MOLDINO
The Edge To Innovation

BR2P type

Ball End Mill BR2P type

MOLDINO Tool Engineering, Ltd.

New Product News | No.2001E-4 | 2022-11

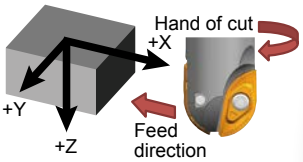
Unique insert mounting mechanism and helical cutting edge for greater cutting efficiency

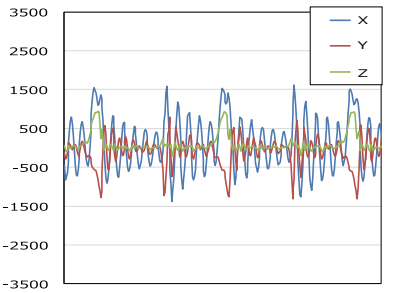
Issue 01

Need to set less demanding cutting conditions when using conventional tools due to potential for chattering vibration

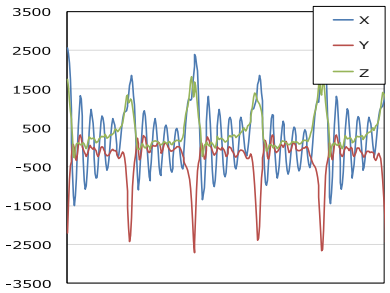
Proposed solutions

- The shape of the helical cutting edge reduces cutting resistance, suppresses chattering by mitigating impact on contact with the cutting edge, and helps prevent a rapid increase in cutting resistance.

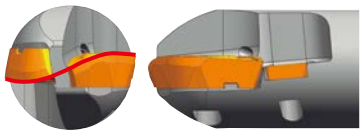




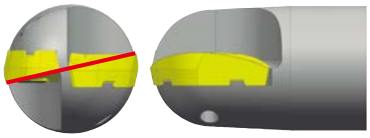
cutting force(N)



cutting force(N)



BR2P type



Conventional

Cutting conditions

Work material : S50C (220HB)
Machine : Vertical type (BT50)
Tool
BR2P type
Cutter : BR2P3043S32-200-100
Insert : ZPET150R-B JP4120
Cutting speed : Vc =200m/min
Revolution : n =2122min^{-1}
Feed per tooth : fz=0.2mm/t
Feed speed : Vf =849mm/min
Radial depth of cut : $ap \times ae$=15×0.5mm
Overhang : 120mm Air

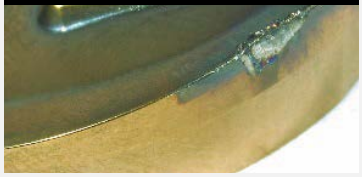
Point! Helical cutting edge to suppress chattering

The helical shape of the cutting edge results in improved tool life for BR2P than conventional products by suppressing chattering vibration.

BR2P type

After six hours of cutting : Normal wear

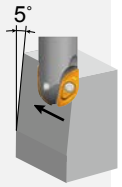
Conventional

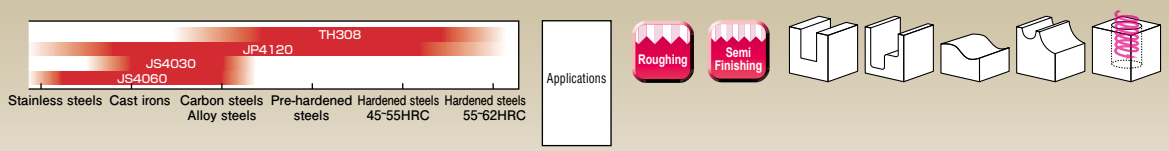


After an hour of cutting : Severely damaged; almost completely consumed

Cutting conditions

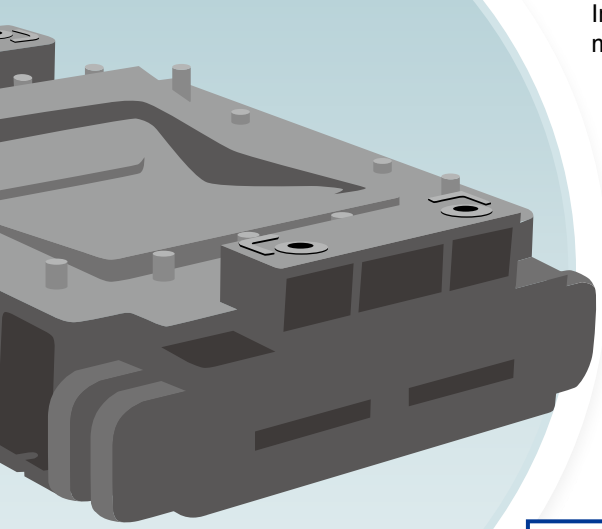
Work material : SKD61(45HRC) Slant angle: 5°
Machine : Vertical type (BT50)
Tool
BR2P type
Cutter : BR2P3043S32-200-100
Insert : ZPET150R-B JP4120
Cutting speed : Vc =200m/min
Revolution : n =2122min^{-1}
Feed per tooth : fz=0.3mm/t
Feed speed : Vf =1273mm/min
Radial depth of cut : $ap \times ae$=3×3mm
Overhang : 120mm Air





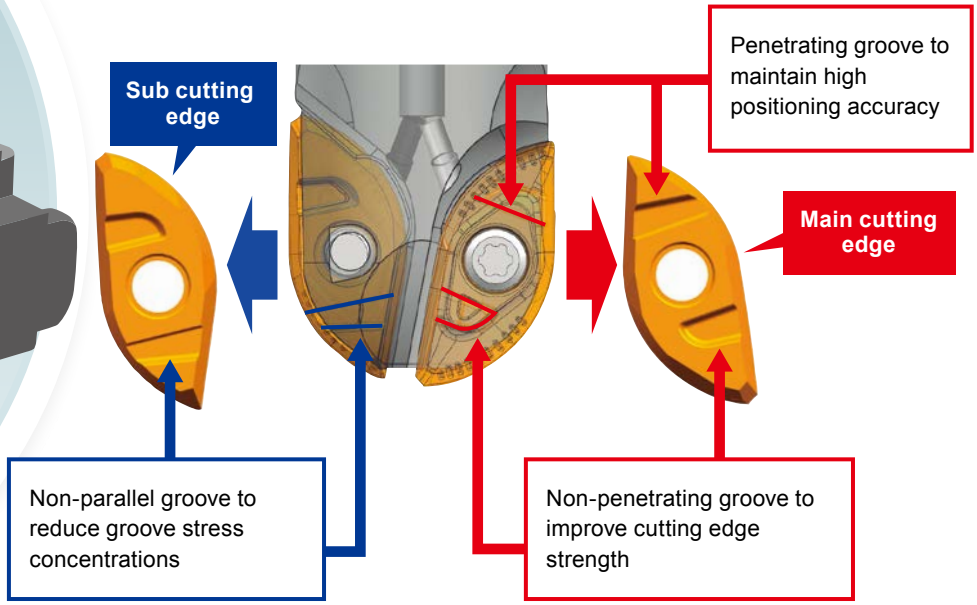
Issue 02

Unable to increase cutting conditions, since more demanding cutting conditions could potentially damage the insert.

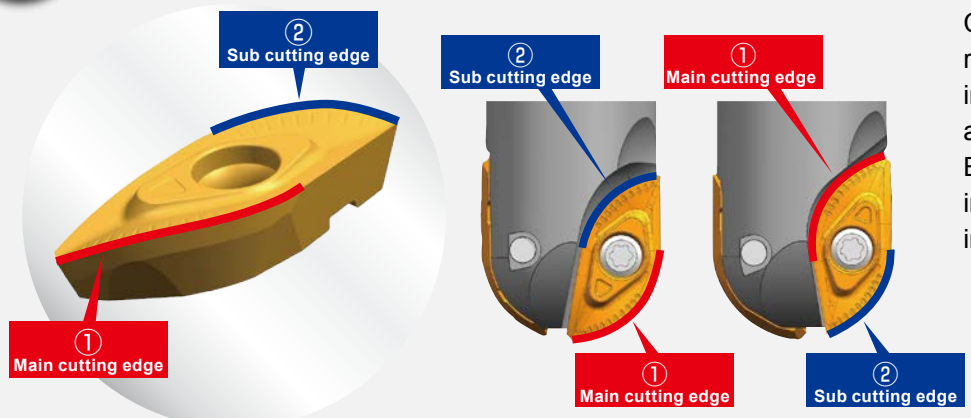


Proposed solutions

- A non-penetrating groove on the bottom surface of the main cutting edge secures cutting edge strength. (The bottom surface of the main cutting edge receives the greatest cutting resistance.)
  In addition, a penetrating groove on the constraint surface of the main cutting edge maintains high positioning accuracy.



Point! Two-in-one integrated insert for improved convenience



Conventional products require two types of inserts (a main insert and a sub insert). In contrast, BR2P uses a single integrated insert for improved handling.

Issue 03

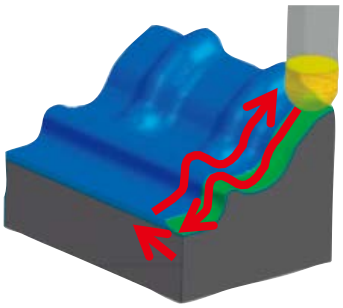
Tool life is reduced due to the difficulty in cutting the overlay welding material used for the press die repair.
“Are there any suitable tools?”

Proposed solutions

- The BR2P enables smooth cutting of overlay welding materials with variable cutting depths because the helical cutting edge suppresses cutting resistance even as cutting depth increases.

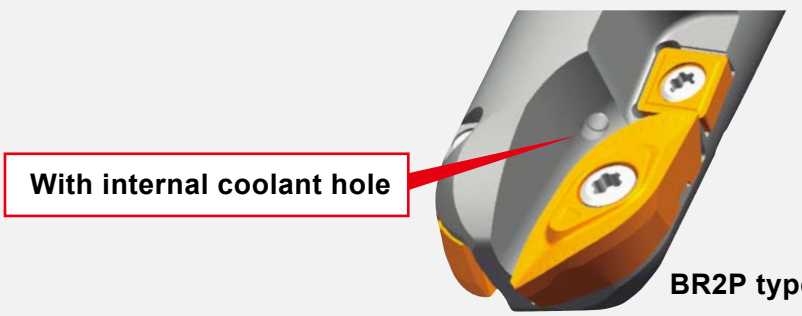
Cutting conditions

Work material : Nodular cast irons
+TM-2000 *1
Machine :Vertical type（BT50）
Tool
Cutter : BR2P30S32-160-80
Insert : ZPET150R-C JP4120
Cutting speed : Vc=100m/min
Revolution : n=1070min^{-1}
Feed per tooth : fz=0.17mm/t
Feed speed : Vf=370mm/min
Radial depth of cut : ap × ae=3× 1mm
Overhang : 80mm Air
＊1 TM-2000 is a product name of Tokai Yogyo Co., Ltd.



Point! Internal coolant improves chip evacuation

The BR2P has coolant holes for all diameters of the modular and shank types (except MT shank). The internal coolant improves the chip evacuation, reducing chip biting.



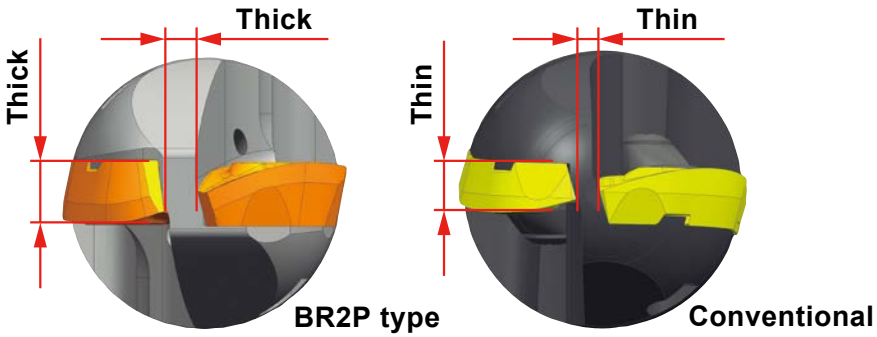
BR2P type

Issue 04

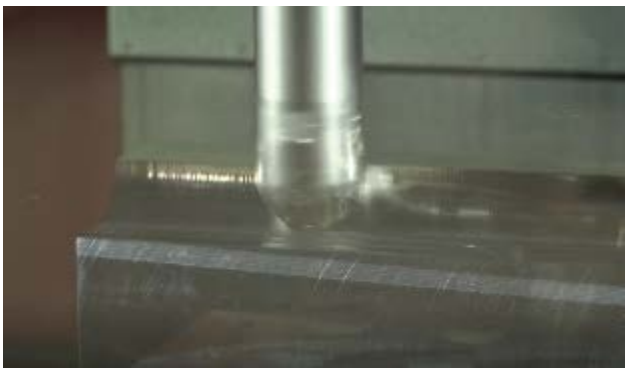
Is there a tool that can be used stably for the roughing cut of large-sized dies?

Proposed solutions

- Large φ40 and φ50 tools are available for the BR2P. In addition, improved body and insert rigidity helps suppress chipping.



Increasing the body center thickness improves the rigidity of the body. Increasing the insert thickness enables to suppress sudden chipping under higher efficiency machining.

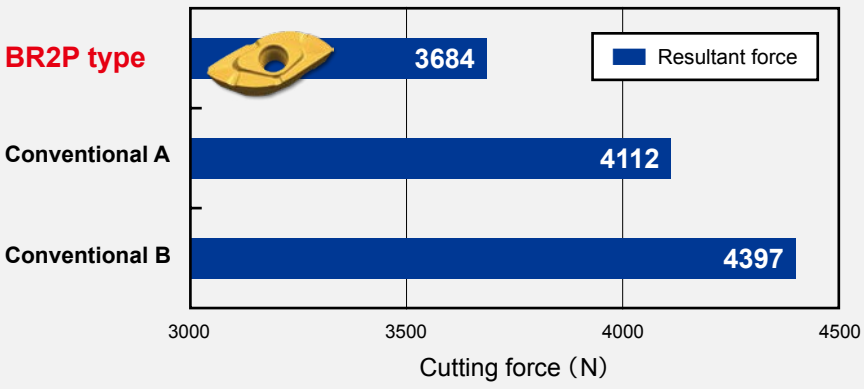


Cutting conditions

Work material : S50C（220HB）
Machine : Vertical type（BT50）
Tool
Cutter : BR2P5063C508-200-120
Insert : ZPET250R-N JP4120
Cutting speed : *V*c=250m/min
Revolution : *n*=1592min^{-1}
Feed per tooth : *f*z=0.23mm/t
Feed speed : *V*f=732mm/min
Radial depth of cut : *a*p × *a*e=25× 15mm
Air

Point! Nicked inserts reduce cutting resistance

- Using a φ50 nicked insert, the BR2P reduces cutting resistance compared to conventional products.



Cutting conditions

Work material : S50C（220HB）
Machine : Vertical type（BT50）
Tool
Cutter : BR2P5063C508-200-120
Insert : ZPET250R-N JP4120
Cutting speed : *V*c=141m/min
Revolution : *n*=900min^{-1}
Feed per tooth : *f*z=0.17mm/t
Feed speed : *V*f=300mm/min
Radial depth of cut : *a*p × *a*e=25× 1mm
Air

Line Up

Shank type

BR2P○○○○□○○○-○○○-○○○

Numeric figure in a circle ○ and Alphabetical character comes in a square □.

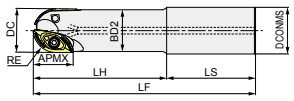


Fig.1 Straight neck

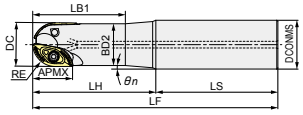


Fig.2 Taper neck

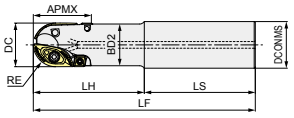


Fig.3 Straight neck long cutting edge

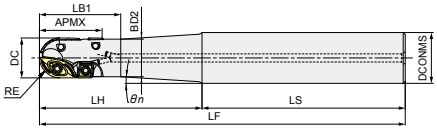


Fig.4 Taper neck long cutting edge

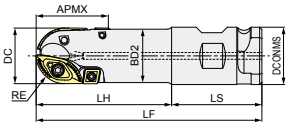


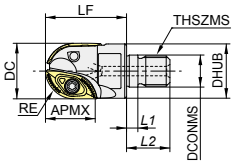
Fig.5 Combination shank type

Item code	Stock	Size (mm)										Insert				Shape
												R insert		Peripheral insert		
		DC	RE	LF	DCONMS	BD2	APMX	LH	LB1	θn	LS	Item code	No.of flutes	Item code	No.of flutes	
BR2P16S16-130-50	●	16	8	130	16	14.8	15	50	-	-	80	ZPET080R-□	2	—	—	Fig.1
BR2P16S20-130-50	●	16	8	130	20	14.8	15	50	27	4.23	80					Fig.2
BR2P20S20-130-50	●	20	10	130	20	18.5	18	50	-	-	80	ZPET100R-□		—	—	Fig.1
BR2P20S25-140-60	●	20	10	140	25	18.5	18	60	40	6.14	80					Fig.2
BR2P25S25-140-60	●	25	12.5	140	25	23.3	22	60	-	-	80	ZPET125R-□		—	—	Fig.1
BR2P25S32-150-70	●	25	12.5	150	32	23.3	22	70	50	8.41	80					Fig.2
BR2P30S32-160-80	●	30	15	160	32	28	27	80	60	3.4	80	ZPET150R-□		—	—	Fig.2
BR2P30S32-200-120	●	30	15	200	32	28	27	120	60	1.13	80					Fig.2
BR2P32S32-160-80	●	32	16	160	32	30	28	80	-	-	80	ZPET160R-□		—	—	Fig.1
BR2P40S42-200-120	●	40	20	200	42	37.6	35	120	-	-	80	ZPET200R-□		—	—	Fig.1
BR2P2030S20-160-80	●	20	10	160	20	18.5	30	80	-	-	80	ZPET100R-□	2	CPMT070304	2	Fig.3
BR2P2030S20-220-120	●	20	10	220	20	18.5	30	120	-	-	100					
BR2P2030S20-250-150	●	20	10	250	20	18.5	30	150	-	-	100					
BR2P2030S25-180-80	●	20	10	180	25	18.5	30	80	40	3.61	100					Fig.4
BR2P2535S25-160-80	●	25	12.5	160	25	23.3	35	80	-	-	80	ZPET125R-□		CPMT070304		Fig.3
BR2P2535S25-200-100	●	25	12.5	200	25	23.3	35	100	-	-	100					
BR2P2535S25-250-150	●	25	12.5	250	25	23.3	35	150	-	-	100					
BR2P2535S32-200-100	●	25	12.5	200	32	23.3	35	100	-	-	100					
BR2P2535S32-250-150	●	25	12.5	250	32	23.3	35	150	-	-	100					
BR2P3043S32-200-100	●	30	15	200	32	28	43	100	-	-	100	ZPET150R-□		CPMT090308		
BR2P3043S32-250-150	●	30	15	250	32	28	43	150	-	-	100					
BR2P3043S32-260-180	●	30	15	260	32	28	43	180	-	-	80					
BR2P4050S42-200-100	●	40	20	200	42	37.6	50	100	-	-	100	ZPET200R-□		CPMT090308		
BR2P4050S42-250-150	●	40	20	250	42	37.6	50	150	-	-	100					
BR2P5063C508-200-120	●	50	25	200	50.8	47.3	63	120	-	-	80	ZPET250R-□	2	CPMT120408	2	Fig.5
BR2P5063C508-250-170	●	50	25	250	50.8	47.3	63	170	-	-	80					

Modular type

BR2PM○○-M○○

Numeric figure in a circle ○ and Alphabetical character comes in a square □.



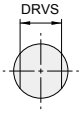


Fig.6 Modular type

Item code	Stock	Size (mm)										Insert		Shape
												R insert		
		DC	RE	APMX	LF	DCONMS	THSZMS	DHUB	L1	L2	DRVS	Item code	No.of flutes	
BR2PM16-M8	●	16	8	15	32	8.5	M8	12.8	5.5	17	10	ZPET080R-□	2	Fig.6
BR2PM20-M10	●	20	10	18	38	10.5	M10	17.8	5.5	19	15	ZPET100R-□		
BR2PM25-M12	●	25	12.5	22	38	12.5	M12	20.8	5.5	22	17	ZPET125R-□		
BR2PM30-M16	●	30	15	27	43	17	M16	28.8	6	23	22	ZPET150R-□		
BR2PM32-M16	●	32	16	28	43	17	M16	28.8	6	23	22	ZPET160R-□		

【Note】 Do not apply lubricants to the threaded section or end surface sections in contact with the dedicated shank/arbor for modular mills.

● : Stocked items.　No mark : Manufactured upon request only.

MT Shank type

BR2P○○○○MT5-○○○-M○○

Numeric figure in a circle ○ and Alphabetical character comes in a square □.

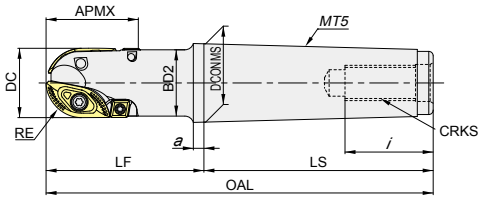
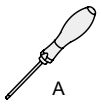


Fig.7
Long cutting edge

Item code	Stock	Size (mm)											Insert				Shape
		DC	RE	APMX	OAL	LF	LS	DCONMS	BD2	a	i	CRKS	R insert		Peripheral insert		
													Item code	No.of flutes	Item code	No.of flutes	
BR2P4050MT5-90-M20	●	40	20	50	219.5	90			37.6		50	M20					
BR2P4050MT5-120-M16		40	20	50	249.5	120			37.6		40	M16					
BR2P4050MT5-120-M20	●	40	20	50	249.5	120			37.6		50	M20	ZPET200R-□	2	CPMT090308	2	
BR2P4050MT5-170-M16		40	20	50	299.5	170			37.6		40	M16					
BR2P4050MT5-170-M20	●	40	20	50	299.5	170			37.6		50	M20					
BR2P5063MT5-100-M20	●	50	25	63	229.5	100			47.3		50	M20					
BR2P5063MT5-120-M16		50	25	63	249.5	120	129.5	44.399	47.3	6.5	40	M16					Fig.7
BR2P5063MT5-120-M20	●	50	25	63	249.5	120			47.3		50	M20					
BR2P5063MT5-120-M24		50	25	63	249.5	120			47.3		50	M24					
BR2P5063MT5-150-M20	●	50	25	63	279.5	150			47.3		50	M20	ZPET250R-□	2	CPMT120408	2	
BR2P5063MT5-170-M16		50	25	63	299.5	170			47.3		40	M16					
BR2P5063MT5-170-M20	●	50	25	63	299.5	170			47.3		50	M20					
BR2P5063MT5-170-M24		50	25	63	299.5	170			47.3		50	M24					

Parts

Parts	Clamp screw				Screw Driver/Wrench				Screw anti-seizure agent
Shape / Cutter body					 A B				
	R insert	Fastening torque (N・m)	Peripheral insert	Fastening torque (N・m)	R insert	Shape	Peripheral insert	Shape	
BR2P16S○○-○○○-○○	P08-2507	1.1	—	—	106-8IP	A	—	—	P-37
BR2PM16-M8									
BR2P20S○○-○○○-○○	P10-3008	2.0	—	—	106-10IP	A	—	—	
BR2PM20-M10									
BR2P2030S○○-○○○-○○			P10-3007	2.0			106-10IP	A	
BR2P25S○○-○○○-○○	P15-4011	2.9	—	—	106-15IP	A	—	—	
BR2PM25-M12									
BR2P2535S○○-○○○-○○			P10-3007	2.0			106-10IP	A	
BR2P30S32-○○○-○○	P20-5013	4.9	—	—	105-20IP	B	—	—	
BR2PM30-M16									
BR2P32S32-○○○-○○									
BR2PM32-M16									
BR2P3043S32-○○○-○○			P15-4008	2.9			106-15IP	A	
BR2P40S42-○○○-○○○	P25-6016	8.0	—	—	105-25IP	B	—	—	
BR2P4050S42-○○○-○○○			P15-4008	2.9			106-15IP	A	
BR2P4050MT5-○○○-M○○									
BR2P5063C508-○○○-○○○	P30-6019	9.8	P20-5011	4.9	105-30IP	B	105-20IP	B	
BR2P5063MT5-○○○-M○○									

【Note】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 the R insert.

Line Up

Inserts

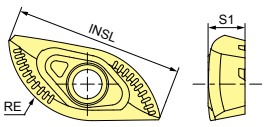


Fig-1
B breaker

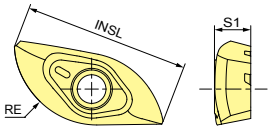


Fig-2
C breaker

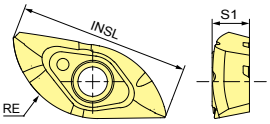


Fig-3
N breaker(With nick)

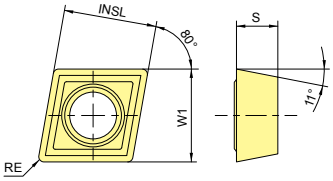


Fig-4
Peripheral insert

P	Carbon steels	⬓	■	■	■
K	FC・FCD Cast irons	⬓	■	⬓	■
M	SUS, etc		⬓		⬓
H	Hardened steels	■	■		

■ : General cutting, First recommendation
⬓ : General cutting, Second recommendation

Type	Item code	Tolerance class	TH3 Coating	AJ Coating	JS Coating		Size (mm)					Shape
			TH308	JP4120	JS4030	JS4060	RE	INSL	W1	S1	S	
R insert	ZPET080R-B	E		●	●	●	8	16.9	—	3.6	—	Fig-1
	ZPET100R-B			●	●	●	10	20.3	—	4.7	—	
	ZPET125R-B			●	●	●	12.5	25.4	—	6	—	
	ZPET150R-B			●	●	●	15	30.5	—	7.5	—	
	ZPET160R-B			●	●	●	16	32.5	—	7.5	—	
	ZPET200R-B			●	●	●	20	40.4	—	8.8	—	
	ZPET250R-B			●	●	●	25	46.0	—	10.8	—	
R insert	ZPET080R-C	E	●	●			8	16.9	—	3.6	—	Fig- 2
	ZPET100R-C		●	●			10	20.3	—	4.7	—	
	ZPET125R-C		●	●			12.5	25.4	—	6	—	
	ZPET150R-C		●	●			15	30.5	—	7.5	—	
	ZPET160R-C		●	●			16	32.5	—	7.5	—	
	ZPET200R-C		●	●			20	40.4	—	8.8	—	
	ZPET250R-C		●	●			25	46.0	—	10.8	—	
R insert	ZPET200R-N	E	—	●	●	●	20	40.4	—	8.8	—	Fig- 3
	ZPET250R-N		—	●	●	●	25	46.0	—	10.8	—	
Peripheral insert	CPMT070304	M	—		●		0.4	7.14	7.14	—	3.18	Fig- 4
	CPMT090308		—		●		0.8	9.525	9.525	—	3.18	
	CPMT120408		—		●		0.8	12.7	12.7	—	4.76	

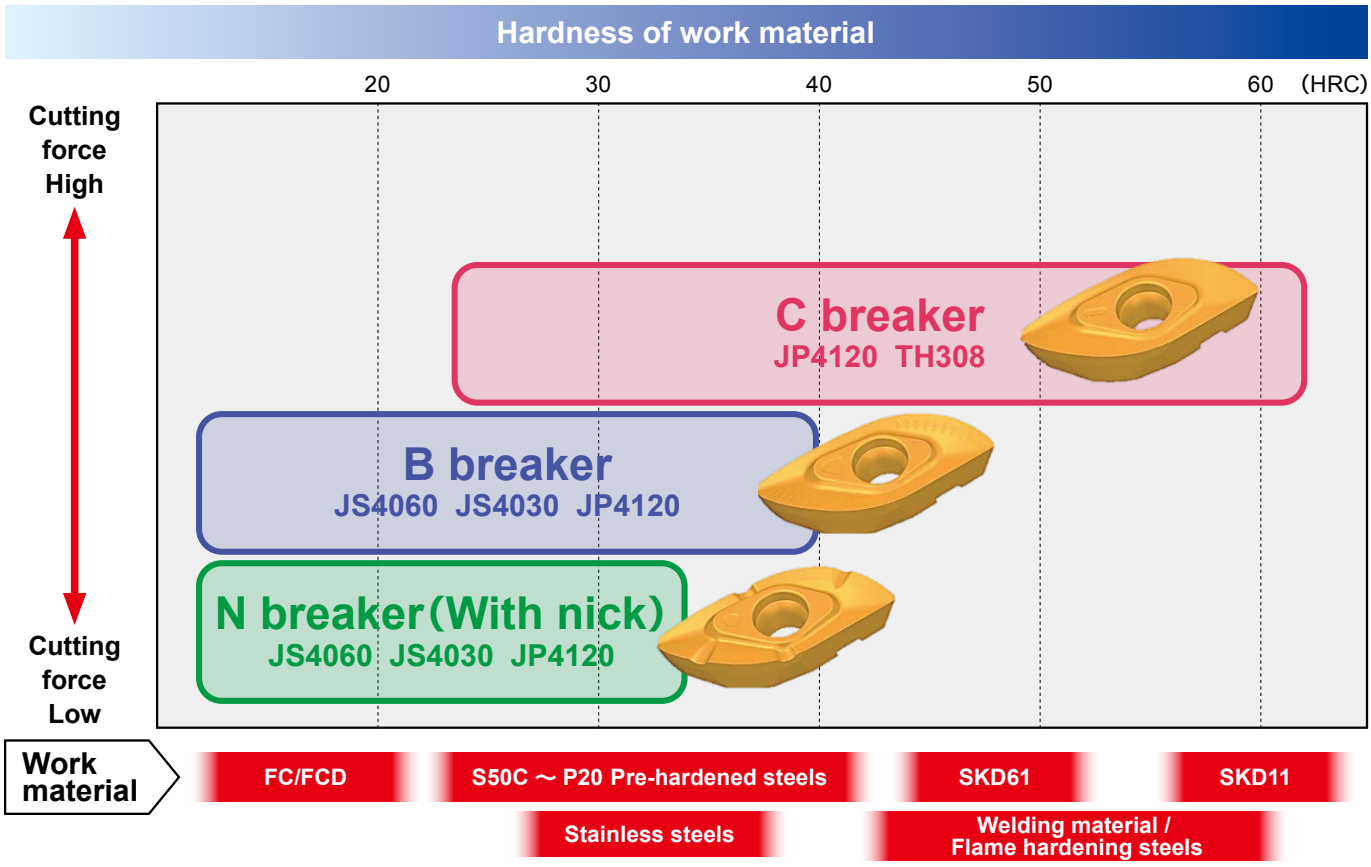
【Note】 Please note that the JS Coating does not cause a reaction in conductive touch sensors.

Insert grade selection

Grade	Application	Features
TH308	High-hardened steels	Features micro grain substrate and TH3 Coating. Offers excellent versatility for cutting high-hardened steels.
JP4120	Alloy steels, hardened steels, and overlay welding materials with hardness ranging from 30 to 50 HRC	Features fine grain substrate and AJ Coating. Suitable for cutting materials ranging from general steel to hardened steels.
JS4030	General steel	Features rough grain substrate and JS coating. Suitable for cutting general steel.
JS4060	Unstable cutting/wet cutting	Features rough grain substrate and JS Coating. Suitable for unstable mild steel cutting and wet cutting.

● : Stocked items. No mark : Manufactured upon request only. — : No Manufactured.

Suitable uses for B, C, and N chipbreakers



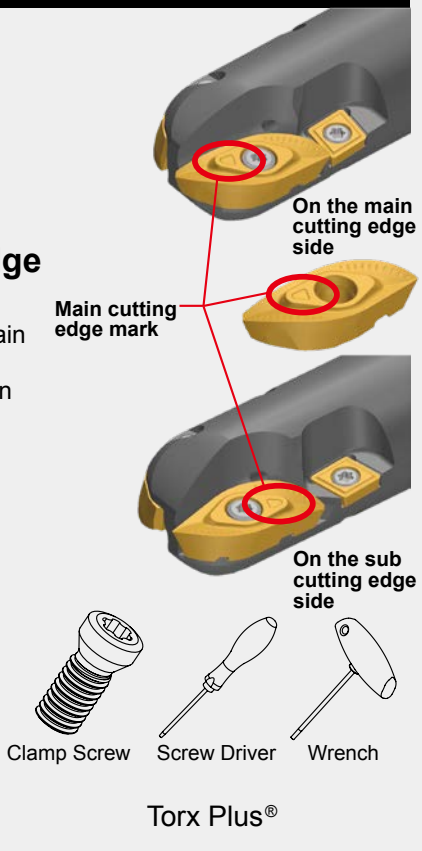
Insert setup procedures

1 Clean the insert seat:
Clean the insert seat surface, such as by using an air blower.

2 The insert is formed by integrating a main cutting edge and a sub cutting edge.
On the main cutting edge side, position the insert on the body seat with the main cutting edge mark facing toward the tip.
On the sub cutting edge side, position the insert on the body seat with the main cutting edge mark facing toward the shank.

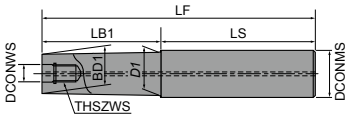
3 Tighten the clamp screw to fix the insert.
The drive type of the clamp screw is Torx Plus®
Use a Torx Plus® wrench.

4 This concludes the insert setup.

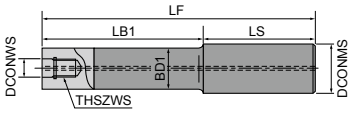


The Shanks for Modular Mill

Carbide Shank



A type



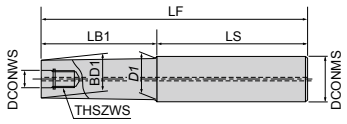
B type

Item code	Stock	Size (mm)								Shape	Cutter body
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	*D1*		
ASC16-8.5-95-30Z	●	8.5	M8	95	30	65	14.5	16	15.5	A	ϕ16
ASC16-8.5-120-55Z	●			120	55	65					
ASC16-8.5-140-75Z	●			140	75	65					
ASC16-8.5-160-95Z	●			160	95	65					
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
ASC20-10.5-170-90Z	●			170	90	80					
ASC20-10.5-220-120Z	●			220	120	100					
ASC20-10.5-270-150Z	●			270	150	120					
ASC20-10.5-220-50Z	●	10.5	M10	220	50	170	18.5	20	19.5	A	ϕ20
ASC20-10.5-270-50Z	●			270		220					
ASC25-12.5-145-65	●	12.5	M12	145	65	80	23	25	-	B	ϕ25
ASC25-12.5-215-115	●			215	115	100					
ASC25-12.5-265-145	●			265	145	120					
ASC25-12.5-315-195	●			315	195	120					
ASC25-12.5-265-65	●	12.5	M12	265	65	200	23	25	-	B	ϕ25
ASC25-12.5-315-65	●			315		250					
ASC32-17-160-80	●	17	M16	160	80	80	28	32	-	B	ϕ30 ϕ32
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					
ASC32-17-260-80	●	17	M16	260	80	180	28	32	-	B	ϕ30 ϕ32
ASC32-17-310-80	●			310		230					
ASC32-17-360-80	●			360		280					

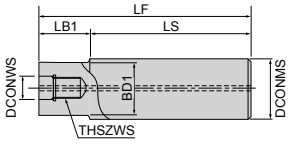
【Note】Commercial milling chucks or shrink-fit holders can be used.

The Shanks for Modular Mill

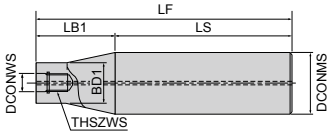
Steel Shank



A type (Tapered neck)



B type



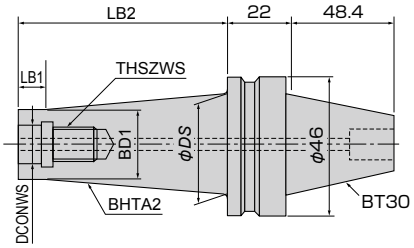
C type

Item code	Stock	Size (mm)								Shape	Cutter body
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	*D1*		
AS16-8.5-95-15	●	8.5	M8	95	15	80	14.5	16	15.5	A	ϕ16
AS20-10.5-100-20	●	10.5	M10	100	20	80	18	20	—	B	ϕ20
AS25-12.5-115-35	●	12.5	M12	115	35	80	23	25	—	B	ϕ25
AS32-17-110-30	●	17	M16	110	30	80	28	32	—	B	ϕ30 ϕ32
AS42-17-360-90	●	17	M16	360	90	270	28	42	—	C	ϕ30 ϕ32

【Note】Commercial milling chucks can be used.

Modular Mill Arbor

BT30

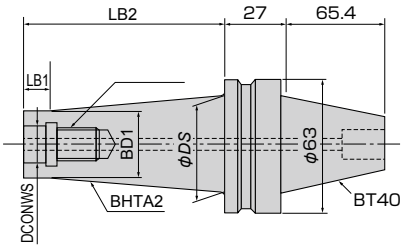


※For neck section, additional machining to user specifications is possible.

Item code	Stock	寸　法 Size (mm)						
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2
BT30-6.5-30-9.7		6.5	M6	9.7	25	30	5	17°
BT30-6.5-55-9.7						55	10	9.6°
BT30-6.5-85-9.7						80	10	6.2°
BT30-8.5-25-15		8.5	M8	15	30	25	5	20.6°
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	M10	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	M12	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	M16	28	40	10	5	31°
BT30-17-35-28						35	10	13.5°
BT30-17-60-28						60	10	6.8°

[Note] 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



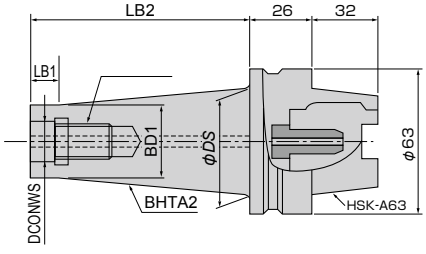
※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm)						
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2
BT40-6.5-30-9.7		6.5	M6	9.7	25	30	5	17°
BT40-6.5-55-9.7						55	10	9.6°
BT40-6.5-80-9.7						80	10	6.2°
BT40-6.5-130-9.7						130	10	3.6°
BT40-8.5-25-15		8.5	M8	15	30	25	5	20.6°
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	M10	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	M12	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	M16	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°

[Note] 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).

HSK

HSK Arbor
Modular Mill Type



Item code	Stock	Size (mm)						
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2
HSK-A63-10.5-30-18	●	10.5	M10	18	20.8	30	–	3°
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	M12	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	M16	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°

●：Stocked items.　No mark：Manufactured upon request only.

Recommended cutting conditions

■ Steel Shank

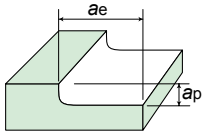
Red indicates primary recommended insert grades.

Work material	Recommended inserts grade	Cutting conditions	ϕ16			ϕ20					ϕ25				
			>3DC			>3DC			3DC ～ 5DC	5DC ～	>3DC			3DC ～ 5DC	5DC ～
			General purpose	Full R cutting in high efficiency machining	Semi-finishing in general machining	General purpose	Full R cutting in high efficiency machining	Semi-finishing in general machining			General purpose	Full R cutting in high efficiency machining	Semi-finishing in general machining		
Carbon steels Alloy steels (30HRC or less)	JS4030 JP4120 JS4060	*n* (min^{-1})	3,190	4,380	4,980	2,550	3,510	3,980	1,760	1,520	2,040	2,810	3,190	1,410	1,210
		vc (m/min)	160	220	250	160	220	250	110	95	160	220	250	110	95
		vf (mm/min)	1,280	880	2,990	1,020	710	2,390	530	370	820	850	1,920	430	300
		fz (mm/t)	0.2	0.1	0.3	0.2	0.1	0.3	0.15	0.12	0.2	0.15	0.3	0.15	0.12
		ap (mm)	3	8	0.5	4	10	0.7	2	1	5	12.5	1	2.5	1.5
		ae (mm)	3	1	1	4	2	1.2	2	1	5	3	2	2.5	1.5
Alloy steels Tool steels (30～45HRC)	JP4120 JS4030 JS4060 TH308	*n* (min^{-1})	2,390	2,590	3,590	1,910	2,070	2,870	1,360	1,120	1,530	1,660	2,300	1,090	900
		vc (m/min)	120	130	180	120	130	180	85	70	120	130	180	85	70
		vf (mm/min)	720	520	2,160	580	420	1,730	330	230	460	500	1,380	270	180
		fz (mm/t)	0.15	0.1	0.3	0.15	0.1	0.3	0.12	0.1	0.15	0.15	0.3	0.12	0.1
		ap (mm)	3	8	0.5	4	10	0.7	2	1	5	12.5	1	2.5	1.5
		ae (mm)	3	1	1	4	2	1.2	2	1	5	3	2	2.5	1.5
Cast irons FC FCD	JP4120 JS4060 JS4030 TH308	*n* (min^{-1})	3,190	4,380	4,980	2,550	3,510	3,980	1,760	1,520	2,040	2,810	3,190	1,410	1,210
		vc (m/min)	160	220	250	160	220	250	110	95	160	220	250	110	95
		vf (mm/min)	1,280	880	2,990	1,020	710	2,390	530	370	820	850	1,920	430	300
		fz (mm/t)	0.2	0.1	0.3	0.2	0.1	0.3	0.15	0.12	0.2	0.15	0.3	0.15	0.12
		ap (mm)	3	8	0.5	4	10	0.7	2	1	5	12.5	1	2.5	1.5
		ae (mm)	3	1	1	4	2	1.2	2	1	5	3	2	2.5	1.5
Stainless steels SUS	JS4060 JP4120	*n* (min^{-1})	1,990	—	2,990	1,600	—	2,390	1,120	960	1,280	—	1,910	900	770
		vc (m/min)	100	—	150	100	—	150	70	60	100	—	150	70	60
		vf (mm/min)	600	—	1,800	480	—	1,440	270	200	390	—	1,150	220	160
		fz (mm/t)	0.15	—	0.3	0.15	—	0.3	0.12	0.1	0.15	—	0.3	0.12	0.1
		ap (mm)	3	—	0.5	4	—	0.7	2	1	5	—	1	2.5	1.5
		ae (mm)	3	—	1	4	—	1.2	2	1	5	—	2	2.5	1.5
Hardened steels (45～55HRC)	JP4120 TH308	*n* (min^{-1})	1,990	—	2,990	1,600	—	2,390	1,120	960	1,280	—	1,910	900	770
		vc (m/min)	100	—	150	100	—	150	70	60	100	—	150	70	60
		vf (mm/min)	480	—	1,800	390	—	1,440	180	140	310	—	1,150	150	110
		fz (mm/t)	0.12	—	0.3	0.12	—	0.3	0.08	0.07	0.12	—	0.3	0.08	0.07
		ap (mm)	1.5	—	0.5	2	—	0.7	1	0.5	2.5	—	0.5	1.5	0.7
		ae (mm)	1.5	—	1	2	—	1.2	1	0.5	2.5	—	2.7	1.5	0.7
Hardened steels (55～62HRC)	TH308 JP4120	*n* (min^{-1})	1,600	—	2,390	1,280	—	1,910	880	800	1,020	—	1,530	710	640
		vc (m/min)	80	—	120	80	—	120	55	50	80	—	120	55	50
		vf (mm/min)	390	—	1,440	310	—	1,150	150	100	250	—	920	120	80
		fz (mm/t)	0.12	—	0.3	0.12	—	0.3	0.08	0.06	0.12	—	0.3	0.08	0.06
		ap (mm)	1.5	—	0.5	1.5	—	0.7	0.7	0.5	2	—	0.5	0.7	0.5
		ae (mm)	1.5	—	1	2	—	1.2	1.5	1	2.5	—	2.7	1.5	1

【Note】 ① Use the coolant appropriate for the work material and cutting conditions.
② This table of cutting conditions shows only reference data. For actual cutting, adjust the conditions by accounting for the shape to be machined, purpose, and machine type.
③ Note that the JS Coating does not respond to conductive touch sensors.
④ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑤ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑥ Replace the insert ahead of time to prevent breakage caused by excessive use.
⑦ In particular, chip clogging or chattering vibration may occur when cutting a groove or processing cutting widths near the groove, which can lead to problems. Refer to the following to adjust conditions:
- Reduce revolution speed and table feed by 50 to 70%.
- Reduce cutting depth (*ap*) by 50 to 70%.
- Reduce cutting width (*ae*) by 50 to 70%.

⑧ A slant angle of 3 to 5° is recommended for pocketing with a feed rate of 70%. Reduce the slant angle to less than 3° for high hard materials.

ϕ30					ϕ32			ϕ40		ϕ50		Work material
>3DC			3DC～5DC	5DC～	>3DC							
General purpose	Full R cutting in high efficiency machining	Semi-finishing in general machining			General purpose	Full R cutting in high efficiency machining	Semi-finishing in general machining	General purpose	Full R cutting in high efficiency machining	General purpose	Full R cutting in high efficiency machining	
1,700	2,340	2,660	1,170	1,010	1,600	2,190	2,490	1,280	1,990	1,020	1,600	Carbon steels Alloy steels (30HRC or less)
160	220	250	110	95	160	220	250	160	250	160	250	
1,020	710	2,130	470	370	960	660	2,000	770	600	820	740	
0.3	0.15	0.4	0.2	0.18	0.3	0.15	0.4	0.3	0.15	0.4	0.23	
6	15	1	3	2	6	16	1	8	20	10	25	
6	4	3	3	2	6	4	3	8	5	10	6	
1,280	1,380	1,910	910	750	1,200	1,300	1,800	960	1,200	770	960	Alloy steels Tool steels (30～45HRC)
120	130	180	85	70	120	130	180	120	150	120	150	
520	420	1,530	260	180	480	390	1,440	390	360	470	450	
0.2	0.15	0.4	0.14	0.12	0.2	0.15	0.4	0.2	0.15	0.3	0.23	
6	15	1	3	2	6	16	1	8	20	10	25	
6	4	3	3	2	6	4	3	8	5	10	6	
1,700	2,340	2,660	1,170	1,010	1,600	2,190	2,490	1,280	1,990	1,020	1,600	Cast irons FC FCD
160	220	250	110	95	160	220	250	160	250	160	250	
1,020	710	2,130	470	370	960	660	2,000	770	600	820	740	
0.3	0.15	0.4	0.2	0.18	0.3	0.15	0.4	0.3	0.15	0.4	0.23	
6	15	1	3	2	6	16	1	8	20	10	25	
6	4	3	3	2	6	4	3	8	5	10	6	
1,070	—	1,600	750	640	1,000	—	1,500	800	—	640	—	Stainless steels SUS
100	—	150	70	60	100	—	150	100	—	100	—	
430	—	960	210	160	400	—	900	320	—	390	—	
0.2	—	0.3	0.14	0.12	0.2	—	0.3	0.2	—	0.3	—	
6	—	1	3	2	6	—	1	8	—	10	—	
6	—	3	3	2	6	—	3	8	—	10	—	
1,070	—	1,600	750	640	1,000	—	1,500	800	—	640	—	Hardened steels (45～55HRC)
100	—	150	70	60	100	—	150	100	—	100	—	
330	—	960	150	110	300	—	900	240	—	200	—	
0.15	—	0.3	0.1	0.08	0.15	—	0.3	0.15	—	0.15	—	
3	—	0.5	2	1	3	—	0.5	4	—	5	—	
3	—	3	2	1	3	—	3	4	—	5	—	
850	—	1,280	590	540	800	—	1,200	640	—	510	—	Hardened steels (55～62HRC)
80	—	120	55	50	80	—	120	80	—	80	—	
210	—	770	100	70	200	—	720	130	—	110	—	
0.12	—	0.3	0.08	0.06	0.12	—	0.3	0.1	—	0.1	—	
2	—	0.5	1	0.5	2	—	0.5	2	—	2	—	
3	—	3	2	1	3	—	3	3	—	4	—	



Recommended cutting conditions

■ Modular

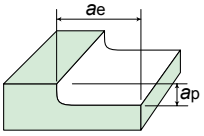
Red indicates primary recommended insert grades.

Work material	Recommended inserts grade	Cutting conditions	ϕ16			ϕ20		
			3DC～5DC	5DC～7DC	>7DC	3DC～5DC	5DC～7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	JS4030 JP4120 JS4060	*n* (min^{-1})	2,190	1,890	1,600	1,760	1,520	1,280
		*v*c (m/min)	110	95	80	110	95	80
		*v*f (mm/min)	1,100	570	320	1,060	610	260
		*f*z (mm/t)	0.25	0.15	0.1	0.3	0.2	0.1
		*a*p (mm)	1	1	1	1	1	1
		*a*e (mm)	1.7	1.2	1	2	1.5	1
Alloy steels Tool steels (30～45HRC)	JP4120 JS4030 JS4060 TH308	*n* (min^{-1})	1,700	1,400	1,200	1,360	1,120	960
		*v*c (m/min)	85	70	60	85	70	60
		*v*f (mm/min)	680	340	170	550	340	140
		*f*z (mm/t)	0.2	0.12	0.07	0.2	0.15	0.07
		*a*p (mm)	1	1	1	1	1	1
		*a*e (mm)	1.7	1.2	1	2	1.5	1
Cast irons FC FCD	JP4120 JS4060 JS4030 TH308	*n* (min^{-1})	2,190	1,890	1,600	1,760	1,520	1,280
		*v*c (m/min)	110	95	80	110	95	80
		*v*f (mm/min)	1,100	570	320	1,060	610	260
		*f*z (mm/t)	0.25	0.15	0.1	0.3	0.2	0.1
		*a*p (mm)	1	1	1	1	1	1
		*a*e (mm)	1.7	1.2	1	2	1.5	1
Stainless steels SUS	JS4060 JP4120	*n* (min^{-1})	1,400	1,200	1,000	1,120	960	800
		*v*c (m/min)	70	60	50	70	60	50
		*v*f (mm/min)	560	290	140	450	290	120
		*f*z (mm/t)	0.2	0.12	0.07	0.2	0.15	0.07
		*a*p (mm)	1	1	1	1	1	1
		*a*e (mm)	1.7	1.2	1	2	1.5	1
Hardened steels (45～55HRC)	JP4120 TH308	*n* (min^{-1})	1,400	1,200	1,000	1,120	960	800
		*v*c (m/min)	70	60	50	70	60	50
		*v*f (mm/min)	280	170	100	230	140	80
		*f*z (mm/t)	0.1	0.07	0.05	0.1	0.07	0.05
		*a*p (mm)	0.5	0.5	0.5	0.5	0.5	0.5
		*a*e (mm)	1	0.7	0.5	1.2	0.8	0.5
Hardened steels (55～62HRC)	TH308 JP4120	*n* (min^{-1})	1,100	1,000	800	880	800	640
		*v*c (m/min)	55	50	40	55	50	40
		*v*f (mm/min)	160	120	80	130	100	70
		*f*z (mm/t)	0.07	0.06	0.05	0.07	0.06	0.05
		*a*p (mm)	0.5	0.5	0.5	0.5	0.5	0.5
		*a*e (mm)	1	0.7	0.5	1.2	0.8	0.5

【Note】 ① Use the coolant appropriate for the work material and cutting conditions.
② This table of cutting conditions shows only reference data. For actual cutting, adjust the conditions by accounting for the shape to be machined, purpose, and machine type.
③ Note that the JS Coating does not respond to conductive touch sensors.
④ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑤ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑥ Replace the insert ahead of time to prevent breakage caused by excessive use.
⑦ In particular, chip clogging or chattering vibration may occur when cutting a groove or processing cutting widths near the groove, which can lead to problems. Refer to the following to adjust conditions:
- Reduce revolution speed and table feed by 50 to 70%.
- Reduce cutting depth (*a*p) by 50 to 70%.
- Reduce cutting width (*a*e) by 50 to 70%.

⑧ A slant angle of 3 to 5° is recommended for pocketing with a feed rate of 70%. Reduce the slant angle to less than 3° for high hard materials.

ϕ25			ϕ30			ϕ32			Work material
3DC～5DC	5DC～7DC	>7DC	3DC～5DC	5DC～7DC	>7DC	3DC～5DC	5DC～7DC	>7DC	
1,410	1,210	1,020	1,170	1,010	850	1,110	950	800	Carbon steels Alloy steels (30HRC or less)
110	95	80	110	95	80	110	95	80	
850	490	210	940	610	340	880	570	320	
0.30	0.20	0.10	0.40	0.30	0.20	0.40	0.30	0.20	
1	1	1	1	1	1	1	1	1	
2	1.5	1	3	2	1	3	2	1	
1,090	900	770	910	750	640	850	700	600	Alloy steels Tool steels (30～45HRC)
85	70	60	85	70	60	85	70	60	
440	270	110	550	300	130	510	280	120	
0.20	0.15	0.07	0.30	0.20	0.10	0.30	0.20	0.10	
1	1	1	1	1	1	1	1	1	
2	1.5	1	3	2	1	3	2	1	
1,410	1,210	1,020	1,170	1,010	850	1,100	950	800	Cast irons FC FCD
110	95	80	110	95	80	110	95	80	
850	490	210	940	610	340	880	570	320	
0.30	0.20	0.10	0.40	0.30	0.20	0.40	0.30	0.20	
1	1	1	1	1	1	1	1	1	
2	1.5	1	3	2	1	3	2	1	
900	770	640	750	640	540	700	600	500	Stainless steels SUS
70	60	50	70	60	50	70	60	50	
360	240	90	450	260	110	420	240	100	
0.2	0.15	0.07	0.3	0.2	0.1	0.3	0.2	0.1	
1	1	1	1	1	1	1	1	1	
2	1.5	1	3	2	1	3	2	1	
900	770	640	750	640	540	700	600	500	Hardened steels (45～55HRC)
70	60	50	70	60	50	70	60	50	
180	110	70	230	130	80	210	120	70	
0.1	0.07	0.05	0.15	0.1	0.07	0.15	0.1	0.07	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
1.2	0.8	0.5	1.5	1	0.5	1.5	1	0.5	
710	640	510	590	540	430	550	500	400	Hardened steels (55～62HRC)
55	50	40	55	50	40	55	50	40	
100	80	60	120	80	50	110	70	40	
0.07	0.06	0.05	0.1	0.07	0.05	0.1	0.07	0.05	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
1.2	0.8	0.5	1.5	1	0.5	1.5	1	0.5	



Recommended cutting conditions

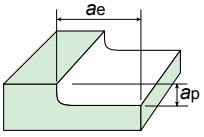
■ Recommended cutting conditions table for processing overlay welding materials

Red indicates primary recommended insert grades.

Work material				Recommended inserts grade	Cutting conditions	Steel shank		
Mold material	Welding material					ϕ 30		
	Applicable standard (Brand)	Features and Applications	Hardness (HRC)			>3DC	3DC～5DC	5DC～
Cast irons FC FCD	Standard:N/A (TM-2000C)	Mold hardfacing	20～30	JP4120 JS4060	*n* (min^{-1})	1700	1170	1010
					vc (m/min)	160	110	95
					vf (mm/min)	1020	470	370
					fz (mm/t)	0.3	0.2	0.18
					ap (mm)	～3	～3	2
					ae (mm)	3	3	2
	Standard:N/A (TM-2000B)	Mold hardfacing [for anti-wear and anti-galling]	37～39	JP4120 JS4060	*n* (min^{-1})	1280	910	750
					vc (m/min)	120	85	70
					vf (mm/min)	520	260	180
					fz (mm/t)	0.2	0.14	0.12
					ap (mm)	～3	～3	2
					ae (mm)	3	3	2
	Standard:N/A (TM-2000)	Mold hardfacing [for anti-wear and anti-galling]	44～46	JP4120 JS4060	*n* (min^{-1})	1070	910	750
					vc (m/min)	100	85	70
					vf (mm/min)	370	220	150
					fz (mm/t)	0.17	0.12	0.1
					ap (mm)	～3	2	1
					ae (mm)	3	2	2
	Standard:N/A (TC-8B) (NIW-5)	Mold hardfacing (for cutting edge)	52～58	JP4120 TH308	*n* (min^{-1})	1070	750	640
					vc (m/min)	100	70	60
					vf (mm/min)	330	150	110
					fz (mm/t)	0.15	0.1	0.08
					ap (mm)	～3	2	1
					ae (mm)	3	2	2
Alloy steels Tool steels (30～45HRC)	Standard JIS Z3251 DF4A-500-B (TM-11Cr)	Mold hardfacing (for cutting edge)	52～55	JP4120 TH308	*n* (min^{-1})	1070	750	640
					vc (m/min)	100	70	60
					vf (mm/min)	330	150	110
					fz (mm/t)	0.15	0.1	0.08
					ap (mm)	～3	2	1
					ae (mm)	3	2	2
Steel for flame-hardening	Standard:N/A (THW)	Mold hardfacing (for anti-impact wear)	55～60	JP4120 TH308	*n* (min^{-1})	850	640	540
					vc (m/min)	80	60	50
					vf (mm/min)	170	110	70
					fz (mm/t)	0.1	0.08	0.06
					ap (mm)	～3	2	1
					ae (mm)	3	2	2
Hardened Steels (55～62HRC)	Standard JIS Z3251 DF3B-600-B (TM10B)	Mold hardfacing (for anti-impact wear)	54～58	JP4120 TH308	*n* (min^{-1})	850	640	540
					vc (m/min)	80	60	50
					vf (mm/min)	170	110	70
					fz (mm/t)	0.1	0.08	0.06
					ap (mm)	～3	2	1
					ae (mm)	3	2	2
SKD11 equivalent material	Standard:N/A (THW)	Mold hardfacing (for anti-impact wear)	55～60	JP4120 TH308	*n* (min^{-1})	850	640	540
					vc (m/min)	80	60	50
					vf (mm/min)	170	110	70
					fz (mm/t)	0.1	0.08	0.06
					ap (mm)	～3	2	1
					ae (mm)	3	2	2

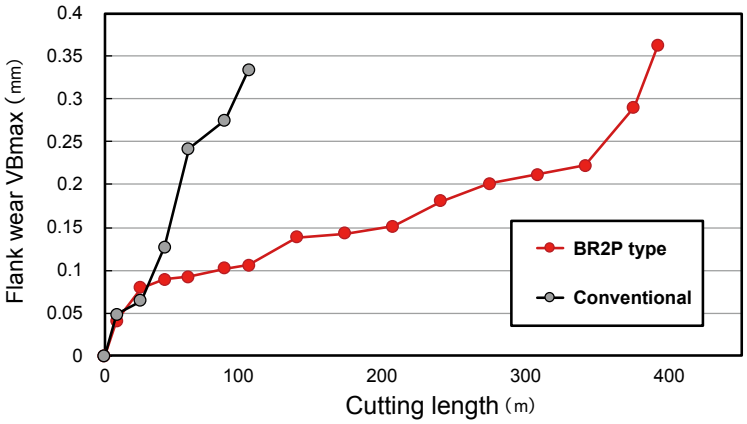
【Note】
① Information related to the brand, features, and hardness of the welding materials is drawn from Tokai Yogyo's product catalog.
② Contact our sales department if you have any questions regarding weld material processing, material types not listed above, or other matters.
③ Use the coolant appropriate for the work material and cutting conditions.
④ This table of cutting conditions shows only reference data. For actual cutting, adjust the conditions by accounting for the shape to be machined, purpose, and machine type.
⑤ Note that the JS Coating does not respond to conductive touch sensors.
⑥ To prevent tool damage due to chip clogging, always use a chip removal method such as an air blower, etc.
⑦ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
⑧ Replace the insert ahead of time to prevent breakage caused by excessive use.
⑨ In particular, chip clogging or chattering vibration may occur when cutting a groove or processing cutting widths near the groove, which can lead to problems. Refer to the following to adjust conditions:
・Reduce revolution speed and table feed by 50 to 70%. ・Reduce cutting depth (*ap*) by 50 to 70%. ・Reduce cutting width (*ae*) by 50 to 70%.
⑩ A slant angle of 3 to 5° is recommended for pocketing with a feed rate of 70%. Reduce the slant angle to less than 3° for high hard materials.

Steel shank				Modular			Work material
ϕ 40		ϕ 50		ϕ 30			Mold material
>3DC	3DC ～5DC	>3DC	3DC ～5DC	3DC ～5DC	5DC ～7DC	>7DC	
1280	880	1020	710	1170	1010	850	Cast irons FC FCD
160	110	160	110	110	95	80	
770	360	620	290	940	610	340	
0.3	0.2	0.3	0.2	0.4	0.3	0.2	
～4	～4	～5	～5	1	1	1	
4	4	5	5	3	2	1	
960	680	770	550	910	750	640	
120	85	120	85	85	70	60	
390	200	310	160	550	300	130	
0.2	0.14	0.2	0.14	0.3	0.2	0.1	
～4	～4	～5	～5	1	1	1	
4	4	5	5	3	2	1	
800	680	640	550	750	640	540	
100	85	100	85	70	60	50	
280	170	220	140	230	130	80	
0.17	0.12	0.17	0.12	0.15	0.1	0.07	
～4	3	～5	4	0.5	0.5	0.5	
4	3	5	4	1.5	1	0.5	
800	560	640	450	750	640	540	
100	70	100	70	70	60	50	
240	120	200	90	150	110	70	
0.15	0.1	0.15	0.1	0.1	0.08	0.06	
～4	3	～5	4	0.5	0.5	0.5	
4	3	5	4	1.5	1	0.5	
800	560	640	450	750	640	540	Alloy steels Tool steels (30～45HRC) Steel for flame-hardening
100	70	100	70	70	60	50	
240	120	200	90	150	110	90	
0.15	0.1	0.15	0.1	0.1	0.08	0.08	
～4	3	～5	4	0.5	0.5	0.5	
4	3	5	4	1.5	1	0.5	
640	480	510	390	750	640	540	
80	60	80	60	70	60	50	
130	80	110	70	120	80	70	
0.1	0.08	0.1	0.08	0.08	0.06	0.06	
～4	3	～5	4	0.5	0.5	0.5	
4	3	5	4	1.5	1	0.5	
640	480	510	390	750	640	540	Hardened Steels (55～62HRC) SKD11
80	60	80	60	70	60	50	
130	80	110	70	120	80	70	
0.1	0.08	0.1	0.08	0.08	0.06	0.06	
～4	3	～5	4	0.5	0.5	0.5	
4	3	5	4	1.5	1	0.5	
640	480	510	390	750	640	540	
80	60	80	60	70	60	50	
130	80	110	70	120	80	70	
0.1	0.08	0.1	0.08	0.08	0.06	0.06	
～4	3	～5	4	0.5	0.5	0.5	
4	3	5	4	1.5	1	0.5	



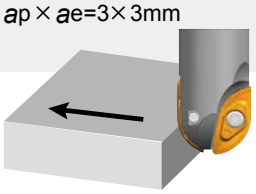
Field data

01 Wear curve



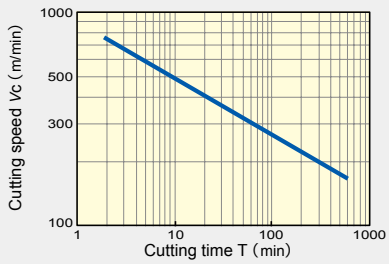
Cutting conditions

Work material : SKD61 (45HRC)
Machine : Vertical type (BT50)
Tool
Cutter : BR2P3043S32-200-100 JP4120
Insert : ZPET150R-C JP4120
Cutting speed : *V*c=200m/min
Revolution : n=2122min^{-1}
Feed per tooth : *f*z=0.3mm/t
Feed speed : *V*f=1273mm/min
Radial depth of cut : *a*p × *a*e=3×3mm
Air Planing



02 *V*c-T chart

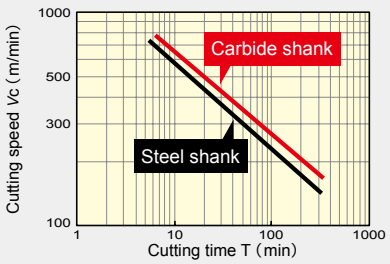
*V*c-T chart for S50C



Cutting conditions

Work material : S50C (220HB)
Tool
Cutter : BR2P3043S32-200-100
Insert : ZPET150R-B JS4030
Overhang : 120mm
Feed per tooth : *f*z=0.5mm/t
Radial depth of cut : *a*p × *a*e=3×3mm
Machine : Vertical type (BT50)
Cutting shape :
Contouring cutting on the sloped face 5°
Air

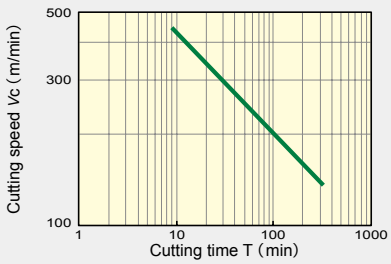
*V*c-T chart for Pre-hardened steels



Cutting conditions

Work material : Pre-hardened steels (40HRC)
Tool
Cutter : BR2P2030S20-160-80 (Steel shank)
Modular : BR2PM20-M10
Carbide shank : ASC20-10.5-120-50Z
Insert : ZPET150R-B JP4120
Overhang : 100mm
Feed per tooth : *f*z=0.3mm/t
Radial depth of cut : *a*p × *a*e=2×1mm
Machine : Vertical type (HSK-A63)
Cutting shape :
Contouring cutting on the sloped face 5°
Air

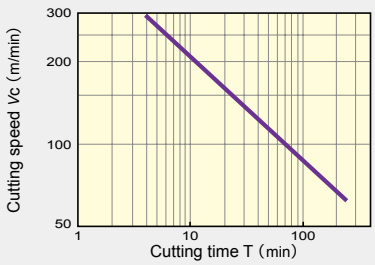
*V*c-T chart for SKD61



Cutting conditions

Work material : SKD61 (45HRC)
Tool
Cutter : BR2P3043S32-200-100
Insert : ZPET150R-C JP4120
Overhang : 120mm
Feed per tooth : *f*z=0.5mm/t
Radial depth of cut : *a*p × *a*e=3×3mm
Machine : Vertical type (BT50)
Cutting shape :
Contouring cutting on the sloped face 5°
Air

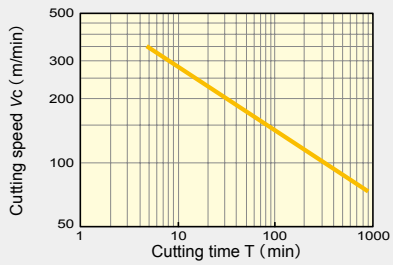
*V*c-T chart for SKD11



Cutting conditions

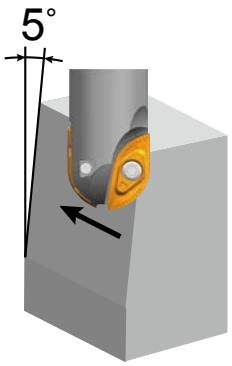
Work material : SKD11 (60HRC)
Tool
Cutter : BR2P3043S32-200-100
Insert : ZPET150R-C TH308
Overhang : 120mm
Feed per tooth : *f*z=0.3mm/t
Radial depth of cut : *a*p × *a*e=2×1mm
Machine : Vertical type (BT50)
Cutting shape :
Contouring cutting on the sloped face 5°
Air

*V*c-T chart for SUS304



Cutting conditions

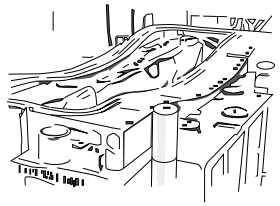
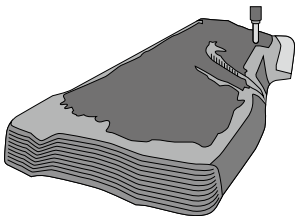
Work material : SUS304
Tool
Cutter : BR2P3043S32-200-100
Insert : ZPET150R-B JS4060
Overhang : 120mm
Feed per tooth : *f*z=0.5mm/t
Radial depth of cut : *a*p × *a*e=1×1mm
Machine : Vertical type (BT50)
Cutting shape :
Contouring cutting on the sloped face 5°
Wet



Cutting shape

Contouring cutting on the sloped face 5°

Field Data

Cutting examples	Cutting conditions	Result
Press die 	Tool : BR2P30S32-200-120 Work material : SKD11 (60HRC) Insert : ZPET150R-C JP4120 Machine : Gate type M/C (BT50) Cutting speed : Vc=188m/min Revolution : n=2000min^{-1} Feed speed : Vf=1500mm/min Feed per tooth : fz=0.38mm/t Cutting depth : ap=1mm Pick feed : ae=2mm Overhang : 120 mm Coolant : Air	Penetrating the bolt hole with the BR2P caused no breakage at the cutting edge. This also improved cutting efficiency.
	Tool : BR2P5063MT5-150-M20 Work material : FC300 Insert : ZPET250R-B JS4030 Machine : Gate type M/C (BT50) Cutting speed : Vc=220m/min Revolution : n=1400min^{-1} Feed speed : Vf=2560mm/min Feed per tooth : fz=0.91mm/t Cutting depth : ap=7mm Pick feed : ae=15mm Overhang : 150 mm Coolant : Air	Used BR2P at double the feed rate of conventional tool and insert had good wear condition.

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The diagrams and table data are examples of test results, and are not guaranteed values.
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⚠ 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.

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