5-AXIS Series

TECHNOLOGY

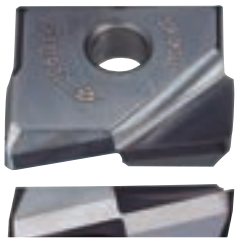
Designs that allow you to machine freely & quickly

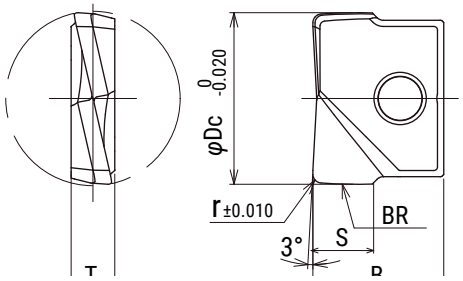
Advanced machining technology that enables high-precision and high efficiency

A line-up that supports machining of complex sharpes found in the Die&Mould and Aerospace industries.

5-AXIS Series

KRM TYPE Insert for "MIRROR BARREL" KRM type





Radius form accuracy on the outer periphery ±0.010mm

Corner radius accuracy of inserts within ±0.010mm

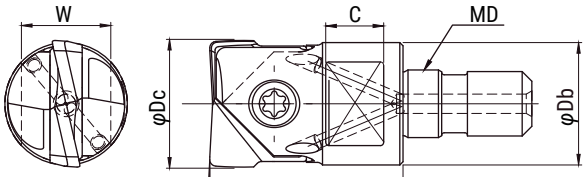
5 axis

Cat.No.	Grade		Dimensions (mm)					
	JC8015	DH102	φDc	*r*	BR	S	B	T
KRM-160-R10-BR50	●	●	16	1	50	5.7	12	4
KRM-200-R10-BR60	●	●	20	1	60	6.8	15	5
KRM-250-R10-BR60	●	●	25	1	60	7.3	18.5	6
KRM-300-R10-BR60	●	●	30	1	60	9.1	22.5	7

MRX TYPE Modular head MRX type

5 axis

Accuracy of MRX after combined O.D. run out: below 15μm (Target below 10 μm).
When using KRM type insert/Corner radius accuracy: within ±0.010mm. Radius form accuracy on the outer periphery: within ±0.010mm.

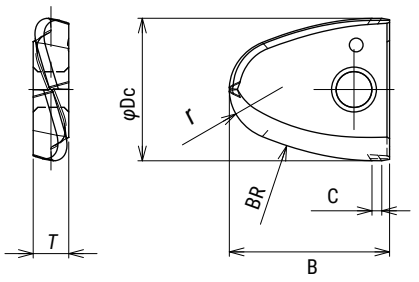


Clamp screw	Torque(N·m)
FSW-4013H	3.0
FSW-5016H	4.0
FSW-6020	5.0
FSW-8025S	6.0

Cat.No.	Stock	Dimensions (mm)						Inserts		Parts	
										Screw	Wrench
		φDc	*Lf*	φDb	MD	C	W				
MRX-160-M8	●	16	23	15	M8	8	12	RNM-160/170... FRM-160/170...	/HRM-160/170... /KRM-160...	FSW-4013H	A-15
MRX-200-M10	●	20	30	19	M10	8	14	RNM-200/210... FRM-200/210...	/HRM-200/220... /KRM-200...	FSW-5016H	A-20W
MRX-250-M12	●	25	25	24	M12	10	17	RNM-250/260...	/FRM-250... /KRM-250...	FSW-6020	A-30
MRX-300-M16	●	30	30	29	M16	12.5	22	RNM-300...	/FRM-200/220... /KRM-300...	FSW-8025S	A-30

5-AXIS Series

TNM TYPE Insert for "MIRROR BARREL" TNM type



Corner radius accuracy of inserts within ±0.010mm

5 axis

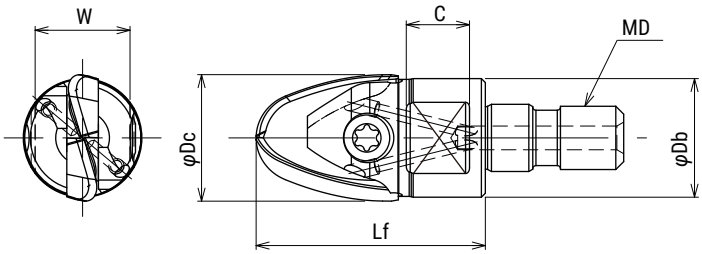
Cat.No.	Grade		Dimensions (mm)					
	JC8015	FZ15	φDc	r	BR	B	T	C
TNM-160-NR6BR32	●		16	6	32	4	1	4
TNM-160-NR6BR32		●	16	6	32	4	1	5
TNM-200-NR8BR40	●		20	8	40	5	1	6
TNM-200-NR8BR40		●	20	8	40	5	1	7

MTP TYPE MIRROR BARREL Modular head MTP type

Through coolant hole

Accuracy of MTP after combined O.D. run out: below 15 μm (Target below 10 μm).
When using TNM type insert / Radius form accuracy on the outer periphery: within ±0.010mm.

5 axis

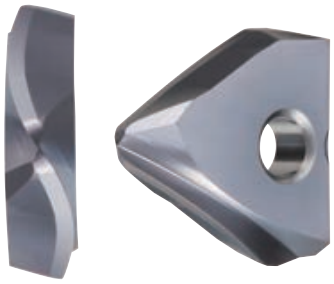


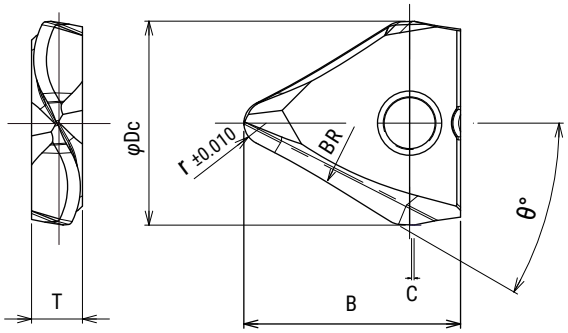
Clamp screw	Torque(N·m)
FSW-4013H	3.0
FSW-5016H	4.0

Cat.No.	Stock	Dimensions (mm)						Inserts	Parts	
		φDc	Lf	φDb	MD	C	W		Screw	Wrench
MTP-160-M8	●	16	29	15	M8	8	12	TPM-160... TNM-160...	FSW-4013H	A-15
MTP-200-M10	●	20	36	19	M10	8	14	TPM-200... TNM-200...	FSW-5016H	A-20W

5-AXIS Series

TPM TYPE — Insert for "MIRROR BARREL" TPM type





Radius form accuracy on the outer periphery ±0.010mm

Radius accuracy of inserts within ±0.010mm

5 axis

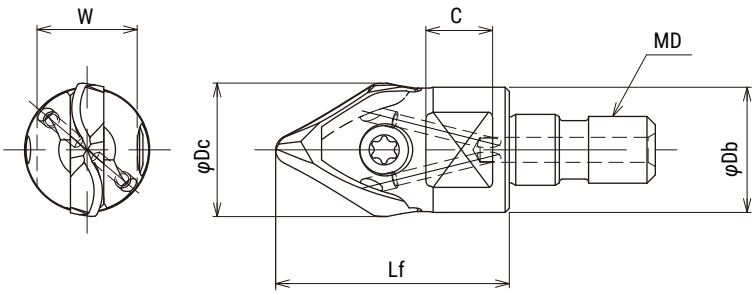
Cat.No.	Grade		Dimensions (mm)						
	JC8015	DH102	φDc	r	BR	B	T	C	θ°
TPM-160-NR2T30BR400	●	●	16	2	400	17	4	1	30°
TPM-200-NR2T30BR500	●	●	20	2	500	20	5	1	30°

MTP TYPE — MIRROR BARREL Modular head MTP type

Through coolant hole

Accuracy of MTP after combined O.D. run out: below 15 μm (Target below 10μm).
When using TPM type insert / Corner Radius accuracy: within ±0.010mm. Radius form accuracy on the outer periphery: within ±0.010mm.

5 axis

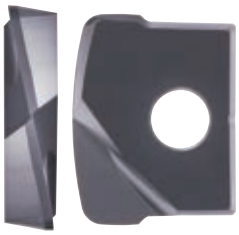


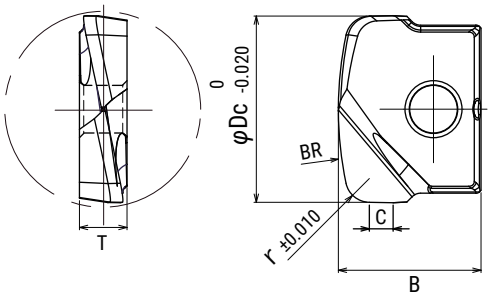
Clamp screw	Torque(N·m)
FSW-4013H	3.0
FSW-5016H	4.0

Cat.No.	Stock	Dimensions (mm)						Inserts	Parts	
		φDc	Lf	φDb	MD	C	W		Screw	Wrench
MTP-160-M8	●	16	28	15	M8	8	12	TPM-160... TNM-160...	FSW-4013H	A-15
MTP-200-M10	●	20	35	19	M10	9	14	TPM-200... TNM-200...	FSW-5016H	A-20W

5-AXIS Series

LRM TYPE — Insert for "MIRROR BARREL" LRM type





Radius form accuracy on the bottom ±0.010mm

Corner radius accuracy of inserts within ±0.010mm

5 axis

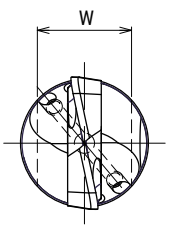
Cat.No.	Grade		Dimensions (mm)					
	JC8015	FZ15	φDc	r	BR	B	T	C
LRM-160-R20-BR32	●	●	16	2	32	12	4	2
LRM-200-R30-BR40	●	●	20	3	40	15	5	2
LRM-250-R30-BR50	●	●	25	3	50	18.50	6	2.5
LRM-300-R30-BR60	●	●	30	3	60	22.50	7	3

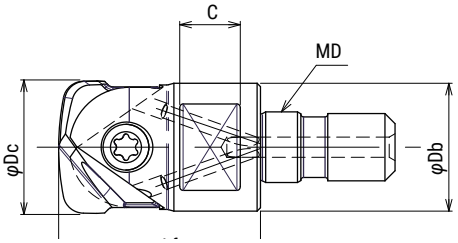
MBX TYPE — Modular head MBX type

Through coolant hole

Accuracy of MBX after combined O.D. run out: below 15μm (Target below 10μm).
When using LRM type insert/Corner radius accuracy: within ±0.010mm. Radius form accuracy on the front edge: within ±0.010mm.

5 axis





Clamp screw	Torque(N.m)
FSW-4013H	3.0
FSW-5016H	4.0
FSW-6020	5.0
FSW-8025S	6.0

Cat.No.	Stock	Dimensions (mm)						Inserts		Parts	
		φDc	Lf	φDb	MD	C	W			Screw	Wrench
MBX-160-M8	●	16	23	15	M8	8	12	BNM-160...	/LRM-160...	FSW-4013H	A-15
MBX-200-M10	●	20	30	19	M10	8	14	BNM-200...	/LRM-200...	FSW-5016H	A-20W
MBX-250-M12	●	25	35	24	M12	10	17	BNM-250...	/LRM-250...	FSW-6020	A-30
MBX-300-M16	●	30	43	29	M16	12.5	22	BNM-300...	/LRM-300...	FSW-8025S	A-30

5-AXIS Series

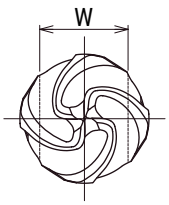
STLP TYPE Solid modular head STLP type

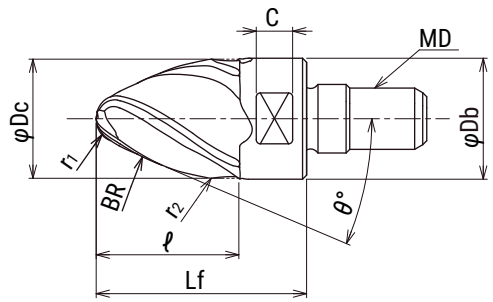
● 4flutes Helix angle 30°

Radius form accuracy on the outer periphery ±0.010mm

DH Coating

5 axis





Cat.No.	Stock	Grade	No.of Flutes	Dimensions (mm)										
				φDc	ℓ	Lf	BR	r_1	r_2	θ°	φDb	MD	C	W
STLP-4160T20R4-M8	●	DH115	4	16	17.7	26	1500	4	4	20°	15	M8	5.5	14
STLP-4200T15R4-M10	●			20	30	38	1500	4	5	15°	19	M10	5.5	17
STLP-4200T20R5-M10	●			20	22	30	1500	5	5	20°	19	M10	5.5	17
STLP-4250T20R5-M12	●			25	28	38	2,200	5	5	20°	24	M12	5.5	22

ΦDc (mm)	Torque	Width across flats W (mm)	DIJET DS type spanner
φ16	10～11 N·m	14	DS-14
φ20	10～16 N·m	17	DS-17

5-AXIS Series

FJVA TYPE

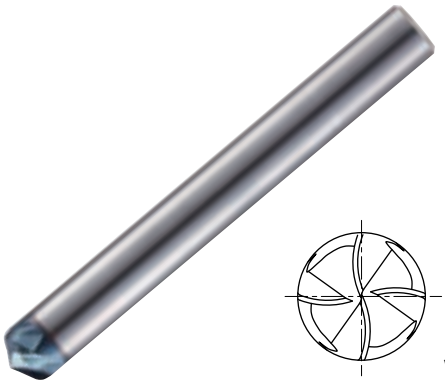
"FUJI BARRELL" FJVA type

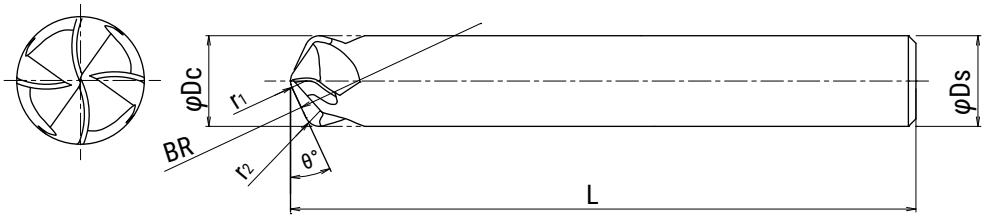
Radius form accuracy on the outer periphery ±0.010mm

DH Coating

5 axis

- 4flutes
- For shrink fit holder





Cat.No.	Stock	Grade	No.of Flutes	Dimensions (mm)						
				φDc	BR	r_1	r_2	θ°	L	φDs
FJVA4060S06-R250	●	DH115	4	6	250	1	1	25°	60	6
FJVA4080S08-R250	●			8	250	1	1.2	25°	75	8
FJVA4100S10-R250	●			10	250	1	1.75	25°	80	10
FJVA4120S12-R250	●			12	250	1	1.75	25°	100	12

5-AXIS Series

MQT TYPE High precison "QM MAX" MQT type

- 3 different angled bodies (0°, 3°, and 5°) that cover a range of tapered walls from 0° ~ 8°
- Possible to use even on 3 axis machine with 3°or 5°angled body ; A03 type or A05 type
- High tolerance insert-pocket for the ground inserts
- High efficiency with multi flutes

Fig 1

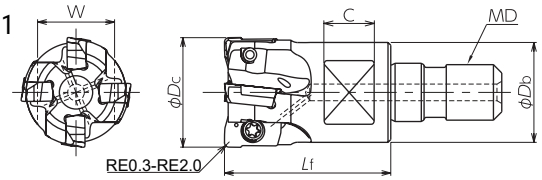
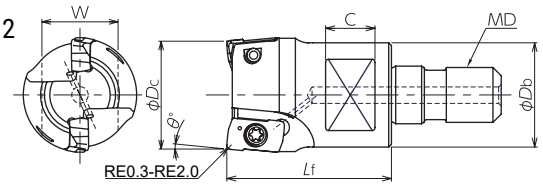


Fig 2

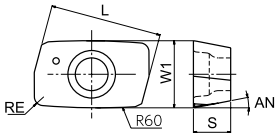


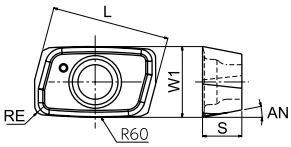
Inclination angle θ°	Cat.No.	Stock	No. of inserts	Dimensions (mm)						Parts		Inserts	Fig.
				φDc	Lf	φDb	MD	C	W	Screws	Wrench		
0°	MQT-2016A00-M8	●	2	16	23	14	M8	8	12	TSW-2556H	A-08	XP**100308ZER-R; YPHW1003**Z*R-**; ZPMT1003**ZER-PL	1
	MQT-4020A00-M10	●	4	20	30	18	M10	9	14				
	MQT-5025A00-M12	●	5	25	35	22.5	M12	10	17	DSW-2563H			
	MQT-6032A00-M16	●	6	32	43	29	M16	12	22				
	MQT-6035A00-M16	●		35			M16						
3°	MQT-2016A03-M8	●	2	16	23	14	M8	8	12	TSW-2556H			2
	MQT-2020A03-M10	●		20	30	18	M10	9	14				
5°	MQT-2016A05-M8	●		16	23	14	M8	8	12				
	MQT-2020A05-M10	●		20	30	18	M10	9	14				

Clamp screw	Torque(N.m)
TSW-2556H	3.0
DSW-2563H	4.0

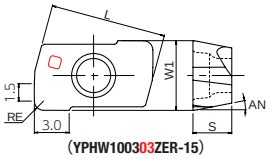
5-AXIS Series

For tapered wall finishing
(XPHW100308ZER-R)
(XPHT100308RZER-R)

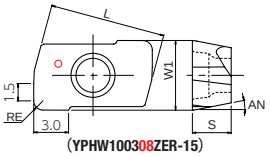




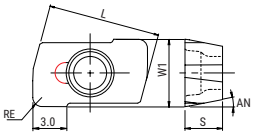
For finishing side face
(YPHW1003ZER-15)**
(YPHW100308ZER-F)
(YPHW100308ZTR-F1)



(YPHW100303ZER-15)

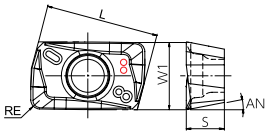


(YPHW100308ZER-15)

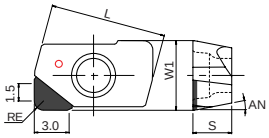


(YPHW100308ZER-F) (for low feed)

Shoulder milling insert
(from semi-finishing to finishing)
ZPMT1003ZER-PL***



CBN Insert



(YPHW100308ZTR-F1)

Type	Cat.No.	Tolerance	PVD Coating				Cermet	CBN	Dimensions (mm)				
			DH102	JC8015	JC8050	JC8118	CX75	JBN795	RE	L	W1	S	AN
For tapered wall finishing	XPHW100308ZER-R	H	●	●					0.8	10.06	6	3.35	11°
							●						
	XPHT100308ZER-R			●									
							●						
For finishing side face	YPHW100303ZER-15			●					0.3				
			●										
							●						
	YPHW100308ZER-15		●						0.8				
							●						
	YPHW100308ZER-F			●									
	YPHW100308ZTR-F1							●					
Shoulder milling insert (from semi-finishing to finishing)	ZPMT100304ZER-PL	M	●		●	●			0.4	10.08		3.4	
							●						
	ZPMT100308ZER-PL		●		●	●			0.8				
							●						
	ZPMT100320ZER-PL		●		●	●			2				
							●						

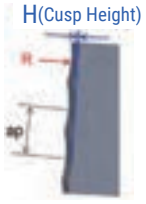
5-AXIS Series

■ Recommended cutting conditions

● KRM Type Side finishing

Material	Grade	Tool dia.(mm)							
		16				20			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	0.8	0.15	5,970	2,390	1	0.15	4,770	1,910
Cast steel (GM190, ICD5) below 285HB	JC8015	0.8	0.15	5,970	2,390	1	0.15	4,770	1,910
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	0.8	0.15	5,970	2,390	1	0.15	4,770	1,910
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	0.8	0.12	5,970	2,390	1	0.12	4,770	1,910
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	0.8	0.12	5,570	1,670	1	0.12	4,460	1,340
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	0.6	0.1	4,970	750	0.7	0.1	3,980	600
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102	0.5	0.1	3,980	600	0.7	0.1	3,180	480
Grey cast iron (FC250) 160-260HB	DH102	0.8	0.2	6,960	3,480	1	0.2	5,570	3,340
Nodular cast iron (FCD700) 170-300HB	DH102	0.8	0.2	6,960	3,480	1	0.2	5,570	3,340
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	0.8	0.12	5,570	2,230	1	0.12	4,460	1,780
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	0.8	0.12	5,570	2,230	1	0.12	4,460	1,780
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.5	0.1	1,990	480	0.6	0.1	1,590	380
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.5	0.1	1,590	380	0.6	0.1	1,270	300

Please refer to chart and formula below to calculate ap.



$$ap = 2\sqrt{(R^2-(R-H)^2)}$$

ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
KRM-160-R10-BR50	50	0.63	0.89	1.10	1.26	1.41	1.55	1.67	1.79	1.90	2.00
KRM-200-R10-BR60	60	0.69	0.98	1.20	1.39	1.55	1.70	1.83	1.96	2.08	2.19

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
3Dc ~ 5Dc	70%	70%
5Dc ~ 10Dc	50%	50%

5-AXIS Series

■ Recommended cutting conditions

● KRM Type Side finishing

Material	Grade	Tool dia.(mm)							
		25				30			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	1.2	0.15	3,820	1,530	1.2	0.15	3,180	1,270
Cast steel (GM190, ICD5) below 285HB	JC8015	1.2	0.15	3,820	1,530	1.2	0.15	3,180	1,270
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	1.2	0.15	3,820	1,530	1.2	0.15	3,180	1,270
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	1.2	0.12	3,820	1,530	1.2	0.12	3,180	1,270
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	1	0.12	3,570	1,070	1	0.12	2,970	890
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	0.8	0.1	3,180	480	0.8	0.1	2,650	400
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102	0.7	0.1	2,550	380	0.7	0.1	2,120	320
Grey cast iron (FC250) 160-260HB	DH102	1.2	0.2	4,460	2,680	1.2	0.2	3,710	2,230
Nodular cast iron (FCD700) 170-300HB	DH102	1.2	0.2	4,460	2,680	1.2	0.2	3,710	2,230
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	1.2	0.12	3,570	1,430	1.2	0.12	2,970	1,190
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	1.2	0.12	3,570	1,430	1.2	0.12	2,970	1,190
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.7	0.1	1,270	320	0.7	0.1	1,060	270
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.7	0.1	1,020	260	0.7	0.1	850	210

Please refer to chart and formula below to calculate ap.

$$ap = 2\sqrt{(R^2-(R-H)^2)}$$

ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
KRM-250-R10-BR60	60	0.69	0.98	1.20	1.39	1.55	1.70	1.83	1.96	2.08	2.19
KRM-300-R10-BR60											

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
3Dc ~ 5Dc	70%	70%
5Dc ~ 10Dc	50%	50%

5-AXIS Series

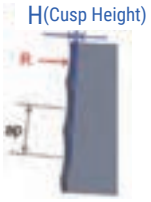
■ Recommended cutting conditions

● TNM Type Side finishing with Barrel R

Material	Grade	Tool dia.(mm)							
		16				20			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	~1	0.2	6,960	2,780	~1	0.2	5,570	2,230
Cast steel (GM190, ICD5) below 285HB	JC8015	~1	0.2	6,960	2,780	~1	0.2	5,570	2,230
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	~1	0.2	6,960	2,780	~1	0.2	5,570	2,230
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	~1	0.2	6,960	2,780	~1	0.2	5,570	2,230
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	~1	0.2	5,970	2,390	~1	0.2	4,770	1,910
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	JC8015	~1	0.1	4,970	1,490	~1	0.1	3,980	1,190
Grey cast iron (FC250) 160-260HB	JC8015	~1	0.2	6,960	2,780	~1	0.2	5,570	2,230
Nodular cast iron (FCD700) 170-300HB	JC8015	~1	0.2	6,960	2,780	~1	0.2	5,570	2,230
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	~1	0.2	6,960	2,090	~1	0.2	5,570	1,670
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	~1	0.2	6,960	2,090	~1	0.2	5,570	1,670
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	~0.4	0.15	4,970	1,490	~0.4	0.15	3,980	1,190
Heat resistant alloy (INCO718) 35-43HRC	JC8015	~0.4	0.1	3,980	800	~0.4	0.1	3,180	640
Alminium alloy below 50-110HRC	FZ15	~1.5	0.25	9,950	4,980	~1.5	0.25	7,960	4,780

Please refer to chart and formula below to calculate ap.

$$ap = 2\sqrt{(R^2-(R-H)^2)}$$



ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
TNM-160-NR6BR32	32	0.51	0.72	0.88	1.01	1.13	1.24	1.34	1.43	1.52	1.60
TNM-200-NR8BR40	40	0.57	0.80	0.98	1.13	1.26	1.39	1.50	1.60	1.70	1.79

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
3Dc ~ 5Dc	70%	70%
5Dc ~ 10Dc	50%	50%

5-AXIS Series

■ Recommended cutting conditions

● TNM Type - with Tip R

Material	Grade	Tool dia.(mm)							
		16				20			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	0.15	0.2	10,940	4,380	0.15	0.25	8,750	5,250
Cast steel (GM190, ICD5) below 285HB	JC8015	0.15	0.2	10,940	4,380	0.15	0.25	8,750	5,250
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	0.15	0.2	10,940	4,380	0.15	0.25	8,750	5,250
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	0.15	0.2	9,950	3,980	0.15	0.25	7,960	4,780
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	0.1	0.2	7,960	2,390	0.1	0.25	6,370	3,190
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	JC8015	0.1	0.2	5,970	1,790	0.1	0.25	4,770	2,390
Grey cast iron (FC250) 160-260HB	JC8015	0.15	0.2	10,940	5,470	0.15	0.25	8,750	6,130
Nodular cast iron (FCD700) 170-300HB	JC8015	0.15	0.2	10,940	5,470	0.15	0.25	8,750	6,130
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	0.15	0.2	10,940	4,380	0.15	0.25	8,750	5,250
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	0.15	0.2	10,940	4,380	0.15	0.25	8,750	5,250
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.1	0.2	7,960	3,180	0.1	0.25	6,370	3,190
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.1	0.1	5,970	1,790	0.1	0.1	4,770	1,910
Alminium alloy below 50-110HRC	FZ15	0.25	0.2	13,330	6,670	0.25	0.2	10,660	6,400

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
3Dc ~ 5Dc	70%	70%
5Dc ~ 10Dc	50%	50%

5-AXIS Series

■ Recommended cutting conditions

● TPM Type - with Barrel R

Material	Grade	Tool dia.(mm)							
		16				20			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	~4	0.15	13,930	4,180	~5	0.2	11,140	3,340
Cast steel (GM190, ICD5) below 285HB	JC8015	~4	0.15	13,930	4,180	~5	0.2	11,140	3,340
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	~4	0.15	13,930	4,180	~5	0.2	11,140	3,340
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	~3.5	0.12	11,940	3,580	~4.5	0.1	9,550	2,870
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	~3	0.12	9,950	2,990	~4	0.1	7,960	2,390
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	~2.5	0.1	6,960	1,390	~3	0.1	5,570	1,110
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102	~2	0.1	5,970	1,190	~2.5	0.1	4,770	950
Grey cast iron (FC250) 160-260HB	DH102	~4	0.15	13,930	5,570	~5	0.2	11,140	4,460
Nodular cast iron (FCD700) 170-300HB	DH102	~4	0.15	13,930	4,180	~5	0.2	11,140	3,340
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	~3	0.12	11,940	3,580	~4	0.1	9,550	2,870
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	~3	0.12	11,940	3,580	~4	0.1	9,550	2,870
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	~2.5	0.1	5,970	1,190	~3	0.1	4,770	950
Heat resistant alloy (INCO718) 35-43HRC	JC8015	~2.5	0.1	3,980	800	~3	0.1	3,180	640

Please refer to chart and formula below to calculate ap.

$$ap = 2\sqrt{(R^2-(R-H)^2)}$$

Pick amount ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
TPM-160-NR2T30BR400	400	1.79	2.53	3.10	3.58	4.00	4.38	4.73	5.06	5.73	5.66
TPM-200-NR2T30BR500	500	2.00	2.83	3.46	4.00	4.47	1.39	4.90	5.66	6.00	6.32

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ/Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
3Dc ~ 5Dc	70%	70%
5Dc ~ 10Dc	50%	50%

5-AXIS Series

■ Recommended cutting conditions

● TPM Type - with Tip R

Material	Grade	Tool dia.(mm)							
		16				20			
		a_p (mm)	a_e (mm)	n (min^{-1})	V_f (mm/min)	a_p (mm)	a_e (mm)	n (min^{-1})	V_f (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	0.1	0.2	15,920	1,590	0.1	0.2	12,730	1,530
Cast steel (GM190, ICD5) below 285HB	JC8015	0.1	0.2	15,920	1,590	0.1	0.2	12,730	1,530
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	0.1	0.2	15,920	1,590	0.1	0.2	12,730	1,530
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	0.1	0.2	14,920	1,490	0.1	0.2	11,940	1,430
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	0.1	0.2	13,930	1,390	0.1	0.2	11,140	1,110
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	0.08	0.2	9,950	1,000	0.08	0.2	7,960	960
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102	0.08	0.2	8,950	900	0.08	0.2	7,160	860
Grey cast iron (FC250) 160-260HB	DH102	0.12	0.2	16,910	1,690	0.12	0.2	13,530	1,620
Nodular cast iron (FCD700) 170-300HB	DH102	0.12	0.2	15,920	1,590	0.12	0.2	12,730	1,530
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	0.1	0.2	14,920	1,490	0.1	0.2	11,940	1,430
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	0.1	0.2	14,920	1,490	0.1	0.2	11,940	1,430
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.06	0.2	5,970	600	0.06	0.2	4,770	570
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.05	0.2	3,980	400	0.05	0.2	3,180	380

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min^{-1})	V_f (mm/min)
~ 3Dc	100%	100%
3Dc ~ 5Dc	70%	70%
5Dc ~ 10Dc	50%	50%

5-AXIS Series

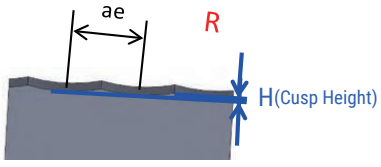
■ Recommended cutting conditions

● LRM Type

Material	Grade	Tool dia.(mm)							
		16				20			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	0.15	~0.6	7,960	4,780	0.15	~0.7	6,370	4,460
Cast steel (GM190, ICD5) below 285HB	JC8015	0.15	~0.6	7,960	4,780	0.15	~0.7	6,370	4,460
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	0.15	~0.6	7,960	4,780	0.15	~0.7	6,370	4,460
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	0.1	~0.6	7,960	3,980	0.1	~0.7	6,370	3,820
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	0.1	~0.6	6,960	3,480	0.1	~0.7	5,570	3,340
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	0.1	~0.5	5,970	2,390	0.1	~0.6	4,770	2,390
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102	0.1	~0.5	4,970	1,990	0.1	~0.6	3,980	1,590
Hardened die steel (SKH,HAP) 55-62HRC	DH102	0.05	~0.25	3,980	1,190	0.05	~0.25	3,180	950
Grey cast iron (FC250) 160-260HB	DH102	0.15	~0.6	7,960	4,780	0.15	~0.7	6,370	4,460
Nodular cast iron (FCD700) 170-300HB	DH102	0.15	~0.6	6,960	4,180	0.15	~0.7	5,570	3,900
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	0.15	~0.6	7,960	3,980	0.15	~0.7	6,370	3,820
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	0.15	~0.6	7,960	3,980	0.15	~0.7	6,370	3,820
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.1	~0.6	4,970	1,990	0.1	~0.7	3,980	1,990
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.1	~0.25	3,980	1,190	0.1	~0.3	3,180	1,270

Please refer to chart and formula below to calculate ap.

$$ae = 2\sqrt{(R^2-(R-H)^2)}$$



Pick amount ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
LRM-160-R20-BR32	32	0.51	0.72	0.88	1.01	1.13	1.24	1.34	1.43	1.52	1.60
LRM-200-R30-BR40	40	0.57	0.80	0.98	1.13	1.26	1.39	1.50	1.60	1.70	1.79

Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
5Dc ~ 10Dc	70%	70%
3Dc ~ 5Dc	50%	50%

5-AXIS Series

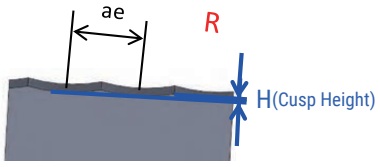
■ Recommended cutting conditions

● LRM Type

Material	Grade	Tool dia.(mm)							
		25				30			
		ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015	0.15	~0.8	5,730	4,010	0.15	~0.8	4,770	3,340
Cast steel (GM190, ICD5) below 285HB	JC8015	0.15	~0.8	5,730	4,010	0.15	~0.8	4,770	3,340
Tool & die steel (SKD61, SKD11) below 255HB	JC8015	0.15	~0.8	5,730	4,010	0.15	~0.8	4,770	3,340
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015	0.1	~0.8	5,730	3,440	0.1	~0.8	4,770	2,860
Mold steel (NAK80, HPM1, P21) 38-43HRC	JC8015	0.1	~0.8	5,090	3,050	0.1	~0.8	4,240	2,540
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102	0.1	~0.7	4,460	2,230	0.1	~0.7	3,710	1,860
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	DH102	0.1	~0.7	3,820	1,530	0.1	~0.7	3,180	1,270
Hardened die steel (SKH,HAP) 55-62HRC	DH102	0.05	~0.25	2,550	770	0.05	~0.25	2,120	640
Grey cast iron (FC250) 160-260HB	DH102	0.15	~0.8	5,730	4,010	0.15	~0.8	4,770	3,340
Nodular cast iron (FCD700) 170-300HB	DH102	0.15	~0.8	5,730	4,010	0.15	~0.8	4,770	3,340
Austenitic stainless steel (SUS304, 316, 317) 17Cr	JC8015	0.15	~0.8	5,730	3,440	0.15	~0.8	4,770	2,860
Ferritic & martensitic stainless steel (SUS403, 420J2, 430) 13Cr	JC8015	0.15	~0.8	5,730	3,440	0.15	~0.8	4,770	2,860
Titanium alloy (Ti-6Al-4V) 35-43HRC	JC8015	0.1	~0.8	3,180	1,590	0.1	~0.8	2,650	1,330
Heat resistant alloy (INCO718) 35-43HRC	JC8015	0.1	~0.3	2,550	1,020	0.1	~0.3	2,120	850

Please refer to chart and formula below to calculate ap.

$$a_e = 2\sqrt{(R^2-(R-H)^2)}$$



Pick amount ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
LRM-250-R30-BR50	50	0.63	0.89	1.10	1.26	1.41	1.55	1.67	1.79	1.90	2.00
LRM-300-R30-BR60	60	0.69	0.98	1.20	1.39	1.55	1.70	1.83	1.96	2.08	2.19

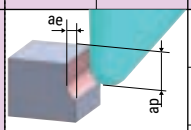
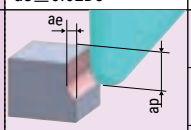
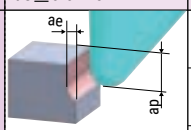
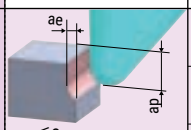
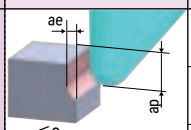
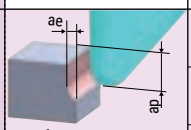
Note
1. Please adjust cutting conditions according to machine rigidity or work rigidity.
2. These parameteres are for overhang length 3Dc. See right table for longer application.
3. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
4. Use air blow.

Overhang (ℓ /Dc)	n (min⁻¹)	Vf (mm/min)
~ 3Dc	100%	100%
5Dc ~ 10Dc	70%	70%
3Dc ~ 5Dc	50%	50%

5-AXIS Series

■ Recommended cutting conditions

● STLP Type - with Barrel R

Material			Tool dia.(mm)					
			16			20		
	a_p (mm)	a_e (mm)	ℓ (mm)	n (min^{-1})	V_f (mm/min)	ℓ (mm)	n (min^{-1})	V_f (mm/min)
Carbon steel (S50C, S55C) below 250HB	 ap≦3 ae≦0.02Dc		70	10,000	3,200~4,000	70	8,000	2,600~3,200
			110	8,800	2,500~3,200	125	7,200	2,000~2,600
			150	7,800	1,900~2,500	175	6,400	1,600~2,100
Alloy steel, Tool & die steel, Mold steel (SKD, SKH, NAK) below 45HB	 ap≦3 ae≦0.02Dc		70	10,000	2,400~3,200	70	8,000	2,000~2,600
			110	8,800	1,800~2,500	125	7,200	1,500~2,100
			150	7,800	1,300~1,900	175	6,400	1,300~1,600
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	 ap≦3 ae≦0.02Dc		70	10,000	2,000~2,800	70	8,000	1,600~2,300
			110	8,800	1,400~2,100	125	7,200	1,200~1,800
			150	7,800	1,000~1,600	175	6,400	800~1,300
Austenitic stainless steel (SUS304, 316, 317) 17Cr	 ap≦3 ae≦0.02Dc		70	10,000	2,000~2,800	70	8,000	1,600~2,300
			110	8,800	1,400~2,100	125	7,200	1,200~1,800
			150	7,800	1,000~1,600	175	6,400	800~1,300
Titanium alloy (Ti-6Al-4V) 35-43HRC	 ap≦3 ae≦0.02Dc		70	8,000	1,000~1,600	70	6,400	800~1,200
			110	7,000	800~1,400	125	5,600	700~900
			150	6,000	500~1,000	175	4,800	400~800
Heat resistant alloy (INCO718) 35-43HRC	 ap≦3 ae≦0.02Dc		70	4,000	320~480	70	3,200	260~380
			110	3,500	280~420	125	2,800	220~340
			150	3,000	240~360	175	2,400	190~290

Please refer to chart and formula below to calculate ap.

H(Cusp Height)

$$a_p = 2\sqrt{(R^2-(R-H)^2)}$$

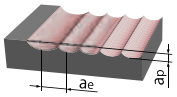
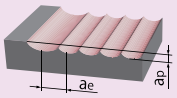
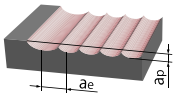
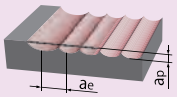
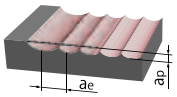
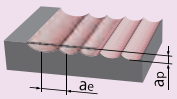
Pick amount ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
STLP-4160T20R4-M8	1500	3.46	4.90	6.00	6.93	7.75	8.49	9.17	9.80	10.39	10.95
STLP-4200T15R4-M10											
STLP-4200T20R5-M10											

Note
1. Please apply coolant according to work material.
2. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
3. In case of machine rpm not enough, reduce Vf at same rate.

5-AXIS Series

■ Recommended cutting conditions

● STLP Type - with Tip R

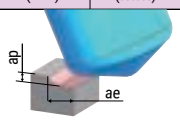
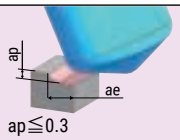
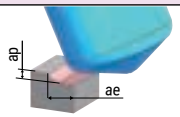
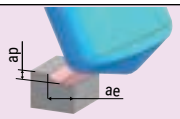
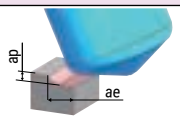
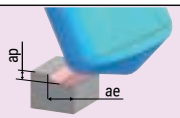
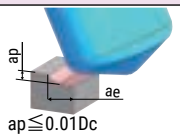
Material			Tool dia.(mm)					
			16			20		
	ap (mm)	ae (mm)	ℓ (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB		ap≦0.4 ae≦0.25	70	7,800	1,090～1,400	70	6,300	880～1,100
			110	7,100	850～1,100	125	5,700	680～910
			150	6,300	630～880	175	5,000	500～700
Alloy steel, Tool & die steel, Mold steel (SKD, SKH, NAK) below 45HB		ap≦0.4 ae≦0.25	70	7,800	780～1,090	70	6,300	630～880
			110	7,100	560～850	125	5,700	450～680
			150	6,300	440～690	175	5,000	350～550
Hardened die steel (SKD61, DAC, DHA) 42-52HRC		ap≦0.3 ae≦0.2	70	6,300	310～560	70	5,000	250～400
			110	5,500	270～380	125	4,400	220～290
			150	4,700	180～320	175	3,800	140～260
Austenitic stainless steel (SUS304, 316, 317) 17Cr		ap≦0.3 ae≦0.2	70	7,800	700～930	70	6,300	560～750
			110	7,100	490～780	125	5,700	390～620
			150	6,300	310～560	175	5,000	250～450
Titanium alloy (Ti-6Al-4V) 35-43HRC		ap≦0.3 ae≦0.2	70	5,900	230～470	70	4,700	180～370
			110	5,100	200～350	125	4,100	160～280
			150	4,300	170～300	175	3,500	140～240
Heat resistant alloy (INCO718) 35-43HRC		ap≦0.2 ae≦0.15	70	4,000	320～480	70	3,200	260～380
			110	3,500	280～420	125	2,800	220～340
			150	3,000	240～360	175	2,400	190～290

Note
1. Please apply coolant according to work material.
2. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
3. In case of machine rpm not enough, reduce Vf at same rate.

5-AXIS Series

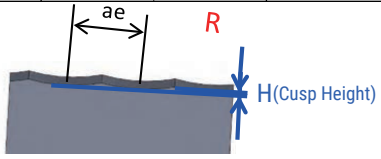
■ Recommended cutting conditions

● FJVA Type - with Barrel R

Material			Tool dia.(mm)							
			6		8		10		12	
	a_p (mm)	a_e (mm)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)	n (min^{-1})	V_f (mm/min)
Carbon steel (S50C, S55C) below 250HB	 ap≦0.3 ae≦3		15,920	2,550	13,930	2,510	12,730	2,550	10,610	2,120
Alloy steel, Tool & die steel, Mold steel (SKD, SKH, NAK) below 45HB	 ap≦0.3 ae≦3		10,610	1,270	9,950	1,390	9,550	1,530	7,960	1,270
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	 ap≦0.02Dc ae≦2.5		8,490	850	7,960	960	7,640	1,070	6,370	890
Hardened die steel (SKD11, SLD, DC11) 55-62HRC	 ap≦0.01Dc ae≦2		6,900	550	6,370	640	6,050	730	5,040	600
Austenitic stainless steel (SUS304, 316, 317) 17Cr	 ap≦0.02Dc ae≦2		10,610	1,060	9,950	1,190	9,550	1,340	7,960	1,110
Titanium alloy (Ti-6Al-4V)	 ap≦0.02Dc ae≦2		5,310	420	4,770	480	4,140	500	3,450	410
Heat resistant alloy (INCO718) 35-43HRC	 ap≦0.01Dc ae≦1		3,180	250	2,790	220	2,550	200	2,120	170

Please refer to chart and formula below to calculate ap.

$$a_e = 2\sqrt{(R^2-(R-H)^2)}$$



Pick amount ap(mm)		Cusp height (mm)									
Cat.No.	R	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
FJVA4060S06-R250	250	1.41	2.00	2.45	2.83	3.16	3.46	3.74	4.00	4.24	4.47
FJVA4080S08-R250											
FJVA4100S10-R250											
FJVA4120S12-R250											

Note
1. Please apply coolant according to work material.
2. In case of chatter ocurring, recommended to reduce ap or rpm and keep feed per tooth.
3. In case of machine rpm not enough, reduce Vf at same rate.

5-AXIS Series

■ Definition of edge shape for programming

● When using taper holder (MQT-***A03/05 type)

Fig.1 XPHW/T

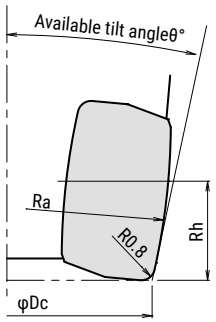
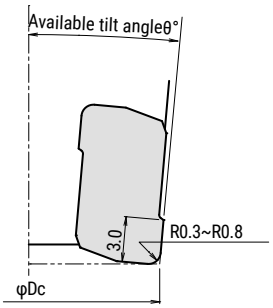


Fig.2 YPHW



● imensions when using XPHW / T insert

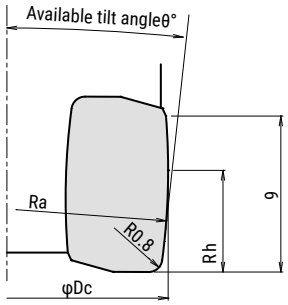
available tilt angle	Cat.No	Dimensions (mm)			Fig
		φDc	Ra	Rh	
1°~6°	MQT-2016A03-M8	15.5	R64.19	8.76	1
3°~8°	MQT-2016A05-M8	15.5	R64.34	10.98	1
1°~6°	MQT-2020A03-M10	19.5	R63.34	8.67	1
3°~8°	MQT-2020A05-M10	19.5	R63.46	10.85	1

● imensions when using YPHW insert

available tilt angle	Cat.No	Dimensions (mm)	Fig
		φDc	
3°	MQT-2016A03-M8	16	2
5°	MQT-2016A05-M8	16	2
3°	MQT-2020A03-M10	20	2
5°	MQT-2020A05-M10	20	2

● When using straight holder (MQT-***A00 type)

Fig.3 XPHW/T



● Dimensions when using XPHW/T insert

available tilt angle	Cat.No	Dimensions (mm)			Fig
		φDc	Ra	Rh	
0°~3°	MQT-2016A00-M8	16	R63.27	5.48	3
0°~3°	MQT-4020A00-M10	20	R64.29	5.48	3
0°~3°	MQT-5025A00-M12	25	R63.26	5.48	3
0°~3	MQT-6032A00-M16	32	R62.41	5.48	3
0°~3°	MQT-6035A00-M16	35	R62.16	5.48	3

● Dimensions when using YPHW insert

available tilt angle	Cat.No	Dimensions (mm)	Fig
		φDc	
0°	MQT-2016A00-M8	16	-
0°	MQT-4020A00-M10	20	-
0°	MQT-5025A00-M12	25	-
0°	MQT-6032A00-M16	32	-
0°	MQT-6035A00-M16	35	-

5-AXIS Series

■ Recommended cutting conditions

MQT type with XPHT/XPHW insert for finishing side wall + MSN shank

Material	Grade	Tool dia.(mm)														
		16					20					20				
		2N					2N					4N				
		r (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	r (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	r (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015 XPHT (XPHW) (CX75)	~55	≦1.5	<0.12	12,000	4,800	~70	≦1.5	<0.12	9,600	3,840	~70	≦1.5	<0.12	9,600	7,680
		55~80	≦1.2	<0.10	9,000	3,600	70~100	≦1.2	<0.10	7,200	2,880	70~100	≦1.2	<0.10	7,200	5,760
		80~105	≦1.0	<0.10	7,200	2,880	100~130	≦1.0	<0.10	5,760	2,300	100~130	≦1.0	<0.10	5,760	4,600
		105~160	≦1.0	<0.10	6,000	2,400	130~200	≦1.0	<0.10	4,800	1,920	130~200	≦1.0	<0.10	4,800	3,840
Tool & die steel (SKD61, SKD11) below 255HB	JC8015 XPHT (XPHW) (CX75)	~55	≦1.5	<0.12	10,000	4,000	~70	≦1.5	<0.12	8,000	3,200	~70	≦1.5	<0.12	8,000	6,400
		55~80	≦1.2	<0.10	7,500	3,000	70~100	≦1.2	<0.10	6,000	2,400	70~100	≦1.2	<0.10	6,000	4,800
		80~105	≦1.0	<0.10	6,000	2,400	100~130	≦1.0	<0.10	4,800	1,920	100~130	≦1.0	<0.10	4,800	3,840
		105~160	≦1.0	<0.10	5,000	2,000	130~200	≦1.0	<0.10	4,000	1,600	130~200	≦1.0	<0.10	4,000	3,200
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015 XPHT (XPHW) (DH102)	~55	≦1.2	<0.12	9,000	3,600	~70	≦1.2	<0.12	7,200	2,880	~70	≦1.2	<0.12	7,200	5,760
		55~80	≦1.0	<0.10	6,800	2,720	70~100	≦1.0	<0.10	5,400	2,160	70~100	≦1.0	<0.10	5,400	4,320
		80~105	≦0.8	<0.10	5,400	2,160	100~130	≦0.8	<0.10	4,320	1,730	100~130	≦0.8	<0.10	4,320	3,460
		105~160	≦0.8	<0.10	4,500	1,800	130~200	≦0.8	<0.10	3,600	1,440	130~200	≦0.8	<0.10	3,600	2,880
Mold steel (NAK80,HPM1,P21) 38-43HRC	DH102 XPHW (JC8015)	~55	≦1.0	<0.12	8,000	3,200	~70	≦1.0	<0.12	6,400	2,560	~70	≦1.0	<0.12	6,400	5,120
		55~80	≦0.8	<0.10	6,000	2,400	70~100	≦0.8	<0.10	4,800	1,920	70~100	≦0.8	<0.10	4,800	3,840
		80~105	≦0.6	<0.10	4,800	1,920	100~130	≦0.6	<0.10	3,840	1,540	100~130	≦0.6	<0.10	3,840	3,080
		105~160	≦0.6	<0.10	4,000	1,600	130~200	≦0.6	<0.10	3,200	1,280	130~200	≦0.6	<0.10	3,200	2,560
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102 XPHW (JC8015)	~55	≦1.0	<0.10	5,000	1,500	~70	≦1.0	<0.10	4,000	1,200	~70	≦1.0	<0.10	4,000	2,400
		55~80	≦0.8	<0.08	3,750	1,130	70~100	≦0.8	<0.08	3,000	900	70~100	≦0.8	<0.08	3,000	1,800
		80~105	≦0.6	<0.08	3,000	900	100~130	≦0.6	<0.08	2,400	720	100~130	≦0.6	<0.08	2,400	1,440
		105~160	≦0.6	<0.08	2,500	750	130~200	≦0.6	<0.08	2,000	600	130~200	≦0.6	<0.08	2,000	1,200
Hardened die steel (SKD11,SLD,DC11) 55-62HRC	DH102 XPHW	~55	≦1.0	<0.10	3,600	720	~70	≦1.0	<0.10	2,860	570	~70	≦1.0	<0.10	2,860	1,140
		55~80	≦0.8	<0.08	2,700	540	70~100	≦0.8	<0.08	2,140	430	70~100	≦0.8	<0.08	2,140	860
		80~105	≦0.6	<0.08	2,160	430	100~130	≦0.6	<0.08	1,720	340	100~130	≦0.6	<0.08	1,720	680
		105~160	≦0.6	<0.08	1,800	360	130~200	≦0.6	<0.08	1,430	290	130~200	≦0.6	<0.08	1,430	580
Gery & Nodular cast iron (FC, FCD) below 300HB	JC8015 XPHW (XPHT) (DH102)	~55	≦1.5	<0.12	12,000	6,000	~70	≦1.5	<0.12	9,600	4,800	~70	≦1.5	<0.12	9,600	9,600
		55~80	≦1.2	<0.10	9,000	4,500	70~100	≦1.2	<0.10	7,200	3,600	70~100	≦1.2	<0.10	7,200	7,200
		80~105	≦1.0	<0.10	7,200	3,600	100~130	≦1.0	<0.10	5,760	2,880	100~130	≦1.0	<0.10	5,760	5,760
		105~160	≦1.0	<0.10	6,000	3,000	130~200	≦1.0	<0.10	4,800	2,400	130~200	≦1.0	<0.10	4,800	4,800
Stainless steel (SUS304) below 250HB	JC8015 XPHT (XPHW)	~55	≦1.2	<0.12	10,000	4,000	~70	≦1.2	<0.12	8,000	3,200	~70	≦1.2	<0.12	8,000	6,400
		55~80	≦1.0	<0.10	7,500	3,000	70~100	≦1.0	<0.10	6,000	2,400	70~100	≦1.0	<0.10	6,000	4,800
		80~105	≦0.8	<0.10	6,000	2,400	100~130	≦0.8	<0.10	4,800	1,920	100~130	≦0.8	<0.10	4,800	3,840
		105~160	≦0.8	<0.10	5,000	2,000	130~200	≦0.8	<0.10	4,000	1,600	130~200	≦0.8	<0.10	4,000	3,200

Cusp height: XPHT/W

Cusp Height (μm)	ap(mm)
0.50	0.5
0.71	0.6
0.97	0.7
1.27	0.8
1.61	0.9
1.98	1.0
2.40	1.1
2.86	1.2

Cusp Height (μm)	ap(mm)
3.35	1.3
3.89	1.4
4.46	1.5
5.08	1.6
5.73	1.7
6.43	1.8
7.16	1.9
7.94	2.0

Note
1. Figures to be adjusted according to machine rigidity or work rigidity.
2. If chattering occurs, recomennded to reduce ap and ae.
3. Use air blow.

5-AXIS Series

■ Recommended cutting conditions

MQT type with XPHT/XPHW insert for finishing side wall + MSN shank

Material	Grade	Tool dia.(mm)									
		25					32/35				
		5N					6N				
		r (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	r (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (S50C, S55C) below 250HB	JC8015 XPHT (XPHW) (CX75)	~90	≦1.5	<0.12	7,640	7,640	~120	≦1.5	<0.12	5,460	6,550
		90~125	≦1.2	<0.10	5,730	5,730	120~175	≦1.2	<0.10	4,100	4,920
		125~160	≦1.0	<0.10	4,580	4,580	175~225	≦1.0	<0.10	3,280	3,940
		160~250	≦1.0	<0.10	3,820	3,820	225~320	≦1.0	<0.10	2,730	3,280
Tool & die steel (SKD61, SKD11) below 255HB	JC8015 XPHT (XPHW) (CX75)	~90	≦1.5	<0.12	6,400	6,400	~120	≦1.5	<0.12	4,550	5,460
		90~125	≦1.2	<0.10	4,800	4,800	120~175	≦1.2	<0.10	3,410	4,090
		125~160	≦1.0	<0.10	3,840	3,840	175~225	≦1.0	<0.10	2,730	3,280
		160~250	≦1.0	<0.10	3,200	3,200	225~320	≦1.0	<0.10	2,280	2,740
Mold steel (HPM7, PX5, P20) 30-36 HRC	JC8015 XPHT (XPHW) (DH102)	~90	≦1.2	<0.12	5,730	5,730	~120	≦1.2	<0.12	4,090	4,910
		90~125	≦1.0	<0.10	4,300	4,300	120~175	≦1.0	<0.10	3,070	3,680
		125~160	≦0.8	<0.10	3,440	3,440	175~225	≦0.8	<0.10	2,450	2,940
		160~250	≦0.8	<0.10	2,870	2,870	225~320	≦0.8	<0.10	2,050	2,460
Mold steel (NAK80,HPM1,P21) 38-43HRC	DH102 XPHW (JC8015)	~90	≦1.0	<0.12	5,100	5,100	~120	≦1.0	<0.12	3,640	4,370
		90~125	≦0.8	<0.10	3,830	3,830	120~175	≦0.8	<0.10	2,730	3,280
		125~160	≦0.6	<0.10	3,060	3,060	175~225	≦0.6	<0.10	2,180	2,620
		160~250	≦0.6	<0.10	2,550	2,550	225~320	≦0.6	<0.10	1,820	2,180
Hardened die steel (SKD61, DAC, DHA) 42-52HRC	DH102 XPHW (JC8015)	~90	≦1.0	<0.10	3,180	2,380	~120	≦1.0	<0.10	2,280	2,050
		90~125	≦0.8	<0.08	2,380	1,780	120~175	≦0.8	<0.08	1,710	1,540
		125~160	≦0.6	<0.08	1,910	1,430	175~225	≦0.6	<0.08	1,370	1,230
		160~250	≦0.6	<0.08	1,590	1,190	225~320	≦0.6	<0.08	1,140	1,030
Hardened die steel (SKD11,SLD,DC11) 55-62HRC	DH102 XPHW	~90	≦1.0	<0.10	2,300	1,150	~120	≦1.0	<0.10	1,640	980
		90~125	≦0.8	<0.08	1,720	860	120~175	≦0.8	<0.08	1,230	740
		125~160	≦0.6	<0.08	1,380	690	175~225	≦0.6	<0.08	980	590
		160~250	≦0.6	<0.08	1,150	580	225~320	≦0.6	<0.08	820	490
Gery & Nodular cast iron (FC, FCD) below 300HB	JC8015 XPHW (XPHT) (DH102)	~90	≦1.5	<0.12	7,640	9,550	~120	≦1.5	<0.12	5,460	8,190
		90~125	≦1.2	<0.10	5,730	7,160	120~175	≦1.2	<0.10	4,100	6,150
		125~160	≦1.0	<0.10	4,580	5,720	175~225	≦1.0	<0.10	3,280	4,920
		160~250	≦1.0	<0.10	3,820	4,780	225~320	≦1.0	<0.10	2,730	4,100
Stainless steel (SUS304) below 250HB	JC8015 XPHT (XPHW)	~90	≦1.2	<0.12	6,400	6,400	~120	≦1.2	<0.12	4,550	5,460
		90~125	≦1.0	<0.10	4,800	4,800	120~175	≦1.0	<0.10	3,410	4,090
		125~160	≦0.8	<0.10	3,840	3,840	175~225	≦0.8	<0.10	2,730	3,280
		160~250	≦0.8	<0.10	3,200	3,200	225~320	≦0.8	<0.10	2,280	2,740

Cusp height: XPHT/W

Cusp Height (μm)	ap(mm)
0.50	0.5
0.71	0.6
0.97	0.7
1.27	0.8
1.61	0.9
1.98	1.0
2.40	1.1
2.86	1.2

Cusp Height (μm)	ap(mm)
3.35	1.3
3.89	1.4
4.46	1.5
5.08	1.6
5.73	1.7
6.43	1.8
7.16	1.9
7.94	2.0

Note
1. Figures to be adjusted according to machine rigidity or work rigidity.
2. If chattering occurs, recomennded to reduce ap and ae.
3. Use air blow.