MOLDINO
The Edge To Innovation

ASPV type

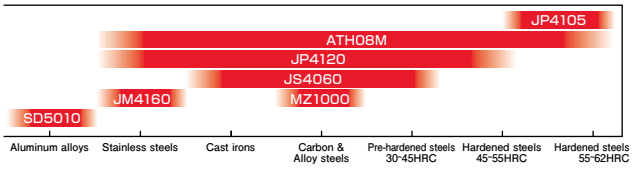
Polish Mill V type ASPV

MOLDINO Tool Engineering, Ltd.

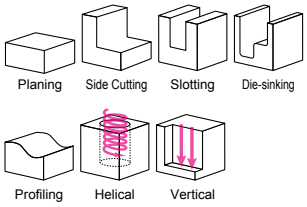
New Product News | No.1211E-11 | 2022-11

Provides good bottom finishing and can also perform standing wall finishing.
Multi-function end mill

A cutting tool with multi-flute specifications to speed up finishing



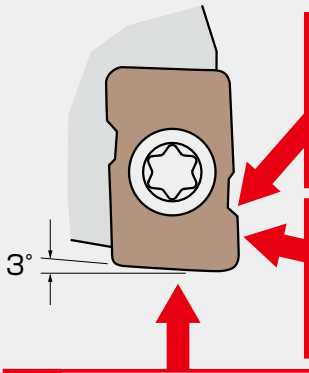
Cutting Applications



Features

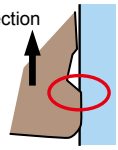
- Ideal cutter for applications finishing structural parts of bottom, side, etc.
- Multi-flute specifications enable higher feed rates for more efficient finishing.
- Vertical machining in which cutting feed is in the direction of the machine's main axis can also be performed.
- Comprehensive lineup of insert materials enables machining of a wide range of materials from carbon steels to hardened steels, as well as aluminum,etc.
- For small machines, use in combination with the modular mill arbor BT30 creates a high-rigidity system and improves machining stability.
- Use in combination with a carbide shank improves machining accuracy when machining with long overhangs.
- In addition to improving durability by using special steel in the cutter body, a PVD coating is applied to the modular type and bore type holder to improve abrasion resistance.

Construction — This insert has 3 cutting edges.



1 Cutting edge for reciprocating machining

Used as the cutting edge when performing reciprocating finishing vertical machining.

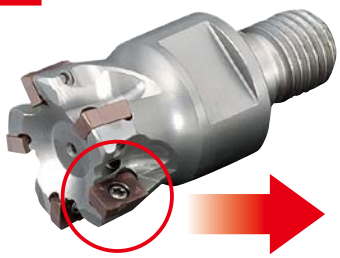


2 Peripheral cutting edge

Used as the peripheral cutting edge when performing side machining.

3 Face cutting edge

Used when bottom finishing.



Insert with minor cutting edge

MPHW0603○○ZEL-0.5
MPHW0603○○ZEL-1.5

minor cutting edge enables feed rate to be increased.

Insert without minor cutting edge

MPHW0603○○ZEL

For bottom machining, suitable for long overhang (L/D= 5 or more) machining or for handling low rigidity in main axis direction.

※For vertical machining, inserts without minor cutting edge are recommended.

Technology

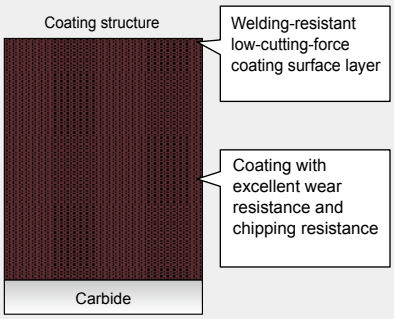
Features of AJ Coating series

- Employs an AlTiN layer with a new composition created by increasing the Al content of conventional layers.
- Excellent wear resistance, chipping resistance, and heat resistance!

New technology!!

- The new layer with high Al content employs a new composition and optimizes the structure to improve wear resistance and chipping resistance!
- Employs a low-friction-effect coating with excellent welding resistance as the top-most surface layer. This reduces welding to the work and decreases cutting force!

Layer structure AJ Coating



PVD Technology Grade for machining pre-hardened or hardened materials **JP4120**

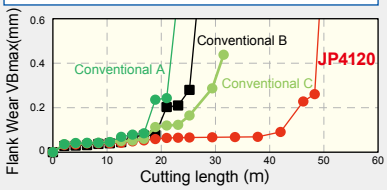
Features

- Employs a fine carbide substrate with an excellent balance between wear resistance and toughness and the new "AJ Coating" to provide improved wear resistance and chipping resistance.
- Highly versatile with excellent wear resistance and chipping resistance when machining steel materials with hardnesses of 30 to 50 HRC.

Strong fields

- Exhibits excellent cutting performance when machining pre-hardened or hardened steels with hardnesses of 30 to 50 HRC.
- Exhibits excellent wear resistance even on difficult-to-cut diecast tool steel or precipitation-hardened stainless steels, or for finishing.

Cutting performance



Work material：P21(40HRC)
Tool：ASRT5063R-4
Insert：WDNW140520
Cutting conditions：
Vc=90m/min *fz*=0.8mm/t
*a*p×*a*e=1×44mm
Dry
※Single-flute cutting

PVD Technology Grade for machining stainless-steel materials **JM4160**

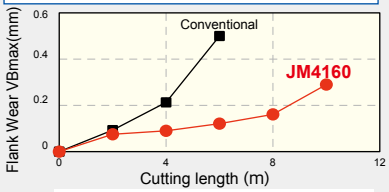
Features

- Employs a carbide substrate with high toughness and the new "AJ Coating" to improve wear resistance and chipping resistance when machining stainless-steel materials.
- Employs AJ Coating with excellent welding resistance to reduce the welding to work material that occurs when machining stainless steel materials.

Strong fields

- Provides long tool life for general processing of stainless-steel materials.

Cutting performance



Work material：SUS304
Tool：ASRS2032R-5
Insert：EPMT0603EN-8LF
Cutting conditions：
Vc=180m/min *fz*=0.5mm/t
*a*p×*a*e=0.8×21mm
Wet
※Single-flute cutting

PVD Technology Grade for machining high-hardness materials **JP4105**

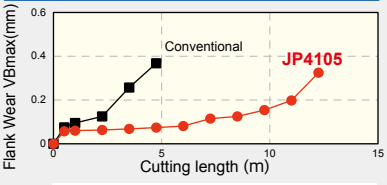
Features

- Employs an ultra-fine cemented carbide substrate and the new "AJ Coating" to improve wear resistance.
- Excellent wear resistance when machining high hardness materials of 50HRC or higher.

Strong fields

- Hardened steels (50 to 60 HRC): SKD11, SKD61, SKH, SUS420, etc.

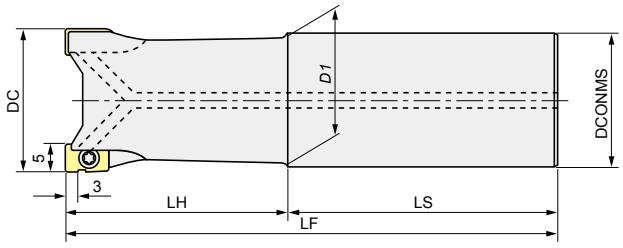
Cutting performance



Work material：SKD11(61HRC)
Tool：ASRS2032-5
Insert：EPNW0603TN-8
Cutting conditions：
Vc=80m/min *fz*=0.2mm/t
*a*p×*a*e=0.5×21mm
Dry
※Single-flute cutting

Straight Shank Type ASPVS2○○○R-○

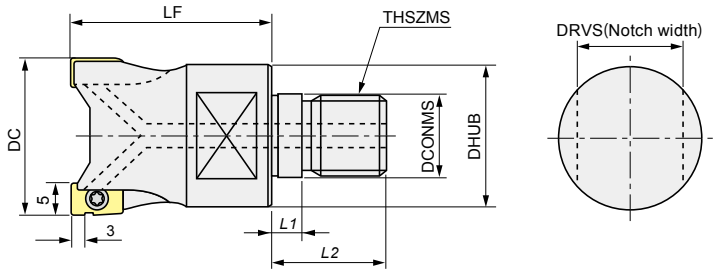
Numeric figure in a circle ○.



	Item code	Stock	No.of flute	Size (mm) DC	LF	DCONMS	*D1*	LH	LS	Inserts
Shank type	ASPVS2016R-2	●	2	16	100	16	14.5	30	70	MPHW0603○○ZEL MPHW06030○ZEL-○○ MPHW0603○○ZFL MPNW0603○○ZEL
	ASPVS2020R-3	●	3	20	110	20	18	30	80	
	ASPVS2025R-4	●	4	25	120	25	23	40	80	
	ASPVS2030R-4	●	4	30	150	32	28	50	100	
	ASPVS2032R-5	●	5	32	150	32	30	50	100	
	ASPVS2035R-5	●	5	35	150	32	31	50	100	
	ASPVS2040R-6	●	6	40	170	32	31	50	120	

Modular Type ASPVM20○○R-○

Numeric figure in a circle ○.



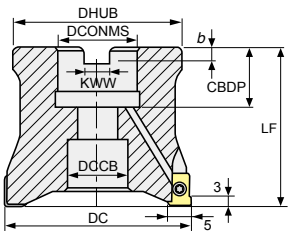
	Item code	Stock	No.of flute	Size (mm) DC	LF	DCONMS	THSZMS	DHUB	*L1*	*L2*	DRVS	Inserts
Modular	ASPVM2016R-2	●	2	16	25	8.5	M8	12.8	5.5	17	10	MPHW0603○○ZEL MPHW06030○ZEL-○○ MPHW0603○○ZFL MPNW0603○○ZEL
	※ ASPVM2018R-2	●	2	18	25	8.5	M8	14.5	5.5	17	10	
	ASPVM2020R-2	●	2	20	30	10.5	M10	17.8	5.5	19	15	
	ASPVM2020R-3	●	3	20	30	10.5	M10	17.8	5.5	19	15	
	ASPVM2022R-2		2	22	30	10.5	M10	17.8	5.5	19	15	
	※ ASPVM2022R-3	●	3	22	30	10.5	M10	17.8	5.5	19	15	
	ASPVM2025R-3		3	25	35	12.5	M12	20.8	5.5	22	17	
	ASPVM2025R-4	●	4	25	35	12.5	M12	20.8	5.5	22	17	
	ASPVM2028R-3		3	28	35	12.5	M12	23	5.5	22	17	
	※ ASPVM2028R-4	●	4	28	35	12.5	M12	23	5.5	22	17	
	ASPVM2030R-3		3	30	40	17	M16	28.8	6	23	22	
	ASPVM2030R-4	●	4	30	40	17	M16	28.8	6	23	22	
	ASPVM2032R-3	●	3	32	40	17	M16	28.8	6	23	22	
	ASPVM2032R-5	●	5	32	40	17	M16	28.8	6	23	22	
	ASPVM2035R-3		3	35	40	17	M16	28.8	6	23	22	
	※ ASPVM2035R-5	●	5	35	40	17	M16	28.8	6	23	22	
	※ ASPVM2040R-3		3	40	40	17	M16	28.8	6	23	22	
	※ ASPVM2040R-6	●	6	40	40	17	M16	28.8	6	23	22	

【Note】 When ※ and carbide shank are used together as a set, there is no interference.
Do not apply lubricants such as grease, etc. to the "contact faces" and "modular screws" of the "modular mill", "dedicated shanks" and "dedicated arbor".

● : Stocked Items. No Mark : Manufactured upon request only.

Bore Type ASPVB2○○○R(M)-○

Numeric figure in a circle ○.



Item code		Stock	No.of flute	Size (mm)								Inserts
				DC	DHUB	LF	CBDP	KWW	b	DCONMS	DCCB	
Inside diameter inch size	ASPVB2050R-7	●	7	50	47	50	19	8.4	5	22.225	17	MPHW0603○○ZEL MPHW06030○ZEL-○○ MPHW0603○○ZFL MPNW0603○○ZEL
	ASPVB2063R-8	●	8	63	60	50	19	8.4	5	22.225	17	
Inside diameter mm size	ASPVB2050RM-7	●	7	50	47	50	20	10.4	6.3	22	17	
	ASPVB2063RM-8	●	8	63	60	50	20	10.4	6.3	22	17	

【Note】 Arbor screw is not included.

Inserts

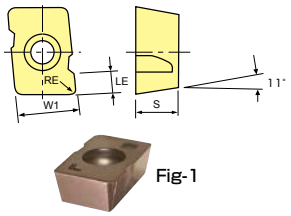


Fig-1

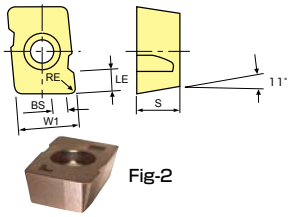


Fig-2

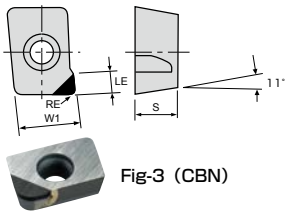


Fig-3 (CBN)

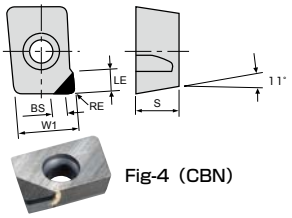


Fig-4 (CBN)

P	Carbon steels	■	⊔		⊔	■	■	■		
M	SUS, etc.	■	■	■			⊔			
K	FC・FCD Cast irons	■	⊔		⊔		■	■		
N	Aluminum alloys								■	
S	Titanium alloys	■	⊔				■			
H	Hardened steels	■	⊔				⊔			

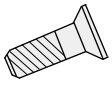
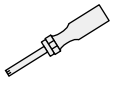
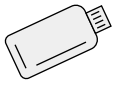
■ :General cutting, First recommended
⊔ :General cutting, Second recommended

Item code	Tolerance class	AJ Coating			JS Coating	Coated Cermet	TH Coating	CBN	DLC Coating	Size (mm)					Shape
		JP4105	JP4120	JM4160	JS4060	MZ1000	ATH08M	BH250	SD5010	W1	BS	S	LE	RE	
MPHW060302ZEL	H					●				6.35	–	3.18	3	0.2	Fig-1
MPHW060302ZEL-0.5						●				6.35	0.5	3.18	3	0.2	Fig-2
MPHW060304ZEL		●				●	●			6.35	–	3.18	3	0.4	Fig-1
MPHW060304ZEL-0.5		●				●	●			6.35	0.5	3.18	3	0.4	Fig-2
MPHW060304ZFL									●	6.35	–	3.18	3	0.4	Fig-1
MPHW060308ZEL		●	●			●	●			6.35	–	3.18	3	0.8	
MPHW060308ZEL-1.5		●	●			●	●	●		6.35	1.5	3.18	3	0.8	Fig-2,4
MPHW060308ZFL									●	6.35	–	3.18	3	0.8	Fig-1,3
MPHW060320ZEL		●				●	●	●		6.35	–	3.18	3	2	
MPNW060308ZEL	N		●	●	●					6.35	–	3.18	3	0.8	
MPNW060320ZEL			●	●	●					6.35	–	3.18	3	2	

【Note】 Please note that the JS Coating does not cause a reaction in conductive touch sensors.

Parts

Numeric figure in a circle ○.

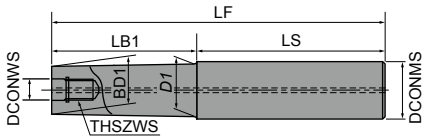
Parts		Clamp screw		Screw driver	Screw anti-seizure agent
Shape / Cutter body			Fastening torque (N・m)		
Modular	ASPVM20○○R-○	250-141	1.1	104-T8	P-37
Shank	ASPVS20○○R-○				
Bore	ASPVB20○○R-○				
	ASPVB20○○RM-○				

【Note】 When supplying air and cutting agent to each flute, please use the arbor screws listed above.
The clamp screw is a consumable part. Since replacement life depends on the use environment, it is recommended that it be replaced at an early stage. One spare clamp screw is provided for cutter bodies with 3 or less flutes, and two for 4 or more flutes.

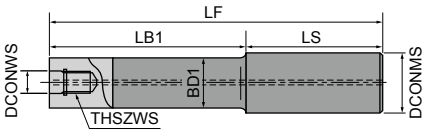
The Shanks for Modular Mill

Carbide Shank

A Type



B Type

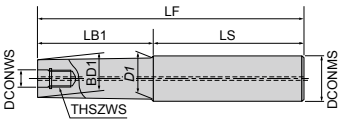


Item code	Stock	Size(mm) DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	D1	Type	Cutter body	Note
ASC16-8.5-95-30Z	●	8.5	M8	95	30	65	14.5	16	15.5	A	ϕ16 ϕ18	With Air hole
ASC16-8.5-120-55Z	●			120	55	65						
ASC16-8.5-140-75Z	●			140	75	65						
ASC16-8.5-160-95Z	●			160	95	65						
※2 ASC16-8.5-160-30Z	●			160	30	130						
ASC20-10.5-120-50Z	●	10.5	M10	120	50	70	18.5	20	19.5	A	ϕ20 ϕ22	
ASC20-10.5-170-90Z	●			170	90	80						
ASC20-10.5-220-120Z	●			220	120	100						
ASC20-10.5-270-150Z	●			270	150	120						
※2 ASC20-10.5-220-50Z	●	10.5	M10	220	50	170	18.5	20	19.5	A	ϕ20 ϕ22	
※2 ASC20-10.5-270-50Z	●			270		220						
ASC25-12.5-145-65	●	12.5	M12	145	65	80	23	25	—	B	ϕ25 ϕ28	
ASC25-12.5-215-115	●			215	115	100						
ASC25-12.5-265-145	●			265	145	120						
ASC25-12.5-315-195	●			315	195	120						
※2 ASC25-12.5-265-65	●	12.5	M12	265	65	200	23	25	—	B	ϕ25 ϕ28	
※2 ASC25-12.5-315-65	●			315		250						
ASC32-17-160-80	●	17	M16	160	80	80	28	32	—	B	ϕ30 ϕ32 ϕ35 〈ϕ40〉	
ASC32-17-210-110	●			210	110	100						
ASC32-17-260-140	●			260	140	120						
ASC32-17-310-190	●			310	190	120						
ASC32-17-360-240	●			360	240	120						
※2 ASC32-17-260-80	●	17	M16	260	80	180	28	32	—	B	ϕ30 ϕ32 〈ϕ40〉	
※2 ASC32-17-310-80	●			310		230						
※2 ASC32-17-360-80	●			360		280						

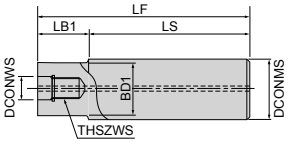
【Note】①When※2 and※1 (P4) are used together as a set, there is no interference.
②Commercial milling chucks or shrink-fit holders can be used.
③For the Ø40 size, it is recommended that the protrusion length be 200mm or less.

Steel Shank

A Type (Tapered neck)



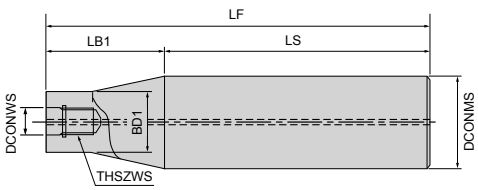
B Type



Item code	Stock	Size(mm) DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	D1	Type	Cutter body	Note
AS16-8.5-95-15	●	8.5	M8	95	15	80	14.5	16	15.5	A	ϕ16 ϕ18	With Air hole
AS20-10.5-100-20	●	10.5	M10	100	20	80	18	20	—	B	ϕ20 ϕ22	
AS25-12.5-115-35	●	12.5	M12	115	35	80	23	25	—	B	ϕ25 ϕ28	
AS32-17-110-30	●	17	M16	110	30	80	28	32	—	B	ϕ30 ϕ32 ϕ35 ϕ40	

【Note】Commercial milling chucks can be used.

Steel Shank



※For neck section or total length, additional machining to user specifications is possible.

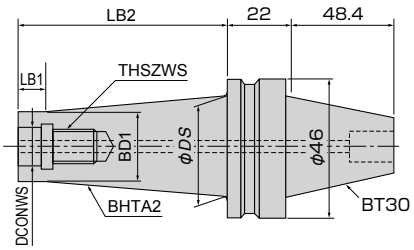
Item code	Stock	Size(mm) DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	Cutter body	Note
AS42-17-360-90	●	17	M16	360	90	270	28	42	ϕ30 ϕ32 ϕ35 ϕ40	With Air hole

【Note】Commercial milling chucks can be used.

● : Stocked Items.

Modular Mill Arbor

BT30

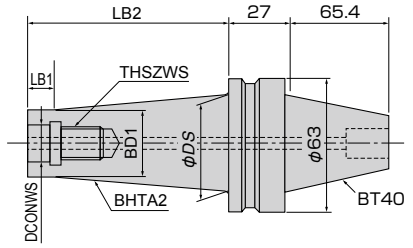


※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm) DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	Note
BT30-8.5-25-15		8.5	8	15	30	25	5	20.6°	With Air hole
BT30-8.5-50-15						50	10	10.6°	
BT30-8.5-75-15						75	10	6.6°	
BT30-10.5-20-18		10.5	10	18	35	20	5	29.5°	
BT30-10.5-45-18						45	10	13.7°	
BT30-10.5-70-18						70	10	8.1°	
BT30-12.5-15-21		12.5	12	21	40	15	5	32.3°	
BT30-12.5-40-21						40	10	17.6°	
BT30-12.5-65-21						65	10	9.8°	
BT30-12.5-85-21						85	10	7.2°	
BT30-17-10-28		17	16	28	40	10	5	31°	
BT30-17-35-28						35	10	13.5°	
BT30-17-60-28						60	10	6.8°	

【Note】When using the BT30 arbor for modular mills, determine the processing conditions using the standard cutting conditions table as a general guide.If vibrations are a concern due to the processing conditions, adjust conditions by 1.reducing cutting depth (*ap*) or 2.reducing per-flute feed rate (*fz*).

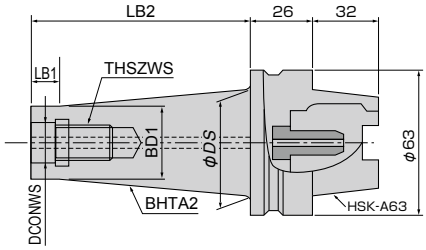
BT40



※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm) DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	Note
BT40-8.5-25-15		8.5	8	15	30	25	5	20.6°	With Air hole
BT40-8.5-50-15						50	10	10.6°	
BT40-8.5-75-15						75	10	6.6°	
BT40-8.5-125-15						125	10	3.7°	
BT40-10.5-20-18		10.5	10	18	35	20	5	29.5°	
BT40-10.5-45-18						45	10	13.7°	
BT40-10.5-70-18						70	10	8.1°	
BT40-10.5-120-18						120	10	4.4°	
BT40-12.5-15-21		12.5	12	21	40	15	5	32.3°	
BT40-12.5-40-21						40	10	17.6°	
BT40-12.5-65-21						65	10	9.8°	
BT40-12.5-115-21						115	10	5.2°	
BT40-17-10-28		17	16	28	48	10	5	45°	
BT40-17-35-28						35	10	21.8°	
BT40-17-60-28						60	10	11.3°	
BT40-17-110-28						110	10	5.7°	

HSK-A63



Item code	Stock	Size (mm) DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	Note
HSK-A63-10.5-30-18	●	10.5	10	18	20.8	30	-	3°	With Air hole
HSK-A63-10.5-70-18	●				25	70	10	3°	
HSK-A63-10.5-70-18S					48	70	10	12°	
HSK-A63-10.5-120-18	●				30.2	120	10	3°	
HSK-A63-12.5-35-21	●	12.5	12	21	24.3	35	-	3°	
HSK-A63-12.5-65-21	●				27.5	65	10	3°	
HSK-A63-12.5-65-21S					48	65	10	12°	
HSK-A63-12.5-115-21	●				32.7	115	10	3°	
HSK-A63-17-40-28	●	17	16	28	31.8	40	-	3°	
HSK-A63-17-60-28	●				33.9	60	10	3°	
HSK-A63-17-60-28S					48	60	10	9.5°	
HSK-A63-17-110-28	●				39.2	110	10	3°	

【Note】Coolant Pipe is attached.

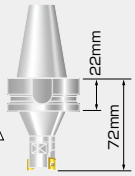
Arbor (BT,HSK) Features

! Point

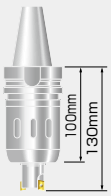
Reduce the chattering vibration by BT, HSK arbor due to the reduction in the “actual” overhang.

Example：Overhang and Application Area

Cutter：
ASPVM2020R-3
Arbor：
BT30-10.5-20-18

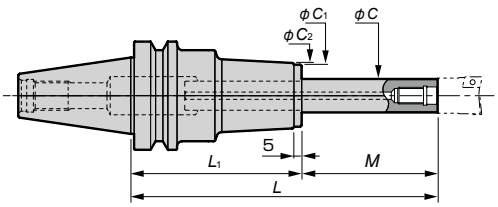


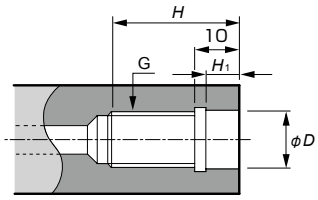
Cutter：
ASPVS2020R-3
Arbor：
Commercial milling chuck
(BT30 type)



● : Stocked Items.　No Mark : Manufactured upon request only.

Red screw arbor





Dimensions for the Modular Mill mounting

■Caution

- Some of the indexable end mills cannot be attached to the RED screw arbor. Please check your indexable end mills for conformance to the dimensions, or please contact MOLDINO Tool Engineering, Ltd.
- Because cutting resistance is greater than the tool holder connection force associated with the machine spindle, please reduce the recommended cutting conditions by 50% for the RED screw arbors marked with ※. Otherwise, the tool holder shank may experience fretting corrosion or fall out of the machine spindle.

	Item code	Stock	G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
BT40	BT40-RSG8-105-M25		M8	8.5	18	6.5	15	105		80	30	32	1.4	0.6
	BT40-RSG8-135-M25							135	25	110			1.8	0.7
	BT40-RSG8-165-M25							165		140			2.1	0.8
	BT40-RSG8-130-M50							130		80			1.4	1.5
	BT40-RSG8-160-M50							160	50	110			1.8	1.7
	BT40-RSG8-190-M50							190		140			2.1	1.8
	BT40-RSG8-155-M75							155		80			1.5	3.1
	BT40-RSG8-185-M75							185	75	110			1.9	3.4
	BT40-RSG8-215-M75							215		140			2.2	3.5
	BT40-RSG8-170-M90							170		140			1.5	4.5
	BT40-RSG8-200-M90							200	90	110			1.9	4.8
	BT40-RSG8-230-M90							230		140			2.2	4.9
	BT40-RSG8-185-M105							185		80			1.6	6.2
	BT40-RSG8-215-M105							215	105	110			2.0	6.7
	BT40-RSG8-245-M105							245		140			2.3	6.8
	BT40-RSG10-125-M25		M10	10.5	22	6.5	19	125		100	36	38	1.8	0.4
	BT40-RSG10-155-M25							155	25	130			2.2	0.5
	BT40-RSG10-185-M25							185		160			2.4	0.7
	BT40-RSG10-150-M50							150		100			1.9	0.8
	BT40-RSG10-180-M50							180	50	130			2.3	1.0
	BT40-RSG10-210-M50							210		160			2.5	1.2
	BT40-RSG10-175-M75							175		100			2.0	1.6
	BT40-RSG10-205-M75							205	75	130			2.4	1.8
	BT40-RSG10-235-M75							235		160			2.6	2.0
	BT40-RSG10-200-M100							200		100			2.0	2.7
	BT40-RSG10-230-M100							230	100	130			2.4	3.0
	BT40-RSG10-260-M100							260		160			2.6	3.3
	BT40-RSG10-220-M120							220		100			2.1	4.0
	BT40-RSG10-250-M120							250	120	130			2.5	4.3
	BT40-RSG10-280-M120							280		160			2.7	4.6
	BT40-RSG12-125-M25		M12	12.5	22	6	24	125		100	43	45	2.0	0.3
	BT40-RSG12-155-M25							155	25	130			2.4	0.4
	BT40-RSG12-185-M25							185		160			2.7	0.5
	BT40-RSG12-150-M50							150		100			2.1	0.5
	BT40-RSG12-180-M50							180	50	130			2.5	0.7
	BT40-RSG12-210-M50							210		160			2.8	0.9
	BT40-RSG12-175-M75							175		100			2.3	0.9
	BT40-RSG12-205-M75							205	75	130			2.7	1.1
	BT40-RSG12-235-M75							235		160			3.0	1.3
	BT40-RSG12-200-M100							200		100			2.4	1.4
	BT40-RSG12-230-M100							230	100	130			2.8	1.6
	BT40-RSG12-260-M100							260		160			3.1	1.9
	BT40-RSG12-225-M125							225		100			2.6	2.1
	BT40-RSG12-255-M125							255	125	130			3.0	2.4
	BT40-RSG12-285-M125							285		160			3.3	2.8
	BT40-RSG16-125-M25		M16	17	25	6	29	125	25		52	54	2.6	0.2
	BT40-RSG16-150-M50							150	50				2.8	0.3
	BT40-RSG16-175-M75							175	75	100			3.0	0.5
	BT40-RSG16-200-M100							200	100				3.2	0.8
	BT40-RSG16-225-M125 ※							225	125				3.4	1.2
BT50	BT50-RSG8-120-M25		M8	8.5	18	6.5	15	120		95	30	32	4.0	0.6
	BT50-RSG8-150-M25							150	25	125			4.3	0.7
	BT50-RSG8-180-M25							180		155			4.8	0.7
	BT50-RSG8-145-M50							145		95			4.0	1.5
	BT50-RSG8-175-M50							175	50	125			4.3	1.7
	BT50-RSG8-205-M50							205		155			4.8	1.7
	BT50-RSG8-170-M75							170		95			4.1	3.1
	BT50-RSG8-200-M75							200	75	125			4.4	3.4
	BT50-RSG8-230-M75							230		155			4.9	3.4
	BT50-RSG8-185-M90							185		155			4.9	4.4
	BT50-RSG8-215-M90							215	90	125			4.4	4.8
	BT50-RSG8-245-M90							245		155			4.9	4.8
	BT50-RSG8-200-M105							200		95			4.2	6.2
	BT50-RSG8-230-M105							230	105	125			4.5	6.6
	BT50-RSG8-260-M105							260		155			5.0	6.6
	BT50-RSG10-140-M25		M10	10.5	22	6.5	19	140	25	115	36	38	4.3	0.4
	BT50-RSG10-170-M25							170		145			4.6	0.5
	BT50-RSG10-200-M25		M10	10.5	22	6.5	19	200	25	175	36	38	5.6	0.5
	BT50-RSG10-165-M50							165		115			4.4	0.8
	BT50-RSG10-195-M50							195	50	145			4.7	0.9
	BT50-RSG10-225-M50							225		175			5.7	1.0
	BT50-RSG10-190-M75							190		115			4.5	1.6
	BT50-RSG10-220-M75							220	75	145			4.8	1.7
	BT50-RSG10-250-M75							250		175			5.8	1.8
	BT50-RSG10-215-M100							215		115			4.5	2.7
	BT50-RSG10-245-M100							245	100	145			4.8	2.9
	BT50-RSG10-275-M100							275		175			5.8	2.9
	BT50-RSG10-235-M120							235		115			4.6	3.9
	BT50-RSG10-265-M120							265	120	145			4.9	4.2
	BT50-RSG10-295-M120							295		175			5.9	4.2
	BT50-RSG10-255-M140							255		115			4.7	5.5
	BT50-RSG10-285-M140							285	140	145			5.0	5.8
	BT50-RSG10-315-M140							315		175			6.0	5.8
	BT50-RSG12-140-M25		M12	12.5	22	6	24	140		115	43	45	4.6	0.2
	BT50-RSG12-170-M25							170	25	145			5.0	0.3
	BT50-RSG12-200-M25							200		175			5.8	0.4
	BT50-RSG12-165-M50							165		115			4.7	0.5
	BT50-RSG12-195-M50							195	50	145			5.1	0.6
	BT50-RSG12-225-M50							225		175			5.9	0.6
	BT50-RSG12-190-M75							190		115			4.9	0.8
	BT50-RSG12-220-M75							220	75	145			5.3	1.0
	BT50-RSG12-250-M75							250		175			6.1	1.0
	BT50-RSG12-215-M100							215		115			5.0	1.3
	BT50-RSG12-245-M100							245	100	145			5.4	1.5
	BT50-RSG12-275-M100							275		175			6.2	1.6
	BT50-RSG12-240-M125							240		115			5.2	2.1
	BT50-RSG12-270-M125							270	125	145			5.6	2.3
	BT50-RSG12-300-M125							300		175			6.4	2.4
	BT50-RSG12-265-M150							265		115			5.3	3.0
	BT50-RSG12-295-M150							295	150	145			5.7	3.3
	BT50-RSG12-325-M150							325		175			6.5	3.4
	BT50-RSG12-290-M175							290		115			5.5	4.2
	BT50-RSG12-320-M175							320	175	145			5.9	4.6
	BT50-RSG12-350-M175							350		175			6.7	4.6
	BT50-RSG16-140-M25		M16	17	25	6	29	140		115	52	54	4.8	0.2
	BT50-RSG16-170-M25							170	25	145			5.4	0.2
	BT50-RSG16-200-M25							200		175			6.6	0.2
	BT50-RSG16-165-M50							165		115			5.0	0.3
	BT50-RSG16-195-M50							195	50	145			5.6	0.4
	BT50-RSG16-225-M50							225		175			6.8	0.4
	BT50-RSG16-190-M75							190		115			5.3	0.5
	BT50-RSG16-220-M75							220	75	145			5.9	0.6
	BT50-RSG16-250-M75							250		175			7.0	0.6
	BT50-RSG16-215-M100							215		115			5.5	0.7
	BT50-RSG16-245-M100							245	100	145			6.1	0.9
	BT50-RSG16-275-M100							275		175			7.2	0.9
	BT50-RSG16-240-M125							240		115			5.7	1.1
	BT50-RSG16-270-M125							270	125	145			6.3	1.3
	BT50-RSG16-300-M125							300		175			7.4	1.3
	BT50-RSG16-265-M150							265		115			5.9	1.6
	BT50-RSG16-295-M150							295	150	145			6.5	1.8
	BT50-RSG16-325-M150							325		175			7.7	1.8
	BT50-RSG16-290-M175							290		115			6.1	2.2
	BT50-RSG16-320-M175							320	175	145			6.7	2.4
	BT50-RSG16-350-M175							350		175			7.9	2.5
	BT50-RSG16-315-M200							315		115			6.3	3.0
	BT50-RSG16-345-M200							345	200	145			6.9	3.2
	BT50-RSG16-375-M200							375		175			8.1	3.3
	BT50-RSG16-340-M225							340		115			6.5	3.9
	BT50-RSG16-370-M225							370	225	145			7.1	4.1
	BT50-RSG16-400-M225							400		175			8.3	4.2
A63	A63-RSG8-105-M25		M8	8.5	18	6.5	15	105		80	30	32	1.3	0.6
	A63-RSG8-135-M25							135	25	110			1.4	0.7
	A63-RSG8-165-M25							165		140			1.9	0.8

No mark : Manufactured upon request only. Delivery time is about ten days after an order received.

	Item code	Stock	Size(mm) G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
A63	A63-RSG8-130-M50		M8	8.5	18	6.5	15	130	50	80	30	32	1.3	1.5
	A63-RSG8-160-M50							160		110			1.4	1.7
	A63-RSG8-190-M50							190		140			1.9	1.7
	A63-RSG8-155-M75							155	75	80			1.4	3.1
	A63-RSG8-185-M75							185		110			1.5	3.4
	A63-RSG8-215-M75							215		140			2.0	3.4
	A63-RSG8-170-M90							170	90	80			2.0	4.4
	A63-RSG8-200-M90							200		110			1.5	4.8
	A63-RSG8-230-M90							230		140			2.0	4.9
	A63-RSG8-185-M105							185	105	80			1.5	6.2
	A63-RSG8-215-M105							215		110			1.6	6.6
	A63-RSG8-245-M105							245		140			2.1	6.7
	A63-RSG10-125-M25		M10	10.5	22	6.5	19	125	25	100	36	38	1.6	0.4
	A63-RSG10-155-M25							155		130			1.9	0.5
	A63-RSG10-185-M25							185		160			2.3	0.6
	A63-RSG10-150-M50							150	50	100			1.7	0.8
	A63-RSG10-180-M50							180		130			2.0	1.0
	A63-RSG10-210-M50							210		160			2.4	1.2
	A63-RSG10-175-M75							175	75	100			1.8	1.6
	A63-RSG10-205-M75							205		130			2.1	1.8
	A63-RSG10-235-M75							235		160			2.5	2.0
	A63-RSG10-200-M100							200	100	100			1.8	2.7
	A63-RSG10-230-M100							230		130			2.1	2.9
	A63-RSG10-260-M100							260		160			2.5	3.2
	A63-RSG10-220-M120							220	120	100			1.9	4.0
	A63-RSG10-250-M120							250		130			2.2	4.2
	A63-RSG10-280-M120							280		160			2.6	4.5
	A63-RSG10-240-M140							240	140	100			2.0	5.6
	A63-RSG10-270-M140							270		130			2.3	5.9
	A63-RSG10-300-M140							300		160			2.7	6.2
	A63-RSG12-125-M25		M12	12.5	22	6	24	125	25	100	43	45	1.9	0.3
	A63-RSG12-155-M25							155		130			2.3	0.4
	A63-RSG12-185-M25							185		160			2.7	0.5
	A63-RSG12-150-M50							150	50	100			2.0	0.5
	A63-RSG12-180-M50							180		130			2.4	0.6
	A63-RSG12-210-M50							210		160			2.8	0.8
	A63-RSG12-175-M75							175	75	100			2.2	0.9
	A63-RSG12-205-M75							205		130			2.6	1.0
	A63-RSG12-235-M75							235		160			3.0	1.3
	A63-RSG12-200-M100							200	100	100			2.3	1.4
	A63-RSG12-230-M100							230		130			2.7	1.6
	A63-RSG12-260-M100							260		160			3.1	1.9
	A63-RSG12-225-M125							225	125	100			2.5	2.1
	A63-RSG12-255-M125							255		130			2.9	2.4
	A63-RSG12-285-M125							285		160			3.3	2.7
	A63-RSG12-250-M150							250	150	100			2.6	3.1
	A63-RSG12-280-M150							280		130			3.0	3.4
	A63-RSG12-310-M150							310		160			3.4	3.8
	A63-RSG16-140-M25		M16	17	25	6	29	140	25	115	52	54	2.8	0.2
	A63-RSG16-165-M50							165	50				3.2	0.4
	A63-RSG16-190-M75							190	75				3.6	0.6
	A63-RSG16-215-M100							215	100				2.8	0.9
	A63-RSG16-240-M125 ※							240	125				2.8	1.3
	A63-RSG16-265-M150 ※							265	150				3.2	1.9
	A63-RSG16-290-M175 ※							290	175				3.6	2.5
A100	A100-RSG8-120-M25		M8	8.5	18	6.5	15	120	25	95	30	32	2.6	0.6
	A100-RSG8-150-M25							150		125			2.9	0.8
	A100-RSG8-180-M25							180		155			3.4	0.8
	A100-RSG8-145-M50							145	50	95			2.6	1.5
	A100-RSG8-175-M50							175		125			2.9	1.7
	A100-RSG8-205-M50							205		155			3.4	1.7
	A100-RSG8-170-M75							170	75	95			2.7	3.1
	A100-RSG8-200-M75							200		125			3.0	3.4
	A100-RSG8-230-M75							230		155			3.5	3.4
	A100-RSG8-185-M90							185	90	95			2.7	4.5
	A100-RSG8-215-M90							215		125			3.0	4.9
	A100-RSG8-245-M90							245		155			3.5	4.8
	A100-RSG8-200-M105							200	105	95			2.8	6.3

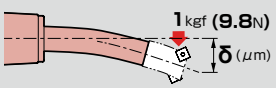
	Item code	Stock	Size(mm) G	φD	H	H1	φC	L	M	L1	φC1	φC2	Weight (kg)	Rigidity value (μm) δ
A100	A100-RSG8-230-M105		M8	8.5	18	6.5	15	230	105	125	30	32	3.1	6.7
	A100-RSG8-260-M105							260		155			3.6	6.6
	A100-RSG10-140-M25		M10	10.5	22	6.5	19	140	25	115	36	38	3.1	0.4
	A100-RSG10-170-M25							170		145			3.5	0.5
	A100-RSG10-200-M25							200		175			4.4	0.5
	A100-RSG10-165-M50							165	50	115			3.2	0.8
	A100-RSG10-195-M50							195		145			3.6	1.0
	A100-RSG10-225-M50							225		175			4.5	1.0
	A100-RSG10-190-M75							190	75	115			3.3	1.6
	A100-RSG10-220-M75							220		145			3.7	1.8
	A100-RSG10-250-M75							250		175			4.6	1.8
	A100-RSG10-215-M100							215	100	115			3.3	2.7
	A100-RSG10-245-M100							245		145			3.7	2.9
	A100-RSG10-275-M100							275		175			4.6	2.9
	A100-RSG10-235-M120							235	120	115			3.4	4.0
	A100-RSG10-265-M120							265		145			3.8	4.2
	A100-RSG10-295-M120							295		175			4.7	4.2
	A100-RSG10-255-M140							255	140	115			3.5	5.6
	A100-RSG10-285-M140							285		145			3.9	5.8
	A100-RSG10-315-M140							315		175			4.8	5.8
	A100-RSG12-140-M25		M12	12.5	22	6	24	140	25	115	43	45	3.4	0.3
	A100-RSG12-170-M25							170		145			3.7	0.4
	A100-RSG12-200-M25							200		175			4.7	0.4
	A100-RSG12-165-M50							165	50	115			3.5	0.5
	A100-RSG12-195-M50							195		145			3.8	0.6
	A100-RSG12-225-M50							225		175			4.8	0.6
	A100-RSG12-190-M75							190	75	115			3.7	0.8
	A100-RSG12-220-M75							220		145			4.0	1.0
	A100-RSG12-250-M75							250		175			5.0	1.0
	A100-RSG12-215-M100							215	100	115			3.8	1.4
	A100-RSG12-245-M100							245		145			4.1	1.6
	A100-RSG12-275-M100							275		175			5.1	1.6
	A100-RSG12-240-M125							240	125	115			4.0	2.1
	A100-RSG12-270-M125							270		145			4.3	2.4
	A100-RSG12-300-M125							300		175			5.3	2.4
	A100-RSG12-265-M150							265	150	115			4.1	3.0
	A100-RSG12-295-M150							295		145			4.4	3.4
	A100-RSG12-325-M150							325		175			5.4	3.4
	A100-RSG12-290-M175							290	175	115			4.3	4.3
	A100-RSG12-320-M175							320		145			4.6	4.6
	A100-RSG12-350-M175							350		175			5.6	4.6
	A100-RSG16-140-M25		M16	17	25	6	29	140	25	115	52	54	4.0	0.2
	A100-RSG16-170-M25							170		145			4.5	0.2
	A100-RSG16-200-M25							200		175			5.7	0.2
	A100-RSG16-165-M50							165	50	115			4.2	0.3
	A100-RSG16-195-M50							195		145			4.7	0.4
	A100-RSG16-225-M50							225		175			5.9	0.4
	A100-RSG16-190-M75							190	75	115			4.5	0.5
	A100-RSG16-220-M75							220		145			5.0	0.6
	A100-RSG16-250-M75							250		175			6.1	0.6
	A100-RSG16-215-M100							215	100	115			4.7	0.8
	A100-RSG16-245-M100							245		145			5.2	0.9
	A100-RSG16-275-M100							275		175			6.3	0.9
	A100-RSG16-240-M125							240	125	115			4.9	1.1
	A100-RSG16-270-M125							270		145			5.4	1.3
	A100-RSG16-300-M125							300		175			6.5	1.3
	A100-RSG16-265-M150							265	150	115			5.1	1.6
	A100-RSG16-295-M150							295		145			5.6	1.8
	A100-RSG16-325-M150							325		175			6.7	1.8
	A100-RSG16-290-M175							290	175	115			5.3	2.2
	A100-RSG16-320-M175							320		145			5.8	2.4
	A100-RSG16-350-M175							350		175			7.0	2.5
	A100-RSG16-315-M200							315	200	115			5.5	3.0
	A100-RSG16-345-M200							345		145			6.0	3.2
	A100-RSG16-375-M200							375		175			7.2	3.3
	A100-RSG16-340-M225							340	225	115			5.7	3.9
	A100-RSG16-370-M225							370		145			6.3	4.2
	A100-RSG16-400-M225							400		175			7.4	4.2

■ Standard accessories
- Coolant duct(HSK)

■ Caution
- The Modular Mill is not a standard accessory.
- Pull stud is not a standard accessory.
- Please check your Modular Mills for conformance to the dimensions.

δ About the rigidity value

A rigidity value represents the amount of deflection for the entire holder and tool when a bending load of 1 kgf (9.8 N) is applied to the tip of the tool. The smaller the numerical value is, the higher the rigidity and the more accurate the machining.

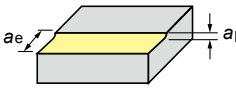


Standard cutting conditions for bottom finishing

※Red indicates primary recommended grade.

Work material	Recommended grade	Tool dia. DC	φ16 (2 Flutes)					φ20 (3 Flutes)					φ25 (4 Flutes)				
		Overhang	<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		Modular carbide shank		
			General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Mild steels (200HB or less)	※ MZ1000 ATH08M JP4120 JS4060	n (min-1)	2,990	5,980	3,990	2,990	2,590	2,390	4,780	3,190	2,390	2,080	1,920	3,830	2,550	1,920	1,660
		Vc (m/min)	150	300	200	150	130	150	300	200	150	130	150	300	200	150	130
		Vf (mm/min)	600	1,800	1,200	720	520	720	2,160	1,440	870	630	770	2,300	1,530	930	670
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Carbon steels Alloy steels (30HRC or less)	MZ1000 ATH08M JP4120 JS4060	n (min-1)	2,990	4,980	3,590	2,590	2,000	2,390	3,990	2,870	2,080	1,600	1,920	3,190	2,300	1,660	1,280
		Vc (m/min)	150	250	180	130	100	150	250	180	130	100	150	250	180	130	100
		Vf (mm/min)	600	1,500	1,080	630	400	720	1,800	1,300	750	480	770	1,920	1,380	800	520
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Carbon steels Alloy steels (30~45HRC)	ATH08M JP4120 JS4060	n (min-1)	2,590	3,990	3,190	2,590	1,800	2,080	3,190	2,550	2,080	1,440	1,660	2,550	2,040	1,660	1,150
		Vc (m/min)	130	200	160	130	90	130	200	160	130	90	130	200	160	130	90
		Vf (mm/min)	520	960	770	520	360	630	1,150	920	630	440	670	1,230	980	670	460
		fz (mm/t)	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Stainless steels SUS	JP4120 JM4160 ATH08M	n (min-1)	2,990	4,980	3,590	2,590	2,000	2,390	3,990	2,870	2,080	1,600	1,920	3,190	2,300	1,660	1,280
		Vc (m/min)	150	250	180	130	100	150	250	180	130	100	150	250	180	130	100
		Vf (mm/min)	600	1,500	1,080	630	400	720	1,800	1,300	750	480	770	1,920	1,380	800	520
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Cast irons FC FCD	ATH08M JP4120 JS4060	n (min-1)	2,990	4,980	3,990	2,990	2,590	2,390	3,990	3,190	2,390	2,080	1,920	3,190	2,550	1,920	1,660
		Vc (m/min)	150	250	200	150	130	150	250	200	150	130	150	250	200	150	130
		Vf (mm/min)	600	2,000	1,600	900	520	720	2,400	1,920	1,080	630	770	2,560	2,040	1,160	670
		fz (mm/t)	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Aluminum alloys	SD5010	n (min-1)	11,950	23,890	15,930	11,950	11,950	9,560	19,110	12,740	9,560	9,560	7,650	15,290	10,200	7,650	7,650
		Vc (m/min)	600	1,200	800	600	600	600	1,200	800	600	600	600	1,200	800	600	600
		Vf (mm/min)	2,390	7,170	4,780	2,870	2,390	2,870	8,600	5,740	3,450	2,870	3,060	9,180	6,120	3,680	3,060
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Titanium alloys Ti-6Al-4V (wet condition)	ATH08M JP4120	n (min-1)	600	1,200	1,000	600	600	480	960	800	480	480	390	770	640	390	390
		Vc (m/min)	30	60	50	30	30	30	60	50	30	30	30	60	50	30	30
		Vf (mm/min)	120	360	300	120	120	150	440	360	150	150	160	470	390	160	160
		fz (mm/t)	0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.1	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Hardened steels 45~55HRC	JP4105 ATH08M JP4120	n (min-1)	1,600	2,390	2,000	1,600	1,600	1,280	1,920	1,600	1,280	1,280	1,020	1,530	1,280	1,020	1,020
		Vc (m/min)	80	120	100	80	80	80	120	100	80	80	80	120	100	80	80
		Vf (mm/min)	320	480	400	320	320	390	580	480	390	390	410	620	520	410	410
		fz (mm/t)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5
Hardened steels 55~62HRC	JP4105 ATH08M JP4120	n (min-1)	1,000	2,000	1,400	1,000	1,000	800	1,600	1,120	800	800	640	1,280	900	640	640
		Vc (m/min)	50	100	70	50	50	50	100	70	50	50	50	100	70	50	50
		Vf (mm/min)	100	280	200	100	100	120	340	240	120	120	130	360	260	130	130
		fz (mm/t)	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05
		ap (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		ae (mm)	8~16	8~16	8~16	8~16	8	10~20	10~20	10~20	10~20	10	12.5~25	12.5~25	12.5~25	12.5~25	12.5

【Note】
①These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
②To prevent tool breakage due to chips clogging tool flutes, always be sure to use an air blower, etc. to remove chips.
③The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
④Please note that the JS Coating does not cause a reaction in conductive touch sensors.
⑤Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑥Make settings so that the cutting depth and per-flute feed rate do not exceed the maximum values.
⑦MZ1000 and BH250 are not suitable for wet cutting. Use them for dry cutting (air blow).
⑧Due to fire risks do not use neat cutting oil as a coolant.
⑨When using the BT30 arbor for modular mills, determine the cutting conditions using the standard cutting conditions table as a general guide. If vibrations are a concern due to the cutting conditions, adjust conditions by 1.reducing cutting depth (ap) or 2.reducing per-flute feed rate (fz).



Finishing

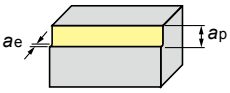
ϕ32 (5 Flutes)					ϕ40 (6 Flutes)					ϕ50 (7 Flutes)					ϕ63 (8 Flutes)					Work material
<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		3DC-5DC	5DC-7DC	>7DC	<3DC		3DC-5DC	5DC-7DC	>7DC	
General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting				General purpose	High-speed cutting				
1,500	2,990	2,000	1,500	1,300	1,200	2,390	1,600	1,200	1,040	960	1,600	1,280	960	830	760	1,270	1,020	760	660	Mild steels (200HB or less)
150	300	200	150	130	150	300	200	150	130	150	250	200	150	130	150	250	200	150	130	
750	2,250	1,500	900	650	720	2,160	1,160	720	630	680	1,680	1,350	810	590	610	1,530	1,230	730	530	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.12	0.1	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
1,500	2,490	1,800	1,300	1,000	1,200	2,000	1,440	1,040	800	960	1,470	1,150	830	640	760	1,170	910	660	510	Carbon steels Alloy steels (30HRC or less)
150	250	180	130	100	150	250	180	130	100	150	230	180	130	100	150	230	180	130	100	
750	1,870	1,350	780	500	720	1,800	1,040	630	480	680	1,550	1,210	700	450	610	1,410	1,100	640	410	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.12	0.1	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
1,300	2,000	1,600	1,300	900	1,040	1,600	1,280	1,040	720	830	1,150	960	830	580	660	910	760	660	460	Carbon steels Alloy steels (30~45HRC)
130	200	160	130	90	130	200	160	130	90	130	180	150	130	90	130	180	150	130	90	
650	1,200	960	650	450	630	1,160	930	630	440	590	970	810	700	410	530	880	730	530	370	
0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.1	0.1	0.1	0.12	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
1,500	2,490	1,800	1,300	1,000	1,200	2,000	1,440	1,040	800	960	1,470	1,150	830	640	760	1,170	910	660	510	Stainless steels SUS
150	250	180	130	100	150	250	180	130	100	150	230	180	130	100	150	230	180	130	100	
750	1,870	1,350	780	500	720	1,800	1,040	630	480	680	1,550	1,210	700	450	610	1,410	1,100	640	410	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.12	0.1	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
1,500	2,490	2,000	1,500	1,300	1,200	2,000	1,600	1,200	1,040	960	1,600	1,280	960	830	760	1,270	1,020	760	660	Cast irons FC FCD
150	250	200	150	130	150	250	200	150	130	150	250	200	150	130	150	250	200	150	130	
750	2,490	2,000	1,130	650	720	2,400	1,920	1,080	630	680	2,240	1,800	1,010	590	610	2,040	1,640	920	530	
0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	0.1	0.2	0.2	0.15	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
5,980	11,950	7,970	5,980	5,980	4,780	9,560	6,370	4,780	4,780	3,830	9,560	6,370	3,830	3,830	3,040	7,590	5,060	3,040	3,040	Aluminum alloys
600	1,200	800	600	600	600	1,200	800	600	600	600	1,500	1,000	600	600	600	1,500	1,000	600	600	
2,990	8,970	5,980	3,590	2,990	2,870	8,610	5,740	3,450	2,870	2,690	10,040	6,690	3,220	3,220	2,440	9,110	6,080	2,920	2,920	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.12	0.1	0.15	0.15	0.12	0.12	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
300	600	500	300	300	240	480	400	240	240	200	390	320	200	200	160	310	260	160	160	Titanium alloys Ti-6Al-4V (wet condition)
30	60	50	30	30	30	60	50	30	30	30	60	50	30	30	30	60	50	30	30	
150	450	380	150	150	150	440	360	150	150	140	410	340	170	140	130	380	320	160	130	
0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
800	1,200	1,000	800	800	640	960	800	640	640	390	640	510	390	390	310	510	410	310	310	Hardened steels 45~55HRC
80	120	100	80	80	80	120	100	80	80	60	100	80	60	60	60	100	80	60	60	
400	600	500	400	400	390	580	480	390	390	280	450	360	280	280	250	410	330	250	250	
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	
500	1,000	700	500	500	400	800	560	400	400	320	510	390	320	320	260	410	310	260	260	Hardened steels 55~62HRC
50	100	70	50	50	50	100	70	50	50	50	80	60	50	50	50	80	60	50	50	
130	350	250	130	130	120	340	240	120	120	120	250	200	120	120	110	230	180	110	110	
0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	0.05	0.07	0.07	0.05	0.05	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
16~32	16~32	16~32	16~32	16	20~40	20~40	20~40	20~40	20	25~50	25~50	25~50	25~50	25	31~63	31~63	31~63	31~63	31	

Standard cutting conditions for side finishing

※Red indicates primary recommended grade.

Work material	Recommended grade	Tool dia. DC	φ16 (2 Flutes)					φ20 (3 Flutes)					φ25 (4 Flutes)				
		Overhang	<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		Modular carbide shank		
			General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Mild steels (200HB or less)	※ MZ1000 ATH08M JP4120 JS4060	n (min-1)	7,970	15,930	11,950	7,970	7,970	6,370	12,740	9,560	6,370	6,370	5,100	10,200	7,650	5,100	5,100
		Vc (m/min)	400	800	600	400	400	400	800	600	400	400	400	800	600	400	400
		Vf (mm/min)	1,600	4,780	3,590	1,920	1,600	1,920	5,740	4,310	2,300	1,920	2,040	6,120	4,590	2,450	2,040
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Carbon steels Alloy steels (30HRC or less)	MZ1000 ATH08M JP4120 JS4060	n (min-1)	5,980	11,950	7,970	7,970	5,980	4,780	9,560	6,370	6,370	4,780	3,830	7,650	5,100	5,100	3,830
		Vc (m/min)	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
		Vf (mm/min)	1,200	3,590	2,400	1,920	1,200	1,440	4,310	2,870	2,300	1,440	1,540	4,590	3,060	2,450	1,540
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Carbon steels Alloy steels (30～45HRC)	ATH08M JP4120 JS4060	n (min-1)	3,990	9,960	6,970	5,980	5,980	3,190	7,970	5,580	4,780	4,780	2,550	6,370	4,460	3,830	3,830
		Vc (m/min)	200	500	350	300	300	200	500	350	300	300	200	500	350	300	300
		Vf (mm/min)	800	2,400	1,680	1,200	960	960	2,870	2,010	1,440	1,150	1,020	3,060	2,150	1,540	1,230
		fz (mm/t)	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Stainless steels SUS	JP4120 JM4160 ATH08M	n (min-1)	5,980	11,950	7,970	7,970	5,980	4,780	9,560	6,370	6,370	4,780	3,830	7,650	5,100	5,100	3,830
		Vc (m/min)	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
		Vf (mm/min)	1,200	3,590	2,400	1,920	1,200	1,440	4,310	2,870	2,300	1,440	1,540	4,590	3,060	2,450	1,540
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cast irons FC FCD	ATH08M JP4120 JS4060	n (min-1)	5,980	11,950	9,960	7,970	7,970	4,780	9,560	7,970	6,370	6,370	3,830	7,650	6,370	5,100	5,100
		Vc (m/min)	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400
		Vf (mm/min)	1,200	3,590	2,990	1,920	1,600	1,440	4,310	3,590	2,300	1,920	1,540	4,590	3,830	2,450	2,040
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Aluminum alloys	SD5010	n (min-1)	11,950	23,890	15,930	11,950	11,950	9,560	19,110	12,740	9,560	9,560	7,650	15,290	10,200	7,650	7,650
		Vc (m/min)	600	1,200	800	600	600	600	1,200	800	600	600	600	1,200	800	600	600
		Vf (mm/min)	2,390	7,170	4,780	2,870	2,390	2,870	8,600	5,740	3,450	2,870	3,060	9,180	6,120	3,680	3,060
		fz (mm/t)	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1
		ap (mm)	2	2	2	1.5	1	2	2	2	1.5	1	2	2	2	1.5	1
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Titanium alloys Ti-6Al-4V (wet condition)	ATH08M JP4120	n (min-1)	1,200	1,800	1,600	1,200	1,200	960	1,440	1,280	960	960	770	1,150	1,020	770	770
		Vc (m/min)	60	90	80	60	60	60	90	80	60	60	60	90	80	60	60
		Vf (mm/min)	240	440	390	240	200	290	520	470	290	240	310	560	490	310	250
		fz (mm/t)	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hardened steels 45～55HRC	JP4105 ATH08M JP4120	n (min-1)	2,990	4,980	3,590	2,990	2,990	2,390	3,990	2,870	2,390	2,390	1,920	3,190	2,300	1,920	1,920
		Vc (m/min)	150	250	180	150	150	150	250	180	150	150	150	250	180	150	150
		Vf (mm/min)	600	1,000	720	480	480	720	1,200	870	580	580	770	1,280	920	620	620
		fz (mm/t)	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08
		ap (mm)	2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1	0.7
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hardened steels 55～62HRC	JP4105 ATH08M JP4120	n (min-1)	2,590	3,990	3,190	2,590	2,590	2,080	3,190	2,550	2,080	2,080	1,660	2,550	2,040	1,660	1,660
		Vc (m/min)	130	200	160	130	130	130	200	160	130	130	130	200	160	130	130
		Vf (mm/min)	520	800	640	420	260	630	960	770	500	320	670	1,020	820	540	340
		fz (mm/t)	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05
		ap (mm)	1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5
		ae (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

【Note】
①These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
②To prevent tool breakage due to chips clogging tool flutes, always be sure to use an air blower, etc. to remove chips.
③The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
④Please note that the JS Coating does not cause a reaction in conductive touch sensors.
⑤Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑥Make settings so that the cutting depth and per-flute feed rate do not exceed the maximum values.
⑦MZ1000 and BH250 are not suitable for wet cutting. Use them for dry cutting (air blow).
⑧Due to fire risks do not use neat cutting oil as a coolant.
⑨When using the BT30 arbor for modular mills, determine the cutting conditions using the standard cutting conditions table as a general guide. If vibrations are a concern due to the cutting conditions, adjust conditions by 1.reducing cutting depth (*a*p) or 2.reducing per-flute feed rate (*f*z).



Finishing

ϕ32 (5 Flutes)					ϕ40 (6 Flutes)					ϕ50 (7 Flutes)					ϕ63 (8 Flutes)					Work material
<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		3DC-5DC	5DC-7DC	>7DC	<3DC		3DC-5DC	5DC-7DC	>7DC	
General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting				General purpose	High-speed cutting				
3,990	7,970	5,980	3,990	3,990	3,190	6,370	4,780	3,190	3,190	2,550	5,100	3,830	2,550	2,550	2,030	4,050	3,040	2,030	2,030	Mild steels (200HB or less)
400	800	600	400	400	400	800	600	400	400	400	800	600	400	400	400	800	600	400	400	
2,000	5,980	4,490	2,400	2,000	1,920	5,740	4,310	2,300	1,920	1,790	5,360	4,030	2,150	1,790	1,630	4,860	3,650	1,950	1,630	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	<0.2	
2,990	5,980	3,990	3,990	2,990	2,390	4,780	3,190	3,190	2,390	1,920	3,830	2,550	2,550	1,920	1,520	3,040	2,030	2,030	1,520	Carbon steels Alloy steels (30HRC or less)
300	600	400	400	300	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300	
1,500	4,490	3,000	2,400	1,500	1,440	4,310	2,880	2,300	1,440	1,350	4,030	2,680	2,150	1,350	1,220	3,650	2,440	1,950	1,220	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	<0.2	
2,000	4,980	3,490	2,990	2,990	1,600	3,990	2,790	2,390	2,390	1,280	3,190	2,230	1,920	1,920	1,020	2,530	1,770	1,520	1,520	Carbon steels Alloy steels (30~45HRC)
200	500	350	300	300	200	500	350	300	300	200	500	350	300	300	200	500	350	300	300	
1,000	2,990	2,100	1,500	1,200	960	2,880	2,010	1,440	1,150	900	2,680	1,880	1,350	1,080	820	2,430	1,700	1,220	980	
0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
2,990	5,980	3,990	3,990	2,990	2,390	4,780	3,190	3,190	2,390	1,920	3,830	2,550	2,550	1,920	1,520	3,040	2,030	2,030	1,520	Stainless steels SUS
300	600	400	400	300	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300	
1,500	4,490	3,000	2,400	1,500	1,440	4,310	2,880	2,300	1,440	1,350	4,030	2,680	2,150	1,350	1,220	3,650	2,440	1,950	1,220	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
2,990	5,980	4,980	3,990	3,990	2,390	4,780	3,990	3,190	3,190	1,920	3,830	3,190	2,550	2,550	1,520	3,040	2,530	2,030	2,030	Cast irons FC FCD
300	600	500	400	400	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400	
1,500	4,490	3,740	2,400	2,000	1,440	4,310	3,600	2,300	1,920	1,350	4,030	3,350	2,150	1,790	1,220	3,650	3,040	1,950	1,630	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
5,980	11,950	7,970	5,980	5,980	4,780	9,560	6,370	4,780	4,780	3,830	9,560	6,370	3,830	3,830	3,040	7,590	5,060	3,040	3,040	Aluminum alloys
600	1,200	800	600	600	600	1,200	800	600	600	600	1,500	1,000	600	600	600	1,500	1,000	600	600	
2,990	8,970	5,980	3,590	2,990	2,870	8,610	5,740	3,450	2,870	2,690	10,040	6,690	3,220	2,690	2,440	9,110	6,080	2,920	2,440	
0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	0.1	0.15	0.15	0.12	0.1	
2	2	2	1.5	1	2	2	2	1.5	1	2	2	2	2	1.5	2	2	2	2	1.5	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
600	900	800	600	600	480	720	640	480	480	390	580	510	390	390	310	460	410	310	310	Titanium alloys Ti-6Al-4V (wet condition)
60	90	80	60	60	60	90	80	60	60	60	90	80	60	60	60	90	80	60	60	
300	540	480	300	240	290	520	470	290	240	280	490	430	280	220	250	450	400	250	200	
0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	0.1	0.12	0.12	0.1	0.08	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	2	1.5	1	2	2	2	1.5	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
1,500	2,490	1,800	1,500	1,500	1,200	2,000	1,440	1,200	1,200	960	1,600	1,150	960	960	760	1,270	910	760	760	Hardened steels 45~55HRC
150	250	180	150	150	150	250	180	150	150	150	250	180	150	150	150	250	180	150	150	
750	1,250	900	600	600	720	1,200	870	580	580	680	1,120	810	540	540	610	1,020	730	490	490	
0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	0.1	0.1	0.1	0.08	0.08	
2	2	1.5	1	0.7	2	2	1.5	1	0.7	2	2	1.5	1.2	1	2	2	1.5	1.2	1	
< 0.2	< 0.2	<0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	<0.2	< 0.2	
1,300	2,000	1,600	1,300	1,300	1,040	1,600	1,280	1,040	1,040	830	1,280	1,020	830	830	660	1,020	810	660	660	Hardened steels 55~62HRC
130	200	160	130	130	130	200	160	130	130	130	200	160	130	130	130	200	160	130	130	
650	1,000	800	520	330	630	960	770	500	320	590	900	720	470	300	530	820	650	370	270	
0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.08	0.05	0.1	0.1	0.1	0.07	0.05	
1.5	1.5	1	0.7	0.5	1.5	1.5	1	0.7	0.5	1.5	1.5	1.5	1	0.7	1.5	1.5	1.5	1.2	1	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	

Standard cutting conditions for vertical side finishing

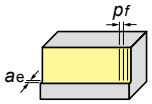
Work material	Recommended grade	Tool dia. DC	φ16 (2 Flutes)					φ20 (3 Flutes)					φ25 (4 Flutes)				
		Overhang	<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		Modular carbide shank		
			General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	※ ATH08M MZ1000 JP4120 JS4060	*n* (min-1)	5,980	11,950	7,970	7,970	5,980	4,780	9,560	6,370	6,370	4,780	3,830	7,650	5,100	5,100	3,830
		*v*c (m/min)	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300
		*v*f (mm/min)	1,560	4,780	2,400	2,080	1,200	1,870	5,740	2,870	2,490	1,440	2,300	6,120	3,680	3,060	1,840
		*f*z (mm/t)	0.13	0.2	0.15	0.13	0.1	0.13	0.2	0.15	0.13	0.1	0.15	0.2	0.18	0.15	0.12
		*p*f (mm)	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
		*a*e (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cast irons FC FCD	ATH08M JP4120 JS4060	*n* (min-1)	5,980	11,950	9,960	7,970	7,970	4,780	9,560	7,970	6,370	6,370	3,830	7,650	6,370	5,100	5,100
		*v*c (m/min)	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400
		*v*f (mm/min)	1,800	4,780	3,990	3,190	2,400	2,160	5,740	4,790	3,830	2,870	3,070	7,650	5,100	4,080	3,060
		*f*z (mm/t)	0.15	0.2	0.2	0.2	0.15	0.15	0.2	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15
		*p*f (mm)	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
		*a*e (mm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Standard cutting conditions for vertical roughing

【Note】 Use nose corner radius *R*0.8 insert.

Work material	Recommended grade	Tool dia. DC	φ16 (2 Flutes)					φ20 (3 Flutes)					φ25 (4 Flutes)				
		Overhang	<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		Modular carbide shank		
			General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	※ JS4060 JP4120	*n* (min-1)	2,990	3,990	2,990	2,990	2,390	2,390	3,190	2,390	2,390	1,920	1,920	2,550	1,920	1,920	1,530
		*v*c (m/min)	150	200	150	150	120	150	200	150	150	120	150	200	150	150	120
		*v*f (mm/min)	900	1,200	720	600	340	1,080	1,440	870	720	410	1,160	1,530	930	770	430
		*f*z (mm/t)	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07
		*p*f (mm)	3.6	3.6	3.6	3.6	3	4	4	4	4	4	4.5	4.5	4.5	4.5	4.5
		*a*e (mm)	< 4	< 4	< 3	< 2	< 2	< 4	< 4	< 3	< 2	< 2	< 4	< 4	< 3	< 2	< 2
Cast irons FC FCD	ATH08M JP4120 JS4060	*n* (min-1)	2,990	4,980	3,990	3,990	2,990	2,390	3,990	3,190	3,190	2,390	1,920	3,190	2,550	2,550	1,920
		*v*c (m/min)	150	250	200	200	150	150	250	200	200	150	150	250	200	200	150
		*v*f (mm/min)	1,200	2,000	1,200	1,040	600	1,440	2,400	1,440	1,250	720	1,540	2,560	1,530	1,330	770
		*f*z (mm/t)	0.2	0.2	0.15	0.13	0.1	0.2	0.2	0.15	0.13	0.1	0.2	0.2	0.15	0.13	0.1
		*p*f (mm)	3.6	3.6	3.6	3.6	3.6	4	4	4	4	4	4.5	4.5	4.5	4.5	4.5
		*a*e (mm)	< 4	< 4	< 4	< 4	< 3	< 4	< 4	< 4	< 4	< 3	< 4	< 4	< 4	< 4	< 3

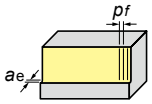
【Note】
①These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
②To prevent tool breakage due to chips clogging tool flutes, always be sure to use an air blower, etc. to remove chips.
③The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
④Please note that the JS Coating does not cause a reaction in conductive touch sensors.
⑤Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑥Make settings so that the cutting depth and per-flute feed rate do not exceed the maximum values.
⑦MZ1000 and BH250 are not suitable for wet cutting. Use them for dry cutting (air blow).
⑧Due to fire risks do not use neat cutting oil as a coolant.
⑨When using the BT30 arbor for modular mills, determine the cutting conditions using the standard cutting conditions table as a general guide. If vibrations are a concern due to the cutting conditions, adjust conditions by 1.reducing cutting depth (*a*p) or 2.reducing per-flute feed rate (*f*z).



Finishing

※Red indicates primary recommended grade.

ϕ32 (5 Flutes)					ϕ40 (6 Flutes)					ϕ50 (7 Flutes)					ϕ63 (8 Flutes)					Work material
<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		3DC-5DC	5DC-7DC	>7DC	<3DC		3DC-5DC	5DC-7DC	>7DC	
General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting				General purpose	High-speed cutting				
2,990	5,980	3,990	3,990	2,990	2,390	4,780	3,190	3,190	2,390	1,920	3,830	2,550	2,550	1,920	1,520	3,040	2,030	2,030	1,520	Carbon steels Alloy steels (30HRC or less)
300	600	400	400	300	300	600	400	400	300	300	600	400	400	300	300	600	400	400	300	
2,250	5,980	3,600	3,000	1,800	2,160	5,740	3,450	2,880	1,730	2,020	5,370	3,220	2,680	1,750	1,830	4,870	2,930	2,440	1,590	
0.15	0.2	0.18	0.15	0.12	0.15	0.2	0.18	0.15	0.12	0.15	0.2	0.18	0.15	0.13	0.15	0.2	0.18	0.15	0.13	
0.8	0.8	0.8	0.8	0.8	0.88	0.88	0.88	0.88	0.88	1	1	1	1	1	1.12	1.12	1.12	1.12	1.12	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
2,990	5,980	4,980	3,990	3,990	2,390	4,780	3,990	3,190	3,190	1,920	3,830	3,190	2,550	2,550	1,520	3,040	2,530	2,030	2,030	Cast irons FC FCD
300	600	500	400	400	300	600	500	400	400	300	600	500	400	400	300	600	500	400	400	
2,990	7,480	4,980	3,990	3,000	2,870	7,170	4,790	3,830	2,880	2,690	6,710	4,920	3,570	3,220	2,440	6,080	4,460	3,250	2,930	
0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.22	0.2	0.18	0.2	0.25	0.22	0.2	0.18	
0.8	0.8	0.8	0.8	0.8	0.88	0.88	0.88	0.88	0.88	1	1	1	1	1	1.12	1.12	1.12	1.12	1.12	
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	<0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	



Roughing

※Red indicates primary recommended grade.

ϕ32 (5 Flutes)					ϕ40 (6 Flutes)					ϕ50 (7 Flutes)					ϕ63 (8 Flutes)					Work material
<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		3DC-5DC	5DC-7DC	>7DC	<3DC		3DC-5DC	5DC-7DC	>7DC	
General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting				General purpose	High-speed cutting				
1,500	2,000	1,500	1,500	1,200	1,200	1,600	1,200	1,200	960	960	1,280	960	960	770	760	1,020	760	760	610	Carbon steels Alloy steels (30HRC or less)
150	200	150	150	120	150	200	150	150	120	150	200	150	150	120	150	200	150	150	120	
1,130	1,500	900	750	420	1,080	1,440	870	720	410	1,010	1,350	810	680	380	920	1,230	730	610	350	
0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	0.15	0.15	0.12	0.1	0.07	
5	5	5	5	5	5.7	5.7	5.7	5.7	5.7	6.3	6.3	6.3	6.3	6.3	7.1	7.1	7.1	7.1	7.1	
< 4	< 4	< 3	< 2	< 2	< 4	< 4	< 3	< 2	< 2	< 4	< 4	< 3	< 2	< 2	< 4	< 4	< 3	< 2	< 2	
1,500	2,490	2,000	2,000	1,500	1,200	2,000	1,600	1,600	1,200	960	1,600	1,280	1,280	960	760	1,270	1,020	1,020	760	Cast irons FC FCD
150	250	200	200	150	150	250	200	200	150	150	250	200	200	150	150	250	200	200	150	
1,500	3,120	2,000	2,000	1,130	1,440	3,000	1,920	1,920	1,080	1,350	2,800	1,800	1,800	1,010	1,220	2,540	1,640	1,640	920	
0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	0.2	0.25	0.2	0.2	0.15	
5	5	5	5	5	5.7	5.7	5.7	5.7	5.7	6.3	6.3	6.3	6.3	6.3	7.1	7.1	7.1	7.1	7.1	
< 4	< 4	< 4	< 4	< 3	< 4	< 4	< 4	< 4	< 3	< 4	< 4	< 4	< 4	< 3	< 4	< 4	< 4	< 4	< 3	

Standard cutting conditions for contour roughing

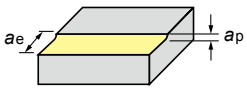
【Note】 Use nose corner radius *R*2 insert.

Work material	Recommended grade	Tool dia. DC	φ16 (2 Flutes)					φ20 (3 Flutes)					φ25 (4 Flutes)				
		Overhang	<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		Modular carbide shank		
			General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	※ JP4120 JS4060	*n* (min⁻¹)	2,590	3,990	2,590	2,590	1,800	2,080	3,190	2,080	2,080	1,440	1,660	2,550	1,660	1,660	1,150
		*v*c (m/min)	130	200	130	130	90	130	200	130	130	90	130	200	130	130	90
		*v*f (mm/min)	2,590	3,990	2,590	2,590	1,800	3,120	4,790	3,120	3,120	2,160	3,320	5,100	3,320	3,320	2,300
		*f*z (mm/t)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		*a*p (mm)	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25
		*a*e (mm)	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20
Carbon steels Alloy steels (30～45HRC)	JP4120 JS4060	*n* (min⁻¹)	1,800	3,590	2,590	2,590	1,800	1,440	2,870	2,080	2,080	1,440	1,150	2,300	1,660	1,660	1,150
		*v*c (m/min)	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90
		*v*f (mm/min)	1,440	2,880	2,080	2,080	1,440	1,730	3,450	2,500	2,500	1,730	1,840	3,680	2,660	2,660	1,840
		*f*z (mm/t)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
		*a*p (mm)	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25
		*a*e (mm)	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20
Stainless steels SUS	JM4160	*n* (min⁻¹)	2,590	3,990	2,590	2,590	1,800	2,080	3,190	2,080	2,080	1,440	1,660	2,550	1,660	1,660	1,150
		*v*c (m/min)	130	200	130	130	90	130	200	130	130	90	130	200	130	130	90
		*v*f (mm/min)	2,590	3,990	2,590	2,590	1,800	3,120	4,790	3,120	3,120	2,160	3,320	5,100	3,320	3,320	2,300
		*f*z (mm/t)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		*a*p (mm)	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25
		*a*e (mm)	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20
Cast irons FC FCD	JP4120 JS4060	*n* (min⁻¹)	2,990	3,990	2,590	2,590	1,800	2,390	3,190	2,080	2,080	1,440	1,920	2,550	1,660	1,660	1,150
		*v*c (m/min)	150	200	130	130	90	150	200	130	130	90	150	200	130	130	90
		*v*f (mm/min)	4,190	5,590	3,630	3,630	2,520	5,020	6,700	4,370	4,370	3,030	5,380	7,140	4,650	4,650	3,220
		*f*z (mm/t)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
		*a*p (mm)	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3
		*a*e (mm)	13	13	13	13	13	16	16	16	16	16	20	20	20	20	20

Standard cutting conditions for CBN bottom finishing

Work material	Recommended grade	Tool dia. DC	φ16 (2 Flutes)		φ20 (3 Flutes)		φ25 (4 Flutes)	
		Overhang	<3DC	Modular carbide shank	<3DC	Modular carbide shank	<3DC	Modular carbide shank
			High-speed cutting	3DC-5DC	High-speed cutting	3DC-5DC	High-speed cutting	3DC-5DC
Carbon steels Alloy steels (30HRC or less)	BH250	*n* (min⁻¹)	11,950	9,960	9,560	7,970	7,650	6,370
		*v*c (m/min)	600	500	600	500	600	500
		*v*f (mm/min)	2,390	1,600	2,870	1,920	3,060	2,040
		*f*z (mm/t)	0.1	0.08	0.1	0.08	0.1	0.08
		*a*p (mm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
		*a*e (mm)	8~16	8~16	10~20	10~20	12.5~25	12.5~25
Cast irons FC FCD	BH250	*n* (min⁻¹)	15,930	11,950	12,740	9,560	11,470	8,920
		*v*c (m/min)	800	600	800	600	900	700
		*v*f (mm/min)	3,830	2,870	4,590	3,450	5,510	4,290
		*f*z (mm/t)	0.12	0.12	0.12	0.12	0.12	0.12
		*a*p (mm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
		*a*e (mm)	8~16	8~16	10~20	10~20	12.5~25	12.5~25

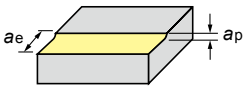
【Note】
①These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
②To prevent tool breakage due to chips clogging tool flutes, always be sure to use an air blower, etc. to remove chips.
③The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
④Please note that the JS Coating does not cause a reaction in conductive touch sensors.
⑤Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑥Make settings so that the cutting depth and per-flute feed rate do not exceed the maximum values.
⑦MZ1000 and BH250 are not suitable for wet cutting. Use them for dry cutting (air blow).
⑧Due to fire risks do not use neat cutting oil as a coolant.
⑨When using the BT30 arbor for modular mills, determine the cutting conditions using the standard cutting conditions table as a general guide. If vibrations are a concern due to the cutting conditions, adjust conditions by 1.reducing cutting depth (*a*p) or 2.reducing per-flute feed rate (*f*z).



Roughing

※Red indicates primary recommended grade.

φ32 (5 Flutes)					φ40 (6 Flutes)					φ50 (7 Flutes)					φ63 (8 Flutes)					Work material
<3DC		Modular carbide shank			<3DC		Modular carbide shank			<3DC		3DC-5DC	5DC-7DC	>7DC	<3DC		3DC-5DC	5DC-7DC	>7DC	
General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	General purpose	High-speed cutting				General purpose	High-speed cutting				
1,300	2,000	1,300	1,300	900	1,040	1,600	1,040	1,040	720	830	1,280	830	830	580	660	1,020	660	660	460	Carbon steels Alloy steels (30HRC or less)
130	200	130	130	90	130	200	130	130	90	130	200	130	130	90	130	200	130	130	90	
3,250	5,000	3,250	3,250	2,250	3,120	4,800	3,120	3,120	2,160	2,910	4,480	2,910	2,910	2,030	2,640	4,080	2,640	2,640	1,840	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	
25	25	25	25	25	32	32	32	32	32	40	40	40	40	40	50	50	50	50	50	
900	1,800	1,300	1,300	900	720	1,440	1,040	1,040	720	830	1,280	830	830	580	460	910	660	660	460	Carbon steels Alloy steels (30～45HRC)
90	180	130	130	90	90	180	130	130	90	130	200	130	130	90	90	180	130	130	90	
1,800	3,600	2,600	2,600	1,800	1,730	3,460	2,500	2,500	1,730	2,330	3,590	2,330	2,330	1,630	1,480	2,920	2,120	2,120	1,480	
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	
25	25	25	25	25	32	32	32	32	32	40	40	40	40	40	50	50	50	50	50	
1,300	2,000	1,300	1,300	900	1,040	1,600	1,040	1,040	720	960	1,470	1,150	830	640	660	1,020	660	660	460	Stainless steels SUS
130	200	130	130	90	130	200	130	130	90	150	230	180	130	100	130	200	130	130	90	
3,250	5,000	3,250	3,250	2,250	3,120	4,800	3,120	3,120	2,160	3,360	5,150	4,030	2,910	2,240	2,640	4,080	2,640	2,640	1,840	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	0.5	0.5	0.4	0.3	0.25	
25	25	25	25	25	32	32	32	32	32	40	40	40	40	40	50	50	50	50	50	
1,500	2,000	1,300	1,300	900	1,200	1,600	1,040	1,040	720	960	1,280	830	830	580	760	1,020	660	660	460	Cast irons FC FCD
150	200	130	130	90	150	200	130	130	90	150	200	130	130	90	150	200	130	130	90	
5,250	7,000	4,550	4,550	3,150	5,040	6,720	4,370	4,370	3,030	4,710	6,280	4,070	4,070	2,850	4,260	5,720	3,700	3,700	2,580	
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.5	0.4	0.3	
25	25	25	25	25	32	32	32	32	32	40	40	40	40	40	50	50	50	50	50	



Finishing

φ32 (5 Flutes)		φ40 (6 Flutes)		φ50 (7 Flutes)		φ63 (8 Flutes)		Work material
<3DC	Modular carbide shank	<3DC	Modular carbide shank	<3DC	3DC-5DC	<3DC	3DC-5DC	
High-speed cutting	3DC-5DC	High-speed cutting	3DC-5DC	High-speed cutting		High-speed cutting		
5,980	4,980	4,780	3,990	3,830	3,190	3,040	2,530	Carbon steels Alloy steels (30HRC or less)
600	500	600	500	600	500	600	500	
2,990	2,000	2,870	1,920	2,690	2,240	2,440	2,030	
0.1	0.08	0.1	0.08	0.1	0.1	0.1	0.1	
< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
16~32	16~32	20~40	20~40	25~50	25~50	31~63	31~63	
8,960	6,970	7,170	5,580	5,740	4,460	4,550	3,540	Cast irons FC FCD
900	700	900	700	900	700	900	700	
5,380	4,190	5,170	4,020	4,830	3,750	4,370	3,400	
0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	
< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
16~32	16~32	20~40	20~40	25~50	25~50	31~63	31~63	

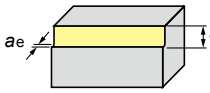
Standard cutting conditions for CBN side finishing

Work material	Recommended grade	Tool dia. DC	ϕ16 (2 Flutes)				ϕ20 (3 Flutes)				ϕ25 (4 Flutes)			
		Overhang	<3DC	Modular carbide shank			<3DC	Modular carbide shank			<3DC	Modular carbide shank		
			High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	BH250	n (min^{-1})	15,930	15,930	11,950	11,950	12,740	12,740	9,560	9,560	10,200	10,200	7,650	7,650
		v_c (m/min)	800	800	600	600	800	800	600	600	800	800	600	600
		v_f (mm/min)	2,240	2,240	1,680	1,200	3,830	3,830	2,010	2,010	4,080	4,080	2,150	2,150
		f_z (mm/t)	0.07	0.07	0.07	0.05	0.1	0.1	0.07	0.07	0.1	0.1	0.07	0.07
		a_p (mm)	2	1.5	1	0.7	2	1.5	1	0.7	2	1.5	1	0.7
		a_e (mm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cast irons FC FCD	BH250	n (min^{-1})	19,910	15,930	15,930	15,930	15,930	12,740	12,740	12,740	12,740	10,200	10,200	10,200
		v_c (m/min)	1,000	800	800	800	1,000	800	800	800	1,000	800	800	800
		v_f (mm/min)	4,780	3,830	3,190	3,190	5,740	4,590	3,830	3,830	6,120	4,900	4,080	4,080
		f_z (mm/t)	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1
		a_p (mm)	2	1.5	1	0.7	2	1.5	1	0.7	2	1.5	1	0.7
		a_e (mm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Standard cutting conditions for CBN vertical side finishing

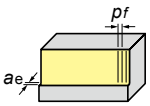
Work material	Recommended grade	Tool dia. DC	ϕ16 (2 Flutes)				ϕ20 (3 Flutes)				ϕ25 (4 Flutes)			
		Overhang	<3DC	Modular carbide shank			<3DC	Modular carbide shank			<3DC	Modular carbide shank		
			High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting	3DC-5DC	5DC-7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	BH250	n (min^{-1})	15,930	15,930	11,950	11,950	12,740	12,740	9,560	9,560	10,200	10,200	7,650	7,650
		v_c (m/min)	800	800	600	600	800	800	600	600	800	800	600	600
		v_f (mm/min)	2,240	2,240	1,680	1,200	3,830	3,830	2,010	2,010	4,080	4,080	2,150	2,150
		f_z (mm/t)	0.07	0.07	0.07	0.05	0.1	0.1	0.07	0.07	0.1	0.1	0.07	0.07
		p_f (mm)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.6	< 0.6	< 0.6	< 0.6	< 0.7	< 0.7	< 0.7	< 0.7
		a_e (mm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cast irons FC FCD	BH250	n (min^{-1})	19,910	15,930	15,930	15,930	15,930	12,740	12,740	12,740	12,740	10,200	10,200	10,200
		v_c (m/min)	1,000	800	800	800	1,000	800	800	800	1,000	800	800	800
		v_f (mm/min)	4,780	3,830	3,190	3,190	5,740	4,590	3,830	3,830	6,120	4,900	4,080	4,080
		f_z (mm/t)	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1
		p_f (mm)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.6	< 0.6	< 0.6	< 0.6	< 0.7	< 0.7	< 0.7	< 0.7
		a_e (mm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

【Note】
①These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
②To prevent tool breakage due to chips clogging tool flutes, always be sure to use an air blower, etc. to remove chips.
③The evacuation of swarf can cause burns, cuts or damage to the eyes please ensue the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.
④Please note that the JS Coating does not cause a reaction in conductive touch sensors.
⑤Ensure to index the insert at the correct time to ensure safety of the tool-body.
⑥Make settings so that the cutting depth and per-flute feed rate do not exceed the maximum values.
⑦MZ1000 and BH250 are not suitable for wet cutting. Use them for dry cutting (air blow).
⑧Due to fire risks do not use neat cutting oil as a coolant.
⑨When using the BT30 arbor for modular mills, determine the cutting conditions using the standard cutting conditions table as a general guide. If vibrations are a concern due to the cutting conditions, adjust conditions by 1.reducing cutting depth (a_p) or 2.reducing per-flute feed rate (f_z).



Finishing

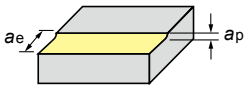
ϕ32 (5 Flutes)				ϕ40 (6 Flutes)				ϕ50 (7 Flutes)				ϕ63 (8 Flutes)				Work material
<3DC	Modular carbide shank			<3DC	Modular carbide shank			<3DC	3DC-5DC	5DC-7DC	>7DC	<3DC	3DC-5DC	5DC-7DC	>7DC	
High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting				High-speed cutting				
7,970	7,970	5,980	5,980	6,370	6,370	4,780	4,780	5,100	5,100	3,830	3,830	4,050	4,050	3,040	3,040	Carbon steels Alloy steels (30HRC or less)
800	800	600	600	800	800	600	600	800	800	600	600	800	800	600	600	
3,990	3,990	2,100	2,100	3,830	3,830	2,010	2,010	3,570	3,570	1,880	1,880	3,240	3,240	1,710	1,710	
0.1	0.1	0.07	0.07	0.1	0.1	0.07	0.07	0.1	0.1	0.07	0.07	0.1	0.1	0.07	0.07	
2	1.5	1	0.7	2	1.5	1	0.7	2	2	1.5	1	2	2	1.5	1	
< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
11,950	9,960	8,960	7,970	9,560	7,970	7,170	6,370	7,650	6,370	5,740	5,100	6,070	5,060	4,550	4,050	Cast irons FC FCD
1,200	1,000	900	800	1,200	1,000	900	800	1,200	1,000	900	800	1,200	1,000	900	800	
7,170	5,980	4,480	3,990	6,890	5,740	4,310	3,830	6,430	5,360	4,020	3,570	5,830	4,860	3,640	3,240	
0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	
2	1.5	1	0.7	2	1.5	1	0.7	2	1.5	1	0.7	2	1.5	1	0.7	
< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	



Finishing

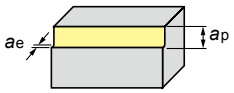
ϕ32 (5 Flutes)				ϕ40 (6 Flutes)				ϕ50 (7 Flutes)				ϕ63 (8 Flutes)				Work material
<3DC	Modular carbide shank			<3DC	Modular carbide shank			<3DC	3DC-5DC	5DC-7DC	>7DC	<3DC	3DC-5DC	5DC-7DC	>7DC	
High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting	3DC-5DC	5DC-7DC	>7DC	High-speed cutting				High-speed cutting				
7,970	7,970	5,980	5,980	6,370	6,370	4,780	4,780	5,100	5,100	3,830	3,830	4,050	4,050	3,040	3,040	Carbon steels Alloy steels (30HRC or less)
800	800	600	600	800	800	600	600	800	800	600	600	800	800	600	600	
3,990	3,990	2,100	2,100	3,830	3,830	2,010	2,010	3,570	3,570	2,690	2,690	3,240	3,240	2,440	2,440	
0.1	0.1	0.07	0.07	0.1	0.1	0.07	0.07	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
< 0.8	< 0.8	< 0.8	< 0.8	< 0.88	< 0.88	< 0.88	< 0.88	< 1	< 1	< 1	< 1	< 1.12	< 1.12	< 1.12	< 1.12	
< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
11,950	9,960	8,960	7,970	9,560	7,970	7,170	6,370	7,650	6,370	5,740	5,100	6,070	5,060	4,550	4,050	Cast irons FC FCD
1,200	1,000	900	800	1200	1000	900	800	1200	1000	900	800	1,200	1,000	900	800	
7,170	5,980	4,480	3,990	6,890	5,740	4,310	3,830	6,430	5,360	4,020	3,570	5,830	4,860	3,640	3,240	
0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	0.12	0.12	0.1	0.1	
< 0.8	< 0.8	< 0.8	< 0.8	< 0.88	< 0.88	< 0.88	< 0.88	< 1	< 1	< 1	< 1	< 1.12	< 1.12	< 1.12	< 1.12	
< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	

Cutting conditions for cutting aluminum alloy and copper using SD5010



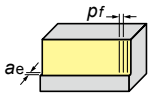
Cutting conditions for bottom finishing：a_e=0.5DC～0.7DC

Work material	Cutting conditions	φ16 2ft.	φ18 2ft.	φ20 3ft.	φ22 3ft.	φ25 4ft.	φ28 4ft.	φ30 4ft.	φ32 5ft.	φ35 5ft.	φ40 6ft.	φ50 7ft.	φ63 8ft.
Expanded aluminum alloy material A5052,A7075, etc. (Air-blow or wet: Water-soluble agent)	Revolution *n* (min-1)	15,900	15,900	15,900	15,900	15,300	13,640	12,730	11,940	10,910	9,550	7,640	6,060
	Cutting speed *Vc* (m/min)	800	900	1,000	1,100	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
	Feed rate *fz* (mm/t)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.08	0.08	0.08	0.06	0.06
	Feed speed *Vf* (mm/min)	3,180	3,180	4,770	4,770	6,120	5,460	5,090	4,780	4,360	4,580	3,210	2,910
	Cutting depth *ap* (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Cast aluminum alloy material AC4A,ADC12, etc. (Air-blow or wet: Water-soluble agent)	Revolution *n* (min-1)	12,700	12,700	12,700	12,700	12,200	10,900	10,190	9,550	8,730	7,640	6,110	4,850
	Cutting speed *Vc* (m/min)	640	720	800	880	960	960	960	960	960	960	960	960
	Feed rate *fz* (mm/t)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.08	0.08	0.08	0.06	0.06
	Feed speed *Vf* (mm/min)	2,540	2,540	3,810	3,810	4,900	4,360	4,080	3,820	3,490	3,670	2,570	2,330
	Cutting depth *ap* (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Pure copper C1100,C1020, etc. (Wet: Water-soluble agent)	Revolution *n* (min-1)	5,970	5,300	4,770	4,340	3,820	3,410	3,180	2,980	2,730	2,390	1,910	1,520
	Cutting speed *Vc* (m/min)	300	300	300	300	300	300	300	300	300	300	300	300
	Feed rate *fz* (mm/t)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.08	0.08	0.08	0.06	0.06
	Feed speed *Vf* (mm/min)	1,190	1,060	1,430	1,300	1,530	1,360	1,270	1,190	1,090	1,150	800	730
	Cutting depth *ap* (mm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2



Cutting conditions for side finishing ：a_e≦0.2mm

Work material	Cutting conditions	φ16 2ft.	φ18 2ft.	φ20 3ft.	φ22 3ft.	φ25 4ft.	φ28 4ft.	φ30 4ft.	φ32 5ft.	φ35 5ft.	φ40 6ft.	φ50 7ft.	φ63 8ft.
Expanded aluminum alloy material A5052,A7075, etc. (Air-blow or wet: Water-soluble agent)	Revolution *n* (min-1)	15,900	15,900	15,900	15,900	15,300	13,640	12,730	11,940	10,910	9,550	7,640	6,060
	Cutting speed *Vc* (m/min)	800	900	1,000	1,100	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
	Feed rate *fz* (mm/t)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.2	0.2
	Feed speed *Vf* (mm/min)	4,770	4,770	7,160	7,160	9,180	8,180	7,640	8,960	8,180	10,300	10,700	9,700
	Cutting depth *ap* (mm)	2	2	2	2	2	2	2	2	2	2	2	2
Cast aluminum alloy material AC4A,ADC12, etc. (Air-blow or wet: Water-soluble agent)	Revolution *n* (min-1)	12,700	12,700	12,700	12,700	12,200	10,900	10,190	9,550	8,730	7,640	6,110	4,850
	Cutting speed *Vc* (m/min)	640	720	800	880	960	960	960	960	960	960	960	960
	Feed rate *fz* (mm/t)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18	0.2	0.2
	Feed speed *Vf* (mm/min)	3,810	3,810	5,720	5,720	7,320	6,540	6,100	7,160	6,550	8,250	8,550	7,760
	Cutting depth *ap* (mm)	2	2	2	2	2	2	2	2	2	2	2	2
Pure copper C1100,C1020, etc. (Wet: Water-soluble agent)	Revolution *n* (min-1)	5,970	5,300	4,770	4,340	3,820	3,410	3,180	2,980	2,730	2,390	1,910	1,520
	Cutting speed *Vc* (m/min)	300	300	300	300	300	300	300	300	300	300	300	300
	Feed rate *fz* (mm/t)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.2	0.2	0.25	0.25
	Feed speed *Vf* (mm/min)	1,790	1,590	2,150	1,950	2,290	2,050	1,910	2,240	2,730	2,870	3,340	3,040
	Cutting depth *ap* (mm)	2	2	2	2	2	2	2	2	2	2	2	2

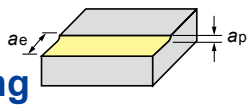


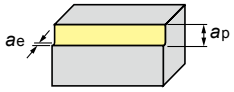
Cutting conditions for vertical roughing

Work material	Cutting conditions	φ16 2ft.	φ18 2ft.	φ20 3ft.	φ22 3ft.	φ25 4ft.	φ28 4ft.	φ30 4ft.	φ32 5ft.	φ35 5ft.	φ40 6ft.	φ50 7ft.	φ63 8ft.
Expanded aluminum alloy material A5052,A7075, etc. (Air-blow or wet: Water-soluble agent)	Revolution *n* (min-1)	15,900	15,900	15,900	15,900	15,300	13,640	12,730	11,940	10,910	9,550	7,640	6,060
	Cutting speed *Vc* (m/min)	800	900	1,000	1,100	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
	Feed rate *fz* (mm/t)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	Feed speed *Vf* (mm/min)	4,770	4,770	7,160	7,160	9,180	8,180	7,640	8,960	8,180	8,600	8,020	7,270
	Pick feed *pf* (mm)	3.5	4	4	4	4.5	4.5	5	5	5.5	6	6.5	7
	Cutting depth *ap* (mm)	4	4	4	4	4	4	4	4	4	4	4	4
Cast aluminum alloy material AC4A,ADC12, etc. (Air-blow or wet: Water-soluble agent)	Revolution *n* (min-1)	12,700	12,700	12,700	12,700	12,200	10,900	10,190	9,550	8,730	7,640	6,110	4,850
	Cutting speed *Vc* (m/min)	640	720	800	880	960	960	960	960	960	960	960	960
	Feed rate *fz* (mm/t)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	Feed speed *Vf* (mm/min)	3,810	3,810	5,720	5,720	7,320	6,540	6,100	7,160	6,550	6,880	6,420	5,820
	Pick feed *pf* (mm)	3.5	4	4	4	4.5	4.5	5	5	5.5	6	6.5	7
	Cutting depth *ap* (mm)	4	4	4	4	4	4	4	4	4	4	4	4
Pure copper C1100,C1020, etc. (Wet: Water-soluble agent)	Revolution *n* (min-1)	5,970	5,300	4,770	4,340	3,820	3,410	3,180	2,980	2,730	2,390	1,910	1,520
	Cutting speed *Vc* (m/min)	300	300	300	300	300	300	300	300	300	300	300	300
	Feed rate *fz* (mm/t)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	Feed speed *Vf* (mm/min)	1,790	1,590	2,150	1,950	2,290	2,050	1,910	2,240	2,050	2,150	2,000	1,820
	Pick feed *pf* (mm)	3.5	4	4	4	4.5	4.5	5	5	5.5	6	6.5	7
	Cutting depth *ap* (mm)	4	4	4	4	4	4	4	4	4	4	4	4

【Note】 ①These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
②When L/D = 4 or higher, reduce the rotation speed and feed rate by 60% (set them to 0.4 times the values shown above).
③Use on a machine equipped with splashguards. During use, be sure to wear protective equipment such as safety glasses, and always perform work in a safe environment.
④When using a machine that cannot provide the rotation speed shown above, set the highest rotation speed possible and calculate the feed rate using the f_z value.
⑤Be sure to use this tool at rotation speeds within the acceptable range for the milling chuck being used. If the acceptable rotation speed range is below the rotation speed shown above, set the highest acceptable rotation speed and calculate the feed rate using the f_z value.

Cutting performance : *Vc*-T diagrams for various finishing

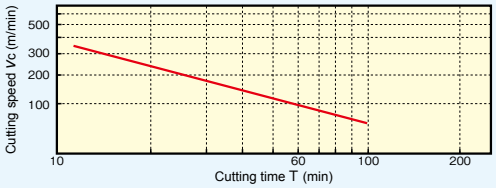




●*Vc*-T diagrams for bottom finishing

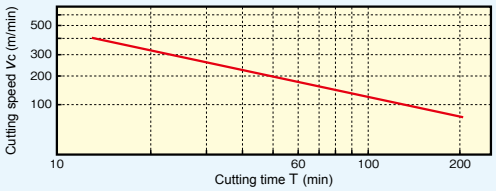
【 Carbon Steels 】

Work Material : S50C(220HB)
Tools : ASPVM2020R-3
Arbor : BT30-10.5-20-18
Insert : MPHW060308ZEL-1.5(MZ1000)
Overhang : 50mm
Machine used : Vertical type (BT30)
Feed rate per flute : 0.15mm/t
Depth of cut : *ap*×*ae*=0.2×10mm
Air



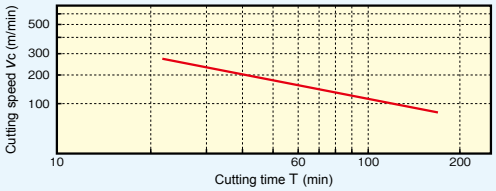
【 Material for plastic mold 】

Work Material : P20(32HRC)
Tools : ASPVM2020R-3
Arbor : BT30-10.5-20-18
Insert : MPHW060308ZEL-1.5(MZ1000)
Overhang : 50mm
Machine used : Vertical type (BT30)
Feed rate per flute : 0.15mm/t
Depth of cut : *ap*×*ae*=0.2×10mm
Air



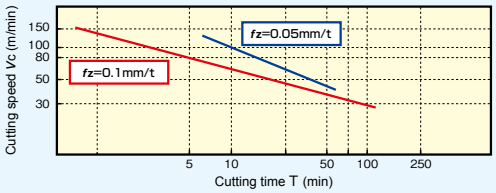
【 Material for plastic mold 】

Work Material : P21(40HRC)
Tools : ASPVM2020R-3
Arbor : BT30-10.5-20-18
Insert : MPHW060308ZEL-1.5(ATH08M)
Overhang : 50mm
Machine used : Vertical type (BT30)
Feed rate per flute : 0.15mm/t
Depth of cut : *ap*×*ae*=0.2×10mm
Air



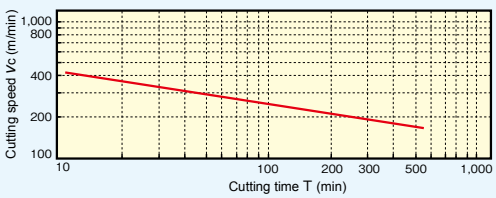
【 Cold-worked die steels 】

Work Material : SKD11(61HRC)
Tools : ASPVM2020R-3
Arbor : BT30-10.5-20-18
Insert : MPHW060308ZEL-1.5(ATH08M)
Overhang : 50mm
Machine used : Vertical type (BT30)
Feed rate per flute : 0.05、0.1mm/t
Depth of cut : *ap*×*ae*=0.2×10mm
Air



【 Cast Iron 】

Work Material : FC250
Tools : ASPVB2050R-7
Arbor : BT50-22.225-50-50
Insert : MPHW060308ZEL-1.5(ATH08M)
Overhang : 100mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.15mm/t
Depth of cut : *ap*×*ae*=0.2×40mm
Air

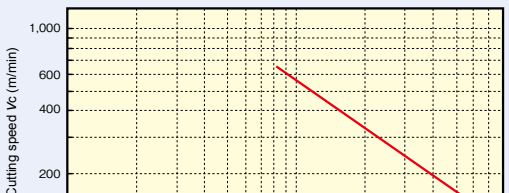


※Tool life shown is for flank wear width of 0.2mm.

●*Vc*-T diagrams for side finishing

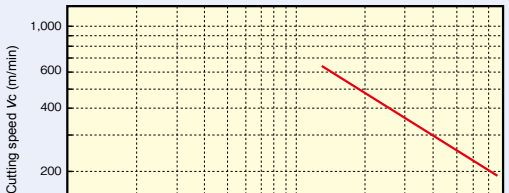
【 Carbon Steels 】

Work Material : S50C(220HB)
Tools : ASPVM2032R-5
Arbor : ASC32-17-260-140
Insert : MPHW060308ZEL(ATH08M)
Overhang : 200mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.1mm/t
Depth of cut : *ap*×*ae*=1×0.1mm
Air



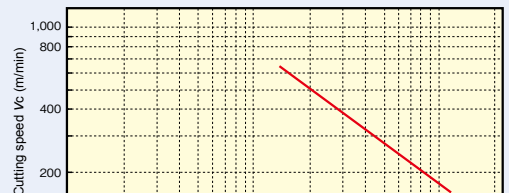
【 Material for plastic mold 】

Work Material : P20(32HRC)
Tools : ASPVM2032R-5
Arbor : ASC32-17-260-140
Insert : MPHW060308ZEL(ATH08M)
Overhang : 200mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.1mm/t
Depth of cut : *ap*×*ae*=1×0.1mm
Air



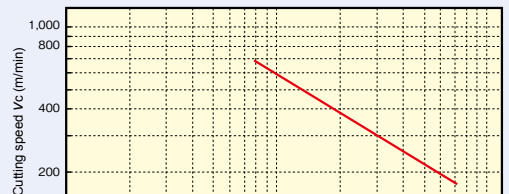
【 Material for plastic mold 】

Work Material : P21(40HRC)
Tools : ASPVM2032R-5
Arbor : ASC32-17-260-140
Insert : MPHW060308ZEL(ATH08M)
Overhang : 200mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.1mm/t
Depth of cut : *ap*×*ae*=1×0.1mm
Air



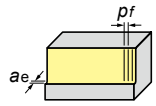
【 Hot-worked die steels 】

Work Material : SKD61(48HRC)
Tools : ASPVM2032R-5
Arbor : ASC32-17-260-140
Insert : MPHW060308ZEL(ATH08M)
Overhang : 200mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.1mm/t
Depth of cut : *ap*×*ae*=1×0.1mm
Air



※Tool life shown is for flank wear width of 0.15mm.

Field data

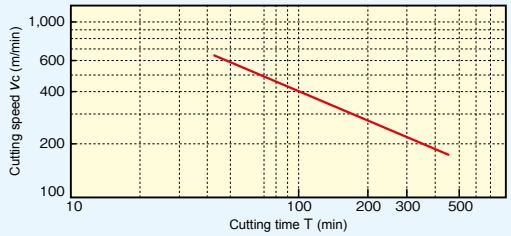


Cutting performance : *Vc*-T diagrams for various finishing

●*Vc*-T diagrams for vertical machining side finishing

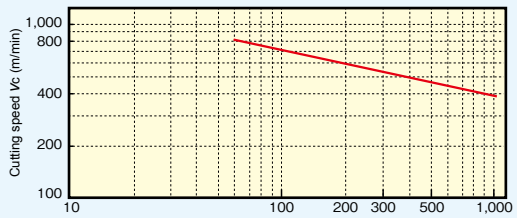
【 Carbon Steels 】

Work Material : S50C(220HB)
Tools : ASPVB2050R-7
Arbor : BT50-22.225-200-50
Insert : MPHW060308ZEL(ATH08M)
Overhang : 250mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.15mm/t
Depth of cut : *pf*×*ae*=1×0.2,0.5mm Reciprocating machining
Air



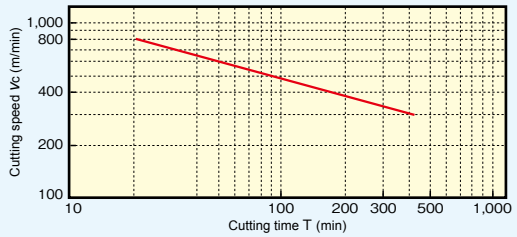
【 Cast Irons 】

Work Material : FC250
Tools : ASPVB2050R-7
Arbor : BT50-22.225-200-50
Insert : MPHW060308ZEL(ATH08M)
Overhang : 250mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.15mm/t
Depth of cut : *pf*×*ae*=1×0.2mm Reciprocating machining
Air



【 Cast Irons 】

Work Material : FC250
Tools : ASPVB2050R-7
Arbor : BT50-22.225-200-50
Insert : MPHW060308ZEL(ATH08M)
Overhang : 250mm
Machine used : Vertical type (BT50)
Feed rate per flute : 0.15mm/t
Depth of cut : *pf*×*ae*=1×0.5mm Reciprocating machining
Air



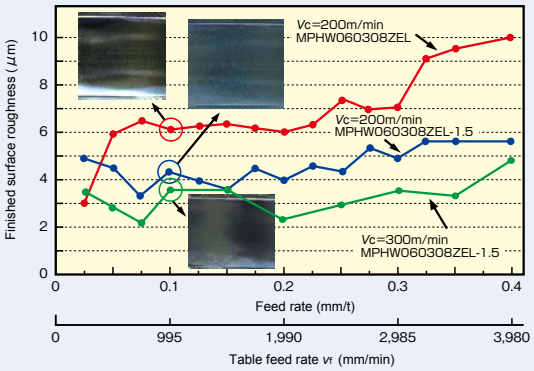
※Tool life shown is for flank wear width of 0.15mm.

Cutting performance : Finished surface roughness

● Relation between feed rate and surface roughness

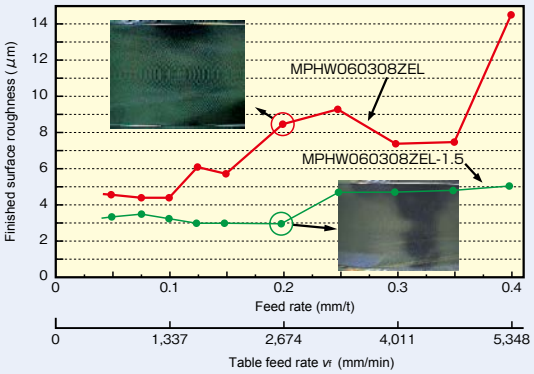
〈When mill diameter is ϕ32〉

Work Material : S50C(220HB)
Tools : ASPVM2032R-5
Shank : AS32-17-110-30
Insert : MPHW060308ZEL-1.5(MZ1000)
: MPHW060308ZEL(MZ1000)
Overhang : 70mm
Machine used : Vertical type(BT50)
Cutting speed : *vc*=200.300m/min
Depth of cut : *ap*×*ae*=0.2×32(Full) mm
Air



〈When mill diameter is ϕ50〉

Work Material : S50C(220HB)
Tools : ASPVB2050R-7
Arbor : BT50-22.225-50-50
Insert : MPHW060308ZEL-1.5(MZ1000)
: MPHW060308ZEL(MZ1000)
Overhang : 100mm
Machine used : Vertical type(BT50)
Rotation speed : *n*=1,910min⁻¹
Cutting speed : *vc*=300m/min
Depth of cut : *ap*×*ae*=0.2×50(Full) mm
Air

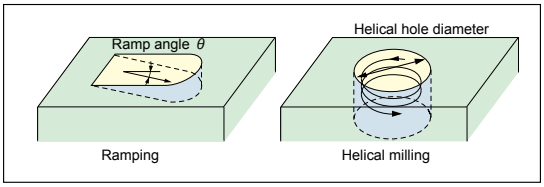


Cutting by direct milling is also possible.

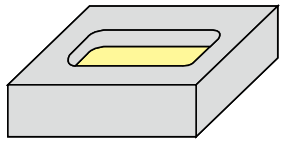
Since the cutting flute do not extend to the center, there are limitations on the ramp angle and hole diameter, but as shown right, cutting by direct milling without a pilot hole is possible for ramping and helical milling.

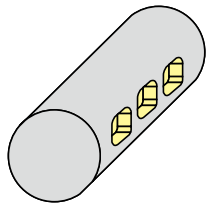
(mm)

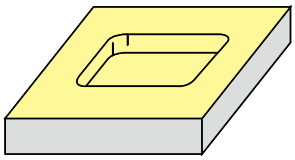
Inserts	MPN (H) W0603○○ZEL											
Tool dia. DC	ϕ16	ϕ18	ϕ20	ϕ22	ϕ25	ϕ28	ϕ30	ϕ32	ϕ35	ϕ40	ϕ50	ϕ63
Maximum ramp angle θ	2.5°	2.5°	2.5°	2.5°	2.1°	1.8°	1.7°	1.6°	1.4°	1.2°	1°	0.5°
Hole Dia.	22~30	26~34	30~38	34~42	40~48	46~54	50~58	54~62	60~68	70~78	90~98	116~124

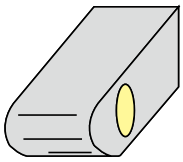


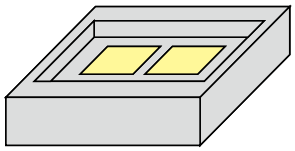
【Note】① The ramp angle θ should be set within the ranges listed above. Use at ramp angles of 0.5° or less is recommended.
② For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

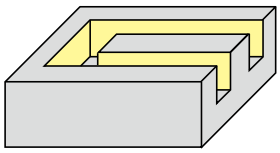
Tools : ASPVS2020R-3	Cutting Conditions	Result
	Work Material :S55C(220HB) Tools :ASPVS2020R-3 Arbor :Commercial milling chuck Insert :MPHW060302ZEL-0.5(MZ1000) Overhang :OH=50mm Machine used :Vertical type (BT50) Rotation speed :n=3,180min^{-1} Cutting speed :v_c=200m/min Feed rate :v_f=670mm/min Feed rate per flute :0.07mm/t Depth of cut :$a_p \times a_e$=0.1×10mm	Compared to past indexable tools, feed rate is 1.5 × as fast and cutting accuracy is more stable, so tool life is more than doubled.

Tools : ASPVM2016R-2	Cutting Conditions	Result
	Work Material : SCM(30HRC) Tools : ASPVM2016R-2 Arbor : ASC16-8.5-95-30 Insert : MPHW060302ZEL(MZ1000) Overhang : OH=55mm Machine used : Compound machining machine(BT40) Rotation speed : n=4,050min^{-1} Cutting speed : v_c=203m/min Feed rate : v_f=800mm/min Feed rate per flute : 0.1mm/t Depth of cut : $a_p \times a_e$=0.5×0.4mm	In the past, HSS end mills were used, but by using ASPVM and a carbide shank, in addition to improved inclination accuracy, it was also possible to stably use an indexable tool.

Tools : ASPVS2016R-2	Cutting Conditions	Result
	Work Material :SUS420 Tools :ASPVS2016R-2 Arbor :Commercial milling chuck Insert :MPHW060304ZEL-0.5(Equivalent to JP4120) Overhang :OH=40mm Machine used :Vertical type (BT40) Rotation speed :n=4,000min^{-1} Cutting speed :v_c=200m/min Feed rate :v_f=1,000mm/min Feed rate per flute :0.125mm/t Depth of cut :$a_p \times a_e$=0.1×8mm	In the past, when using a normal angle type indexable tool, progressing with cutting tended to result in chattering marks, but with ASPV a stable cutting surface with no chattering marks was achieved. Use of the inserts for approximately 1 hour of cutting showed good constant wear.

Tools : ASPVM2032R-5	Cutting Conditions	Result
	Work Material :FCD550 Tools :ASPVM2032R-5 Arbor :ASC32-17-210-110 Insert :MPHW060308ZEL(ATH08M) Overhang :OH=160mm Machine used :Vertical type (BT50) Rotation speed :n=1,800min^{-1} Cutting speed :v_c=180m/min Feed rate :v_f=2,500mm/min Feed rate per flute :0.28mm/t Depth of cut :$a_p \times a_e$=1×0.2mm	In the past, HSS end mills with long flute lengths were used, but cutting accuracy was unstable. Using ASPVM and carbide shanks provided stable cutting accuracy.

Tools : ASPVB2050R-7	Cutting Conditions	Result
	Work Material :FC250 Tools :ASPVB2050R-7 Arbor :BT50-22.225-200-50 Insert :MPHW060308ZEL-1.5(ATH08M) Overhang :OH=250mm Machine used :Vertical type (BT50) Rotation speed :n=1,270min^{-1} Cutting speed :v_c=200m/min Feed rate :v_f=1,510mm/min Feed rate per flute :0.17mm/t Depth of cut :$a_p \times a_e$=0.1×30mm	Compared to past indexable tools, feed marks on the cutting surface were stable and good.

Tools : ASPVM2032R-5	Cutting Conditions	Result
	Work Material :SKD61(HB≦229) Tools :ASPVM2032R-5 Arbor :Commercial Modular arbor Insert :MPHW060308ZEL(Equivalent to JP4120) Overhang :OH=220mm Machine used :Vertical type (BT50) Rotation speed :n=5,000min^{-1} Cutting speed :v_c=500m/min Feed rate :v_f=4000mm/min Feed rate per flute :0.16mm/t Depth of cut :$a_p \times a_e$=1.0×0.2mm	In the past, solid end mills were used, but cutting accuracy was unstable. Using ASPVM provided stable cutting accuracy and provided machining effiency.

MOLDINO

The Edge To Innovation

The diagrams and table data are examples of test results, and are not guaranteed values.
"MOLDINO" is a registered trademark of MOLDINO Tool Engineering, Ltd.

⚠ Attentions on Safety

1. Attentions regarding handling

(1) When removing the tool from the case (package), be careful not to drop it on your foot or drop it onto the tips of your bare fingers.
(2) When actually setting the inserts, be careful not to touch the cutting flute directly with your bare hands.

2. Attentions regarding mounting

(1) When preparing for use, be sure that the inserts are firmly mounted in place and that they are firmly mounted on the arbor, etc.
(2) If abnormal chattering occurs during use, stop the machine immediately and remove the cause of the chattering.

3. Attentions during use

(1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
(2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
(3) The inserts are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be installed and safety equipment such as safety glasses should be worn to create a safe environment for work.
・Do not use where there is a risk of fire or explosion.
・Do not use non-water-soluble cutting oils. Such oils may result in fire.
(4) Do not use the tool for any purpose other than that for which it is intended, and do not modify it.

MOLDINO Tool Engineering, Ltd.

Head Office
Hulic Ryogoku Bldg. 8F, 4-31-11, Ryogoku, Sumida-ku, Tokyo, Japan 130-0026
International Sales Dept. : TEL +81-3-6890-5103 FAX +81-3-6890-5128

Official Web Site
http://www.moldino.com/en/

Database for selection Cutting Tool Products【TOOL SEARCH】
TOOLSEARCH Search Web

Europe **MOLDINO Tool Engineering Europe GmbH**
Itterpark 12, 40724 Hilden,Germany.
Tel +49-(0)2103-24820 Fax +49-(0)2103-248230

China **MOLDINO Tool Engineering (Shanghai), Ltd.**
Room 2604-2605, Metro Plaza, 555 Loushanguan Road, Changning Disctrict,Shanghai, 200051, China
Tel +86-(0)21-3366-3058 Fax +86-(0)21-3366-3050

America **MITSUBISHI MATERIALS U.S.A. CORPORATION**
DETROIT OFFICE Customer service
41700 Gardenbrook Road, Suite 120, Novi, MI 48375-1320 U.S.A.
Tel +1(248) 308-2620 Fax +1(248) 308-2627

Mexico **MMC METAL DE MEXICO, S.A. DE C.V.**
Av. La Cañada No.16, Parque Industrial Bernardo Quintana, El Marques, Querétaro, CP 76246, México
Tel +52-442-1926800

Brazil **MMC METAL DO BRASIL LTDA.**
Rua Cincinato Braga, 340 13° andar.Bela Vista – CEP 01333-010 São Paulo – SP ., Brasil
Tel +55(11)3506-5600 Fax +55(11)3506-5677

Thailand **MMC Hardmetal (Thailand) Co.,Ltd. MOLDINO Division**
622 Emporium Tower, Floor 22/1-4, Sukhumvit Road, Klong Tan, Klong Toei,
Bangkok 10110, Thailand
Tel +66-(0)2-661-8175 Fax +66-(0)2-661-8176

India **MMC Hardmetal India Pvt Ltd.**
H.O.: Prasad Enclave, #118/119, 1st Floor, 2nd Stage, 5th main, BBMP Ward #11, (New #38),
Industrial Suburb, Yeshwanthpura, Bengaluru, 560 022, Karnataka, India.
Tel +91-80-2204-3600

DISTRIBUTED BY:

Printed in JAPAN
2022-11 (ME-To)
2012-2:FP