa					≤0.5	M,R	1.0 [0.2 – 1.5]	1.0 [0.2 – 1.5]
				L	0.8 [0.3 – 1.2]		0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]	
		≤1.0	M,R	0.8 [0.2 – 1.0]	0.6 [0.2 – 0.8]	1.0 [0.3 – 1.2]			
			L	0.5 [0.2 – 0.8]	0.5 [0.2 – 0.8]	0.5 [0.2 – 0.8]			
S		Titanium alloy	Wet	≤0.5	L	0.3 [0.2 – 0.6]	0.3 [0.2 – 0.6]	0.3 [0.2 – 0.6]	
				≤1.0	L	0.3 [0.2 – 0.4]	0.3 [0.2 – 0.4]	0.3 [0.2 – 0.4]	
	Heat resistant alloy	≤0.5		L,M,R	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]		
		≤1.0		L,M,R	0.7 [0.3 – 1.0]	0.7 [0.3 – 1.0]	0.7 [0.3 – 1.0]		
H	Hardened steel	40~55HRC	Dry	≤0.5	R,M	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]	
				≤1.0	R,M	0.5 [0.3 – 0.8]	0.4 [0.3 – 0.6]	0.5 [0.3 – 0.8]	

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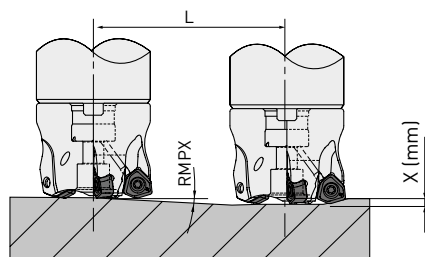
2/2

1. Internal coolant is recommended for titanium alloy and heat resistant alloy machining.
2. To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, wet cutting is recommended.
3. When large vibration occurs, reduce the cutting conditions.
4. For interrupted cutting, reduce the cutting speed and feed rate by 20 %.
5. If ap is set at 1.2 mm or more, avoid wall machining or ramping.

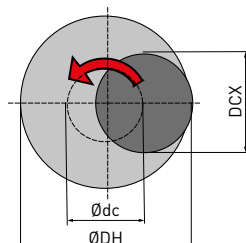
WJX09

MAXIMUM CAPACITIES BY MODE

RAMPING



HELICAL MILLING



How to derive a locus of the centre of the tool.

$$\varnothing DC = \varnothing DH - DCX$$

Locus of the centre of the tool Desired hole diameter Cutting diameter maximum

Tool holder type	APMX	DC	DCX	AZ ^{*1}	Ramping		Helical milling (Blind hole, Flat bottom)		Helical milling (Through hole)
					RMPX	L (mm) ^{*2}	DH		DH
						x=1	Min.	Max.	Min.
WJX09R25	1.2	14	25	0.8	4.7	12.2	38	47	34
WJX09R28	1.2	16.9	28	1.2	5.6	10.2	44	53	38
WJX09R32	1.2	20.9	32	1.2	4.2	13.7	52	61	46
WJX09R35	1.2	23.8	35	1.2	3.6	15.9	58	67	52
WJX09R40	1.2	28.8	40	1.2	2.9	19.8	68	77	61
WJX09-040	1.2	28.8	40	1.2	2.9	19.8	68	77	61
WJX09-050	1.2	38.8	50	1.2	2	28.7	88	97	81
WJX09R050	1.2	38.8	50	1.2	2	28.7	88	97	81
WJX09-052	1.2	40.8	52	1.2	1.9	30.2	92	101	85
WJX09-063	1.2	51.8	63	1.2	1.4	41	114	123	107
WJX09R063	1.2	51.8	63	1.2	1.4	41	114	123	107
WJX09-066	1.2	54.8	66	1.2	1.4	41	120	129	113

- When ramping and helical milling, it is recommended to reduce the feed per tooth.
- Caution – When ramping, helical milling and drilling, long continuous chips may be scattered.
- Helical milling**
To obtain a flat bottom surface when helical milling, it requires removal of “the uncut part” in the centre of the work material.
When helical milling, make sure that the depth of cut per helical pass doesn't exceed the maximum depth of cut (APMX).
- Drilling**
When drilling, set the axial feed per revolution at 0.2 mm/rev or less.

^{*1} AZ = max. plunging

^{*2} L = Required distance for X mm depth

WJX14



MULTI-FUNCTIONAL MILLING

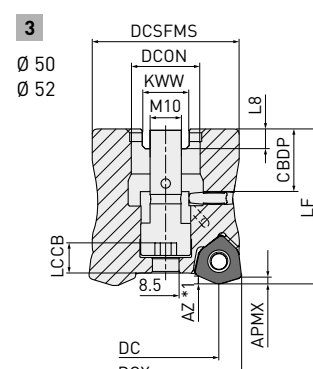
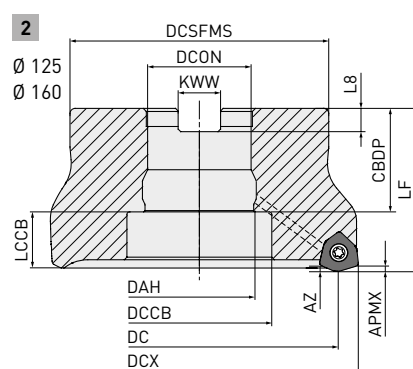
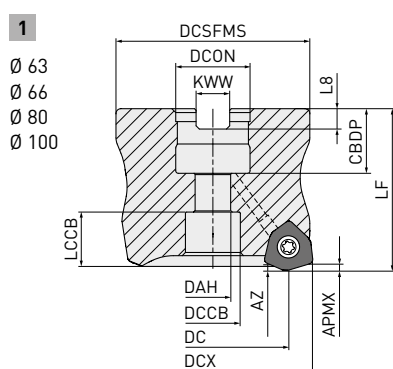


GAMP : -6°
 GAMF : -10°
 T : $+13^{\circ}$
 I : $+7^{\circ}$

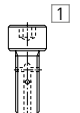
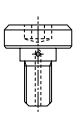


GAMP : -7°
 GAMF : -10°
 T : $+12^{\circ}$
 I : $+7^{\circ}$

A 7 mm Allen wrench is used to tighten the set bolt (included).



Right hand tool holder only.

DCX	Set bolt	Geometry
Ø 63 [22]	HSC10030H	 
Ø 63 [27], Ø 66, Ø 80	HSC12035H	
Ø 100	HSC16040H	
Ø 125, Ø 160	MBA20040H	

ARBOR TYPE

Order number	Stock	APMX	DC	DCON	DCX	LF	RMPX	RMPX*	WT	ZNF	Type
WJX14-050A03AR	★	2	34.5	22	50	50	4.4°	5000	0.4	3	3
WJX14-050A04AR	●	2	34.5	22	50	50	4.4°	5000	0.4	4	3
WJX14-052A04AR	●	2	36.5	22	52	50	4.1°	5000	0.4	4	3
WJX14-063A04AR	●	2	47.5	22	63	50	3°	18200	0.7	4	1
WJX14-063A05AR	★	2	47.5	22	63	50	3°	18200	0.7	5	1
WJX14-063X05AR	●	2	47.5	27	63	50	3°	18200	0.6	5	1
WJX14-066X05AR	●	2	50.4	27	66	50	2.8°	17700	0.7	5	1
WJX14-080A05AR	●	2	64.4	27	80	50	2.1°	15600	1.2	5	1
WJX14-080A06AR	●	2	64.4	27	80	50	2.1°	15600	1.2	6	1
WJX14-100A06AR	★	2	84.4	32	100	63	1.5°	13500	2.5	6	1
WJX14-100A07AR	★	2	84.4	32	100	63	1.5°	13500	2.5	7	1
WJX14-125B07AR	★	2	109.4	40	125	63	1.2°	11600	3.2	7	2
WJX14-125B09AR	★	2	109.4	40	125	63	1.2°	11600	3.1	9	2
WJX14-160B09AR	★	2	144.4	40	160	63	0.8°	9900	4.9	9	2

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* The maximum spindle speeds RMPX are set to ensure tool and insert stability.

1. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

WJX14 – ARBOR TYPE

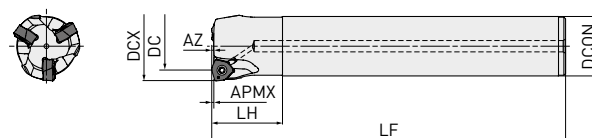
MOUNTING DIMENSIONS

Order number	CBDP	DAH	DCCB	DCON	DCSFMS	DCX	KWW	LCCB	L8	Type
WJX14-050A03AR	20	—	—	22	47	50	10.4	18.3	6.3	3
WJX14-050A04AR	20	—	—	22	47	50	10.4	18.3	6.3	3
WJX14-052A04AR	20	—	—	22	47	52	10.4	18.3	6.3	3
WJX14-063A04AR	20	11	17	22	60	63	10.4	16.7	6.3	1
WJX14-063A05AR	20	11	17	22	60	63	10.4	16.7	6.3	1
WJX14-063X05AR	23	13	20	27	60	63	12.4	15.7	7	1
WJX14-066X05AR	23	13	20	27	60	66	12.4	15.7	7	1
WJX14-080A05AR	23	13	20	27	76	80	12.4	15.7	7	1
WJX14-080A06AR	23	13	20	27	76	80	12.4	15.7	7	1
WJX14-100A06AR	26	17	26	32	96	100	14.4	25.7	8	1
WJX14-100A07AR	26	17	26	32	96	100	14.4	25.7	8	1
WJX14-125B07AR	40	42	56	40	100	125	16.4	21.7	9	2
WJX14-125B09AR	40	42	56	40	100	125	16.4	21.7	9	2
WJX14-160B09AR	40	42	56	40	100	160	16.4	21.7	9	2

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SHANK TYPE



Right hand tool holder only.

Order number	Stock	APMX	DC	DCON	DCX	LF	LH	RMPX	RPMX*	ZNF
WJX14R5003SA42S	★	2	34.5	42	50	150	50	4.4°	21200	3
WJX14R5003SA42L	★	2	34.5	42	50	250	50	4.4°	21200	3

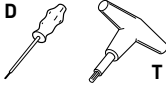
* The maximum spindle speeds RPMX are set to ensure tool and insert stability.

1. When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.



WJX14

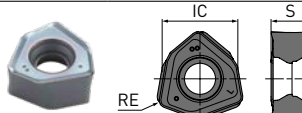
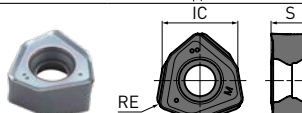
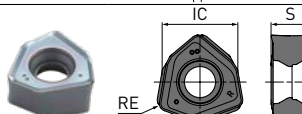
SPARE PARTS

Tool holder type			
	Clamp screw	Wrench (Insert)	Anti-seize lubricant
WJX14 Arbor type	TS5R	TKY20T	MK1KS
WJX14 Shank type	TS5R	TKY20D	MK1KS

* Clamp torque (N • m) : TS5R = 5.0

INSERTS

P	Steel	●	●	●	✱	●	●	●	✱	Cutting conditions : ●: Stable cutting ●: General cutting ✱: Unstable cutting
M	Stainless steel	●	●	✱	●	●	✱	●	●	
K	Cast iron							●	●	✱
S	Heat resistant alloy, Titanium	●	●	✱			●	✱	●	Honing: E: Round F: Sharp edge S: Chamfer + round T: Chamfer Z: Stable
H	Hardened steel								●	

Order number	Class	Honing															IC	S	BS	RE	Geometry Right hand insert only.
			NEW MP1220	NEW MP1230	NEW MP1240	MP6120	MP6130	MC7020	MP7130	MP7140	MP9120	MP9130	MV1020	MV1030	VP15TF	VP30RT					
JOMU140715ZZER-L	M	E	●	●	●	●	●	●	●	●	●	●	●	●	★	★	14	6.575	1.3	1.5	
JOMU140715ZZER-M	M	E	●	●	●	●	●	●	●	●	●	●	●	●	★	★	14	6.63	1.3	1.5	
JOMU140715ZZER-R	M	E	●	●	●	●	●	●					●	●	●	●	14	6.751	1.3	1.5	

[10 inserts in one case]

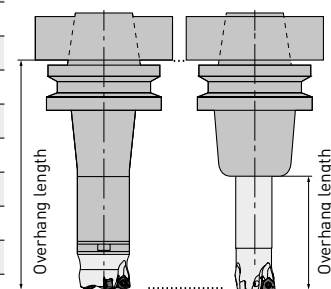
WJX14

RECOMMENDED CUTTING CONDITIONS

ADJUSTMENT ACCORDING TO THE LENGTH OF OVERHANG

Multiply the recommended cutting conditions on pages 24–27 by the adjustment factor below.

	DCX	Overhang length	Adjustment value		
			Vc	ap	fz
Shank type	50	< 2.5×DCON	100 %	100 %	100 %
		3.0×DCON	90 %	100 %	90 %
		4.0×DCON	80 %	80 %	90 %
Arbor type	63–80	< 2.5×DCX	100 %	100 %	100 %
		3.0×DCX	85 %	100 %	90 %
		4.0×DCX	80 %	80 %	80 %
		5.0×DCX	75 %	75 %	60 %
		6.0×DCX	70 %	70 %	40 %
	>100	200 mm	100 %	100 %	100 %
		300 mm	85 %	100 %	90 %
		400 mm	80 %	80 %	80 %



WJX14 – CUTTING SPEED (DRY CUTTING)

Material	Properties	Grade	Vc	
P	Mild steel	≤180HB	MV1020	220 (170 – 270)
			MP1220	150 (100 – 200)
			MP6120	150 (100 – 200)
			MP1230	140 (90 – 180)
			MP6130	140 (90 – 180)
			VP15TF	150 (100 – 200)
			MV1030	130 (80 – 180)
			VP30RT	120 (80 – 160)
	Carbon steel Alloy steel	180–280HB	MV1020	200 (150 – 250)
			MP1220	140 (80 – 200)
			MP6120	140 (80 – 200)
			MV1030	120 (60 – 180)
			MP1230	120 (70 – 180)
			MP6130	120 (70 – 180)
			VP15TF	140 (80 – 200)
			VP30RT	100 (60 – 150)
	Carbon steel Alloy steel	280–350HB	MP1220	140 (80 – 200)
			MP6120	140 (80 – 200)
			MP1230	120 (70 – 180)
			MP6130	120 (70 – 180)
			VP15TF	140 (80 – 200)
			VP30RT	100 (60 – 150)
	Alloy tool steel	≤350HB (Annealing)	MP1220	140 (80 – 200)
			MP6120	140 (80 – 200)
			MP1230	120 (70 – 180)
			MP6130	120 (70 – 180)
			VP15TF	140 (80 – 200)
			VP30RT	100 (60 – 150)
Pre-hardened steel	35–45HRC	MP1220	110 (70 – 150)	
		MP6120	110 (70 – 150)	
		MP1230	90 (50 – 130)	
		MP6130	90 (50 – 130)	
		VP15TF	110 (70 – 150)	
		VP30RT	80 (40 – 120)	

WJX14 – CUTTING SPEED (DRY CUTTING)

Material	Properties	Grade	Vc
M	Austenitic stainless steel	MC7020	220 (170 – 270)
		MV1030	160 (130 – 200)
		MP1230	160 (130 – 200)
		MP7130	160 (130 – 200)
		MP1240	150 (120 – 180)
		MP7140	150 (120 – 180)
		VP30RT	150 (120 – 180)
	>200HB	MC7020	190 (140 – 240)
		MV1030	140 (100 – 200)
		MP1230	140 (100 – 200)
		MP7130	140 (100 – 200)
		MP1240	130 (80 – 180)
		MP7140	130 (80 – 180)
		VP30RT	130 (80 – 180)
	Ferritic and martensitic stainless steel	MC7020	220 (170 – 270)
		MP1220	150 (100 – 200)
		MP1230	150 (100 – 200)
		MP7130	150 (100 – 200)
		MP1240	130 (80 – 180)
		MP7140	130 (80 – 180)
K	Duplex stainless steel	VP30RT	130 (80 – 180)
		MC7020	180 (130 – 230)
		MP1230	130 (80 – 180)
		MP7130	130 (80 – 180)
		MP1240	110 (60 – 160)
		MP7140	110 (60 – 160)
	Precipitation hardening stainless steel	VP30RT	110 (60 – 160)
		MC7020	170 (120 – 220)
		MP1230	110 (60 – 160)
		MP7130	110 (60 – 160)
		MP1240	90 (50 – 130)
		MP7140	90 (50 – 130)
	Gray cast iron	VP30RT	90 (50 – 130)
		VP15TF	160 (120 – 200)
	Ductile cast iron	MV1020	200 (150 – 250)
		MV1030	150 (100 – 200)
	Ductile cast iron	VP15TF	150 (100 – 200)
		MV1020	180 (130 – 230)
		MV1030	120 (80 – 160)
		VP15TF	120 (80 – 160)
S	Titanium alloys	MP1220	50 (30 – 65)
		MP1230	40 (30 – 60)
		MP1240	40 (30 – 60)
	Heat resistant alloy	MP1220	40 (20 – 50)
		MP9120	40 (20 – 50)
		MP1230	30 (20 – 40)
		MP9130	30 (20 – 40)
		MP1240	30 (20 – 40)
		VP15TF	40 (20 – 50)
		VP15TF	70 (40 – 100)
H	Hardened steel	40–55HRC	VP15TF

WJX14 – DEPTH OF CUT / FEED PER TOOTH

Material	Properties	ap		DCX=50.52	DCX>63
				fz	fz
P	Mild steel	≤180HB	≤1 M, R	1.5 [0.6 – 2.5]	1.7 [0.6 – 2.8]
			≤1 L	1.2 [0.4 – 2.0]	1.2 [0.4 – 2.0]
			≤1.5 M, R	1.3 [0.6 – 2.0]	1.5 [0.6 – 2.5]
			≤1.5 L	1.0 [0.4 – 1.8]	1.0 [0.4 – 1.8]
			≤2 M, R	1.2 [0.6 – 2.0]	1.3 [0.6 – 2.5]
			≤2 L	0.8 [0.4 – 1.7]	0.8 [0.4 – 1.7]
			≤2.5 M, R	0.8 [0.3 – 1.5]	1.0 [0.3 – 1.6]
			≤3 M, R	0.4 [0.2 – 1.0]	0.5 [0.2 – 1.2]
	Carbon steel Alloy steel	180 – 280HB	≤1 M, R	1.5 [0.5 – 2.0]	1.7 [0.5 – 2.5]
			≤1 L	1.0 [0.3 – 1.7]	1.0 [0.3 – 1.7]
			≤1.5 M, R	1.2 [0.5 – 1.7]	1.3 [0.5 – 2.5]
			≤1.5 L	0.8 [0.3 – 1.5]	0.8 [0.3 – 1.5]
			≤2 M, R	1.0 [0.5 – 1.5]	1.2 [0.5 – 2.0]
			≤2 L	0.7 [0.3 – 1.2]	0.7 [0.3 – 1.2]
			≤2.5 M, R	0.7 [0.3 – 1.2]	0.9 [0.3 – 1.5]
			≤3 M, R	0.3 [0.2 – 0.8]	0.4 [0.2 – 1.0]
	Carbon steel Alloy steel Alloy tool steel	280 – 350HB ≤350HB (Annealing)	≤1 M, R	1.5 [0.5 – 2.0]	1.7 [0.5 – 2.5]
			≤1 L	1.0 [0.3 – 1.7]	1.0 [0.3 – 1.7]
			≤1.5 M, R	1.2 [0.5 – 1.7]	1.3 [0.5 – 2.2]
			≤1.5 L	0.8 [0.3 – 1.5]	0.8 [0.3 – 1.5]
			≤2 M, R	1.0 [0.5 – 1.5]	1.2 [0.5 – 2.0]
			≤2 L	0.7 [0.3 – 1.2]	0.7 [0.3 – 1.2]
			≤2.5 M, R	0.7 [0.3 – 1.2]	0.9 [0.3 – 1.5]
			≤3 M, R	0.3 [0.2 – 0.8]	0.4 [0.2 – 1.0]
	Pre-hardened steel	35 – 45HRC	≤1 M, R	1.3 [0.4 – 1.7]	1.5 [0.4 – 2.0]
			≤1 L	0.7 [0.3 – 1.2]	0.7 [0.3 – 1.2]
			≤1.5 M, R	1.0 [0.4 – 1.5]	1.2 [0.4 – 1.5]
			≤1.5 L	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]
			≤2 M, R	0.8 [0.4 – 1.2]	1.0 [0.4 – 1.3]
			≤2 L	0.5 [0.3 – 0.8]	0.5 [0.3 – 0.8]
			≤1 L	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]
			≤1 M	1.0 [0.5 – 1.2]	1.0 [0.5 – 1.2]
M	Austenitic stainless steel	≤200HB	≤1.5 L	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]
			≤1.5 M	1.0 [0.5 – 1.0]	1.0 [0.5 – 1.0]
			≤1 L	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]
			≤1 M	1.0 [0.5 – 1.2]	1.0 [0.5 – 1.2]
	Ferritic and martensitic stainless steel	≤200HB	≤1.5 L	0.8 [0.3 – 1.0]	0.8 [0.3 – 1.0]
			≤1.5 M	1.0 [0.5 – 1.0]	1.0 [0.5 – 1.0]
			≤1 L	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]
			≤1 M	0.8 [0.4 – 1.0]	0.8 [0.4 – 1.0]
	Duplex stainless steel	≤280HB	≤1.5 L	0.6 [0.3 – 0.8]	0.6 [0.3 – 0.8]
			≤1.5 M	0.8 [0.4 – 0.8]	0.8 [0.4 – 0.8]
			≤1 L	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]
			≤1 M	0.8 [0.4 – 1.0]	0.8 [0.4 – 1.0]
	Precipitation hardening stainless steel	<450HB	≤1.5 L	0.6 [0.3 – 0.8]	0.6 [0.3 – 0.8]
			≤1.5 M	0.8 [0.4 – 0.8]	0.8 [0.4 – 0.8]
			≤1 L	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]
			≤1 M	0.8 [0.4 – 1.0]	0.8 [0.4 – 1.0]

WJX14 – DEPTH OF CUT / FEED PER TOOTH

Material	Properties	ap		DCX=50.52	DCX>63
				fz	fz
K Gray cast iron	≤350MPa	≤1	M, R	1.7 [0.6 – 2.5]	1.8 [0.6 – 2.8]
		≤1	L	1.3 [0.4 – 2.0]	1.3 [0.4 – 2.0]
		≤1.5	M, R	1.5 [0.6 – 2.0]	1.7 [0.6 – 2.5]
		≤1.5	L	1.2 [0.4 – 1.8]	1.2 [0.4 – 1.8]
		≤2	M, R	1.3 [0.6 – 2.0]	1.5 [0.6 – 2.5]
		≤2	L	1.0 [0.4 – 1.5]	1.0 [0.4 – 1.5]
		≤2.5	M, R	0.8 [0.3 – 1.5]	1.0 [0.3 – 1.6]
		≤3	M, R	0.4 [0.2 – 1.0]	0.5 [0.2 – 1.2]
K Ductile cast iron	≤450MPa	≤1	M, R	1.5 [0.5 – 2.0]	1.7 [0.5 – 2.5]
		≤1	L	1.2 [0.3 – 2.0]	1.2 [0.3 – 2.0]
		≤1.5	M, R	1.3 [0.5 – 1.8]	1.5 [0.5 – 2.0]
		≤1.5	L	1.0 [0.3 – 1.7]	1.0 [0.3 – 1.7]
		≤2	M, R	1.2 [0.5 – 1.8]	1.3 [0.5 – 2.0]
		≤2	L	0.8 [0.3 – 1.5]	0.8 [0.3 – 1.5]
	≤800MPa	≤2.5	M, R	0.7 [0.3 – 1.2]	0.9 [0.3 – 1.5]
		≤3	M, R	0.3 [0.2 – 0.8]	0.4 [0.2 – 1.0]
		≤1	M, R	1.3 [0.4 – 1.8]	1.5 [0.4 – 2.0]
		≤1	L	1.0 [0.3 – 1.7]	1.0 [0.3 – 1.7]
		≤1.5	M, R	1.2 [0.4 – 1.5]	1.3 [0.4 – 1.8]
		≤1.5	L	0.8 [0.3 – 1.5]	0.8 [0.3 – 1.5]
S Titanium alloy	—	≤2	M, R	1.0 [0.4 – 1.5]	1.2 [0.4 – 1.8]
		≤2	L	0.7 [0.3 – 1.2]	0.7 [0.3 – 1.2]
		≤1	L	0.3 [0.2 – 0.6]	0.3 [0.2 – 0.6]
		≤1.5	L	0.3 [0.2 – 0.5]	0.3 [0.2 – 0.5]
		≤2	L	0.3 [0.2 – 0.4]	0.3 [0.2 – 0.4]
		≤1	L, M, R	1.0 [0.3 – 1.3]	1.0 [0.3 – 1.3]
S Heat resistant alloy	—	≤1.5	L, M, R	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]
		≤2	L, M, R	0.7 [0.3 – 1.2]	0.7 [0.3 – 1.2]
		≤1	R, M	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]
H Hardened steel	40 – 55HRC	≤1.5	R, M	0.6 [0.3 – 1.0]	0.6 [0.3 – 1.0]
		≤2	R, M	0.5 [0.3 – 0.8]	0.5 [0.3 – 0.8]
		≤1	R, M	0.8 [0.3 – 1.2]	0.8 [0.3 – 1.2]

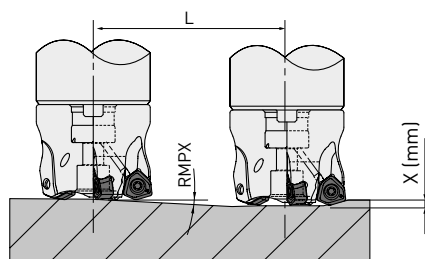
2/2

1. Internal coolant is recommended for titanium alloy and heat resistant alloy machining.
2. To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, wet cutting is recommended.
3. When large vibration occurs, reduce the cutting conditions.
4. For interrupted cutting, reduce the cutting speed and feed rate by 20 %.
5. If ap is set at 2 mm or more, avoid wall machining or ramping.

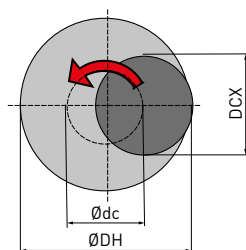
WJX14

MAXIMUM CAPACITIES BY MODE

RAMPING



HELICAL MILLING



How to derive a locus of the centre of the tool.

$$\varnothing DC = \varnothing DH - DCX$$

Locus of the centre of the tool Desired hole diameter Cutting diameter maximum

Tool holder type	APMX	DC	DCX	AZ ^{*1}	Ramping			Helical milling (Blind hole, Flat bottom)		Helical milling (Through hole)
					RMPX	L (mm) ^{*2}		DH		DH
						x=1	x=2	Min.	Max.	Min.
WJX14-063	2	47.5	63	2.1	3.0°	19.1	38.2	108	123	99
WJX14-066	2	50.4	66	2.1	2.8°	20.5	40.9	114	129	105
WJX14-080	2	64.4	80	2.1	2.1°	27.3	54.6	142	157	133
WX14-100	2	84.4	100	2.1	1.5°	38.2	76.4	182	197	173
WJX14-125	2	109.4	125	2.1	1.2°	47.8	95.5	232	247	223
WJX14-160	2	144.4	160	2.1	0.8°	71.7	143.3	302	317	293

- When ramping and helical milling, it is recommended to reduce the feed per tooth.
- Caution – When ramping, helical milling and drilling, long continuous chips may be scattered.
- Helical milling**
To obtain a flat bottom surface when helical milling, it requires removal of “the uncut part” in the centre of the work material. When helical milling, make sure that the depth of cut per helical pass doesn't exceed the maximum depth of cut (APMX).
- Drilling**
When drilling, set the axial feed per revolution at 0.2 mm/rev or less.

^{*1} AZ = max. Plunging

^{*2} L = Required distance for X mm depth

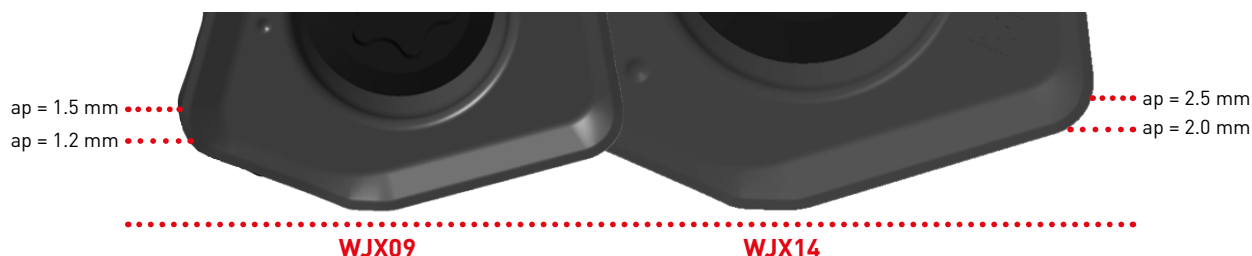
OPERATIONAL GUIDANCE

DEPTH OF CUT

The straight cutting edge covers a maximum depth of cut up to 2.0 mm (APMX).

When face milling steels and cast iron, the depth of cut can be set at up to 3.0 mm, until the corner radius is reached.

When exceeding 2.0 mm depth of cut, decrease the feed rate. See the cutting conditions on page 23–24 for reference.



REMAINING STOCK

Programme the WJX as a radius cutter. The approximate remaining stock K for the programme is shown on the right. See the diagram below for the remaining stock H for vertical walls.

Remaining stock K

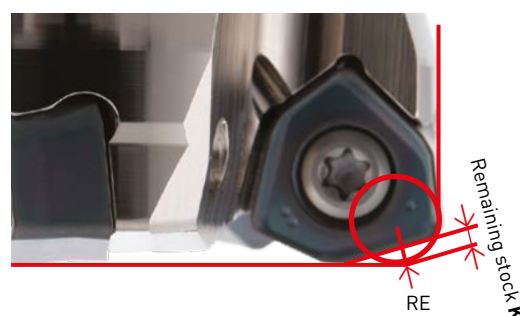
WJX 09 = 0.94 mm

WJX 14 = 1.41 mm

Corner RE (approx.)

WJX09 = R 2.0 mm

WJX14 = R 3.0 mm



WJX09

ap	Remaining stock H
0.5	0.02
1.0	0.07
1.2	0.09

WJX14

ap	Remaining stock H
1.0	0.05
1.5	0.08
2.0	0.12

The 1st pass

The 2nd pass

← Remaining stock H

CUTTER DIAMETER AND FLAT SURFACE MILLING

The maximum cutting diameter (DCX) shown in the WJX items table is not the same as the possible dimensions for face milling a flat surface.

The possible dimensions for face milling are given as the DC value. Please note that this is smaller than the DCX value.



SYMBOLS

 Recommended cutting conditions	MACHINING TYPE
NEW Completely new products or expansions released in the current Spring or Autumn product launch and are not included in the latest version of the General Catalogue.	 Roughing
NEW Products or expansions that have already been introduced in one of the previous Spring or Autumn product launches but are not included in the latest General Catalogue.	 Medium cutting
APPLICATION	 Light cutting
 Face milling	 Pre-finishing
 Chamfer milling	 Finishing
 Shoulder milling with R	 Fine-finishing
 Face milling close to a wall	TOOL MATERIAL
 Shoulder milling	 Ultra micro grain carbide Ultra micro grain carbide substrate material.
 Side milling	 Cubic boron nitride Mitsubishi Materials' original CBN material.
 Slot milling	 Ceramic For high speed efficient machining of super alloys due to the excellent high temperature strength property.
 Ramping	 High hardness powder metallurgy HSS High hardness powder metallurgy HSS substrate material.
 Pocket milling	 High grade high alloy HSS High grade high alloy HSS substrate material.
 Slot milling with R	 Cobalt high speed steel Cobalt high speed steel substrate material.
 Copy milling	 High speed steel High speed steel substrate material.
 T-Slot milling	

SYMBOLS

COATING



SMART MIRACLE coating

New smooth and dense coating technology for high efficiency milling of difficult to cut materials.



CRN coating

Newly developed CrN coating for Copper Electrodes machining.



Violet coating

Increased tool life of 2-3 times more than TiN coated products.



DP coating

New generation coating suitable for a wide range of materials.



MIRACLE coating

The original Miracle (Al,Ti)N coating. Also suitable for dry cutting.



[Al, Ti]N coating

[Al,Ti]N highly versatile application range.



[Al,Ti,Cr]N multi-layer coating

For carbon, alloy and hardened steels.



IMPACT MIRACLE coating

Single phase nano crystal coating technology has higher film hardness and heat resistance.



MIRACLE coating

The original MIRACLE (Al,Ti)N coating. Also suitable for dry cutting.



VFR coating

The [AlCrSi]N/[AlTiSi]N PVD multilayer coating is ideal for machining of extremely hard materials up to 70 HRC.



DLC coating

Hardness similar to CVD diamond coating achieved with high adhesion strength.



Diamond coating

Suitable for CFRP and CFRP-aluminium materials.



Diamond coating

Suitable for graphite machining.



Diamond coating

The original CVD diamond coating.



CVD Diamond coating

Unique multi-layer micro-grain diamond crystal control technology drastically improves wear resistance and smoothness.

CUTTING EDGE PROPERTIES



Sharp corner edge

Indicates the end mill has a sharp corner edge.



Gash land

Indicates the end mill cutting edge has a protective chamfer.



Rake angle



Helix angle

Indicates the helix angle of the end mill.



Point angle

Indicates the drill point angle.



Roughing flute geometry



Variable helix



Rounded gash



Corner angle

WEB THINNING



X type point geometry

X web thinning used at the drill point.



XR type point geometry

XR web thinning used at the drill point.



S type point geometry

Easy cutting geometry.



N type point geometry

Effective when the point web is thick.



Chipbreaker

SYMBOLS

TOLERANCES



Tolerance of taper angle
Indicates the tolerance of the taper angle.



R tolerance
Indicates the radial tolerance of a ball nose end mill.



R tolerance
Indicates the radial tolerance of the corner radius.



R tolerance
Indicates the radial tolerance of a cutter with a corner radius.



Outside diameter tolerance
Indicates the diameter tolerance of the end mill.



Peak tolerance
Indicates the tolerance for the end diameter.



Shank diameter tolerance



Shank diameter tolerance



Drill tolerance / diameter

COOLANT HOLES



External coolant



Internal coolant



Internal coolant



Centered, internal coolant hole



Radial, internal coolant holes



Internal coolant holes



Internal coolant holes

MEMO

MEMO

MEMO

EUROPEAN SALES COMPANIES

GERMANY

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