

# **BR2P** *type*

Ball End Mill BR2P type



MOLDINO Tool Engineering, Ltd.

New Product News | No.2001E-7 | 2026-2

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



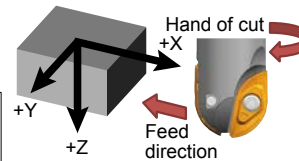
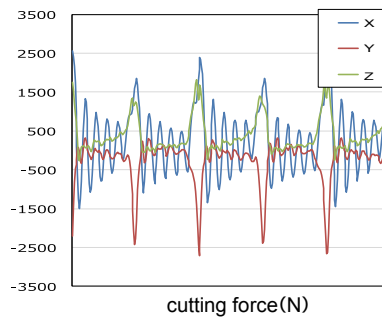
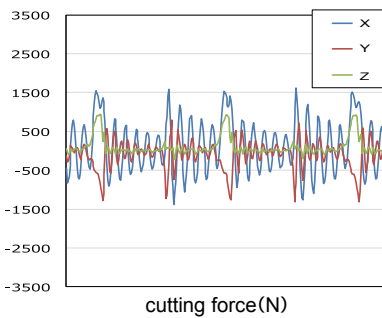
**Issue 01**

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



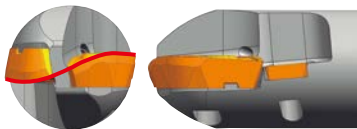
## Proposed solutions

- 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.

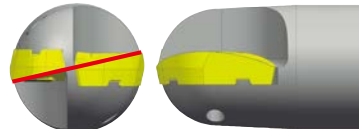


### Cutting conditions

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



BR2P type



Conventional



### 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.



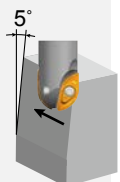
After six hours of cutting : Normal wear

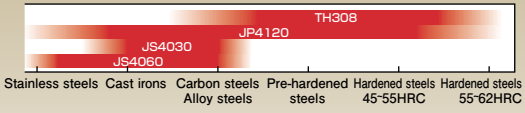


After an hour of cutting : Severely damaged; almost completely consumed

### 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 :  $V_c = 200\text{m/min}$   
 Revolution :  $n = 2122\text{min}^{-1}$   
 Feed per tooth :  $f_z = 0.3\text{mm/t}$   
 Feed speed :  $V_f = 1273\text{mm/min}$   
 Radial depth of cut :  $a_p \times a_e = 3 \times 3\text{mm}$   
 Overhang : 120mm Air





Applications



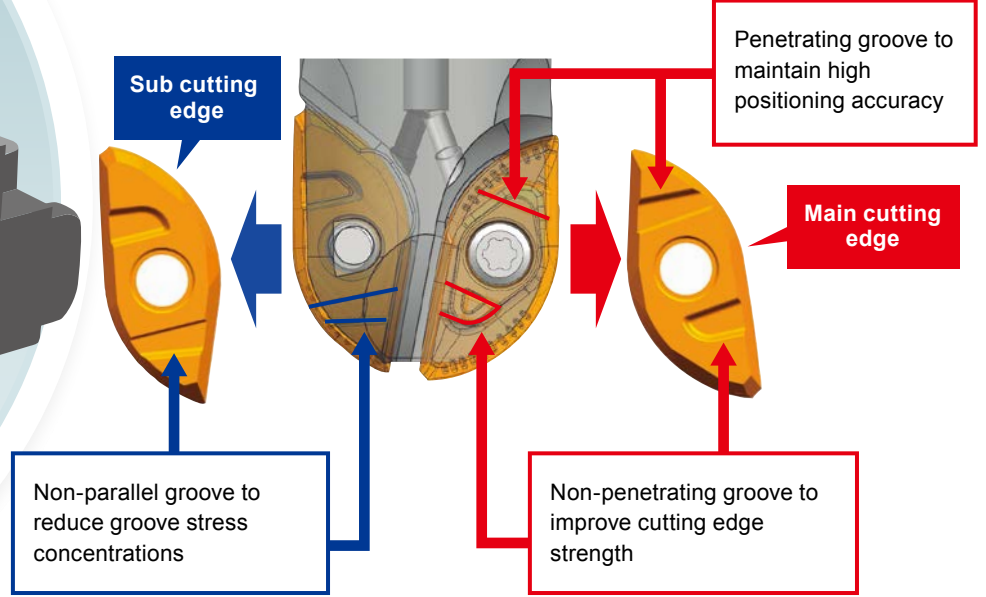
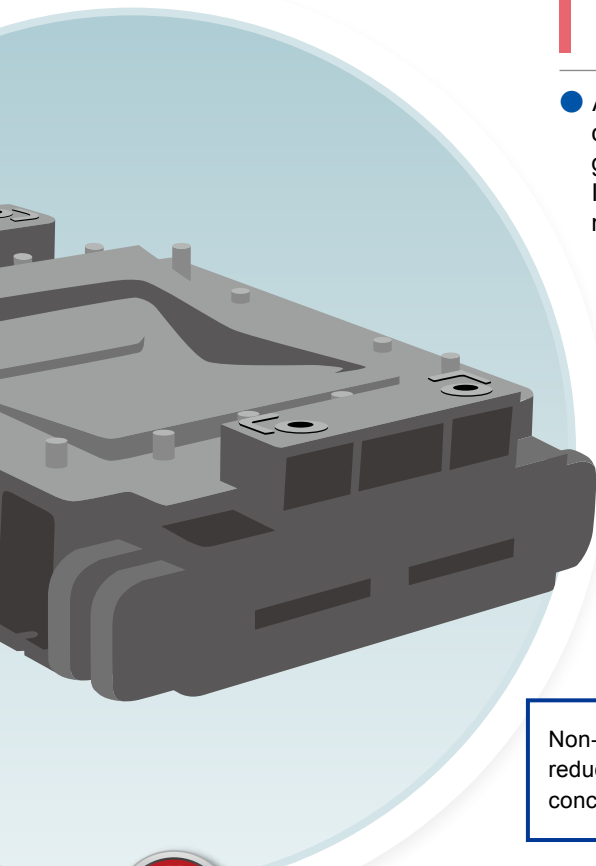
# Issue 02

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



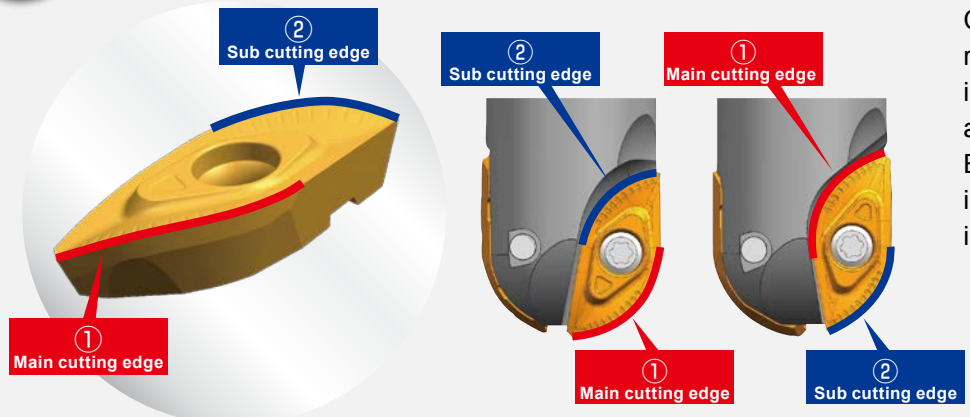
## Proposed solutions

- 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 :  $V_c=100\text{m/min}$

Revolution :  $n=1070\text{min}^{-1}$

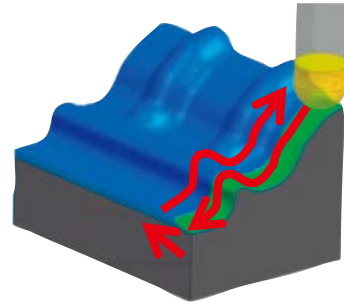
Feed per tooth :  $f_z=0.17\text{mm/t}$

Feed speed :  $V_f=370\text{mm/min}$

Radial depth of cut :  $a_p \times a_e=3 \times 1\text{mm}$

Overhang : 80mm Air

\* 1 TM-2000 is a product name of Tokai Yogyo Co., Ltd.

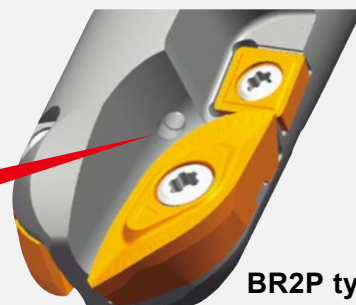


### Point!

### 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.

With internal coolant hole



BR2P type

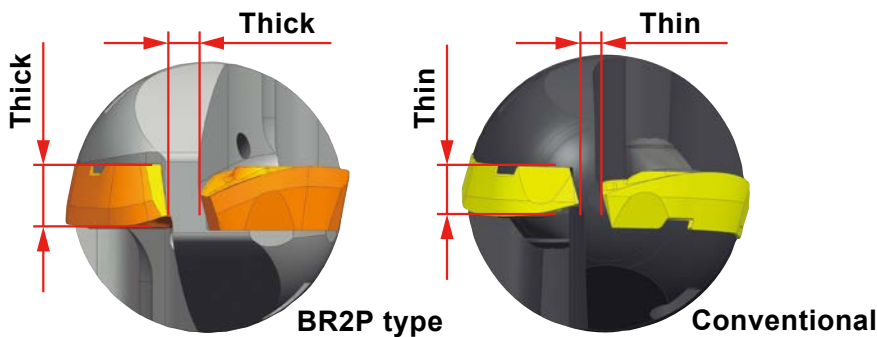
# Issue 04

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



## Proposed solutions

- Large  $\phi 40$  and  $\phi 50$  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

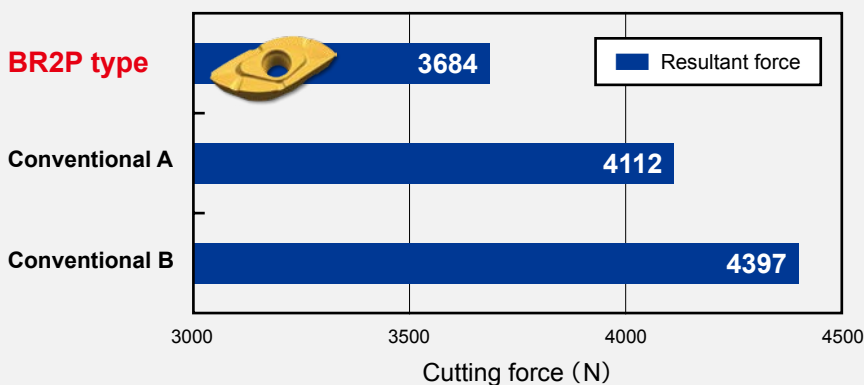
Work material : S50C (220HB)  
 Machine : Vertical type (BT50)  
 Tool  
 Cutter : BR2P5063C508-200-120  
 Insert : ZPET250R-N JP4120  
 Cutting speed :  $V_c=250\text{m/min}$   
 Revolution :  $n=1592\text{min}^{-1}$   
 Feed per tooth :  $f_z=0.23\text{mm/t}$   
 Feed speed :  $V_f=732\text{mm/min}$   
 Radial depth of cut :  $a_p \times a_e=25 \times 15\text{mm}$   
 Air



### Point!

### Nicked inserts reduce cutting resistance

- Using a  $\phi 50$  nicked insert, the BR2P reduces cutting resistance compared to conventional products.



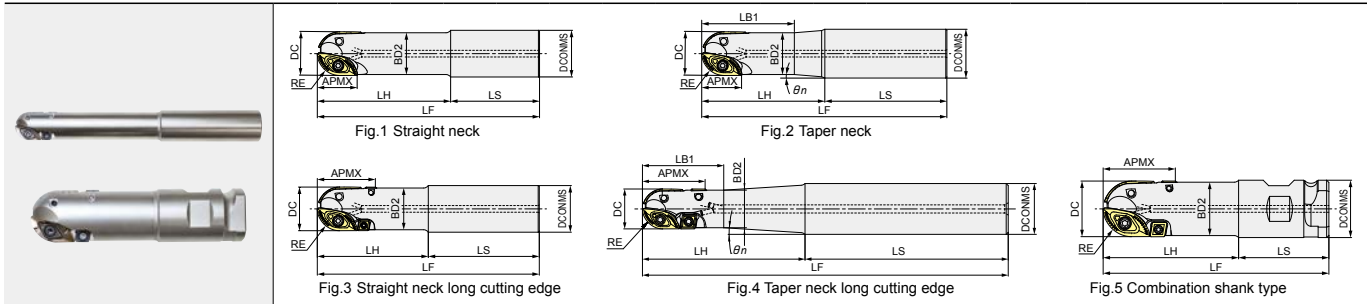
### Cutting conditions

Work material : S50C (220HB)  
 Machine : Vertical type (BT50)  
 Tool  
 Cutter : BR2P5063C508-200-120  
 Insert : ZPET250R-N JP4120  
 Cutting speed :  $V_c=141\text{m/min}$   
 Revolution :  $n=900\text{min}^{-1}$   
 Feed per tooth :  $f_z=0.17\text{mm/t}$   
 Feed speed :  $V_f=300\text{mm/min}$   
 Radial depth of cut :  $a_p \times a_e=25 \times 1\text{mm}$   
 Air

## Shank type

### BR2P

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



Item code	Stock	Size (mm)										Insert				Shape
		DC	RE	LF	DCONMS	BD2	APMX	LH	LB1	$\theta_n$	LS	R insert		Peripheral insert		
												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	ZPET100R	2	-	-	Fig.2
BR2P20S20-130-50	●	20	10	130	20	18.5	18	50	-	-	80	ZPET100R	2	-	-	Fig.1
BR2P20S25-140-60	●	20	10	140	25	18.5	18	60	40	6.14	80	ZPET125R	2	-	-	Fig.2
BR2P25S25-140-60	●	25	12.5	140	25	23.3	22	60	-	-	80	ZPET125R	2	-	-	Fig.1
BR2P25S32-150-70	●	25	12.5	150	32	23.3	22	70	50	8.41	80	ZPET150R	2	-	-	Fig.2
BR2P30S32-160-80	●	30	15	160	32	28	27	80	60	3.4	80	ZPET150R	2	-	-	Fig.2
BR2P30S32-200-120	●	30	15	200	32	28	27	120	60	1.13	80	ZPET150R	2	-	-	Fig.2
BR2P32S32-160-80	●	32	16	160	32	30	28	80	-	-	80	ZPET160R	2	-	-	Fig.1
BR2P40S42-200-120	●	40	20	200	42	37.6	35	120	-	-	80	ZPET200R	2	-	-	Fig.1
BR2P2030S20-160-80	●	20	10	160	20	18.5	30	80	-	-	100	ZPET100R	2	CPMT070304	2	Fig.3
BR2P2030S20-220-120	●	20	10	220	20	18.5	30	120	-	-	100	ZPET100R	2	CPMT070304	2	Fig.4
BR2P2030S20-250-150	●	20	10	250	20	18.5	30	150	-	-	100	ZPET100R	2	CPMT070304	2	Fig.3
BR2P2030S25-180-80	●	20	10	180	25	18.5	30	80	40	3.61	100	ZPET100R	2	CPMT070304	2	Fig.3
BR2P2535S25-160-80	●	25	12.5	160	25	23.3	35	80	-	-	100	ZPET125R	2	CPMT070304	2	Fig.3
BR2P2535S25-200-100	●	25	12.5	200	25	23.3	35	100	-	-	100	ZPET125R	2	CPMT070304	2	Fig.3
BR2P2535S25-250-150	●	25	12.5	250	25	23.3	35	150	-	-	100	ZPET125R	2	CPMT070304	2	Fig.3
BR2P2535S32-200-100	●	25	12.5	200	32	23.3	35	100	-	-	100	ZPET125R	2	CPMT070304	2	Fig.3
BR2P2535S32-250-150	●	25	12.5	250	32	23.3	35	150	-	-	100	ZPET125R	2	CPMT070304	2	Fig.3
BR2P3043S32-200-100	●	30	15	200	32	28	43	100	-	-	100	ZPET150R	2	CPMT090308	2	Fig.3
BR2P3043S32-250-150	●	30	15	250	32	28	43	150	-	-	100	ZPET150R	2	CPMT090308	2	Fig.3
BR2P3043S32-260-180	●	30	15	260	32	28	43	180	-	-	80	ZPET150R	2	CPMT090308	2	Fig.3
BR2P4050S42-200-100	●	40	20	200	42	37.6	50	100	-	-	100	ZPET200R	2	CPMT090308	2	Fig.3
BR2P4050S42-250-150	●	40	20	250	42	37.6	50	150	-	-	100	ZPET200R	2	CPMT090308	2	Fig.3
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	ZPET250R	2	CPMT120408	2	Fig.5

## Modular type

### BR2PM

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



Item code	Stock	Size (mm)										Insert		Shape
		DC	RE	APMX	LF	DCONMS	THSZMS	DHUB	L1	L2	DRVS	R insert		
												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	2	Fig.6
BR2PM25-M12	●	25	12.5	22	38	12.5	M12	20.8	5.5	22	17	ZPET125R	2	Fig.6
BR2PM30-M16	●	30	15	27	43	17	M16	28.8	6	23	22	ZPET150R	2	Fig.6
BR2PM32-M16	●	32	16	28	43	17	M16	28.8	6	23	22	ZPET160R	2	Fig.6

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

## MT Shank type

# BR2P $\circ\circ\circ\circ$ MT5- $\circ\circ\circ\circ$ -M $\circ\circ\circ$

Numeric figure in a circle  $\circ$  and Alphabetical character comes in a square  $\square$ .

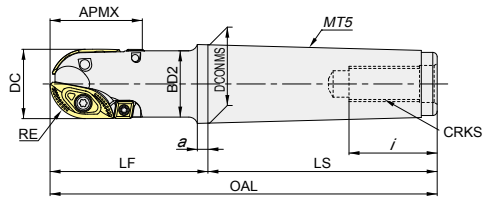


Fig.7  
Long cutting edge

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	ZPET200R- $\square$	2	CPMT090308	2	Fig.7
BR2P4050MT5-120-M20	●	40	20	50	249.5	120		37.6		50	M20						
BR2P4050MT5-170-M20	●	40	20	50	299.5	170		37.6		50	M20						
BR2P5063MT5-100-M20	●	50	25	63	229.5	100	129.5	44.399	47.3	6.5	50	M20	ZPET250R- $\square$	2	CPMT120408	2	
BR2P5063MT5-120-M20	●	50	25	63	249.5	120		47.3		50	M20						
BR2P5063MT5-150-M20	●	50	25	63	279.5	150		47.3		50	M20						
BR2P5063MT5-170-M20	●	50	25	63	299.5	170		47.3		50	M20						

## Parts

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

P-37

[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.

## Inserts

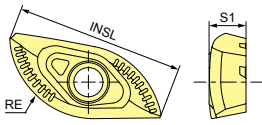


Fig-1  
B breaker

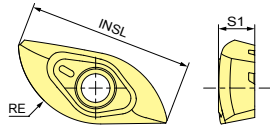


Fig-2  
C breaker

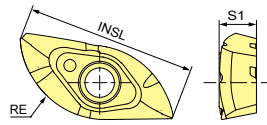


Fig-3  
N breaker (With nick)

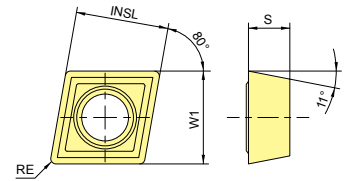


Fig-4  
Peripheral insert

Type	Item code	Tolerance class	TH3 Coating	AJ Coating	JS Coating		Size (mm)					Shape	
			TH308	JP4120	JS4030	JS4060	RE	INSL	W1	S1	S		
			<b>■</b> : General cutting, First recommendation <b>□</b> : General cutting, Second recommendation										
<b>P</b> Carbon steels			□	■	■	■							
<b>K</b> FC·FCD Cast irons			□	■	□	■							
<b>M</b> SUS, etc				□		□							
<b>H</b> Hardened steels			■	■									
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		

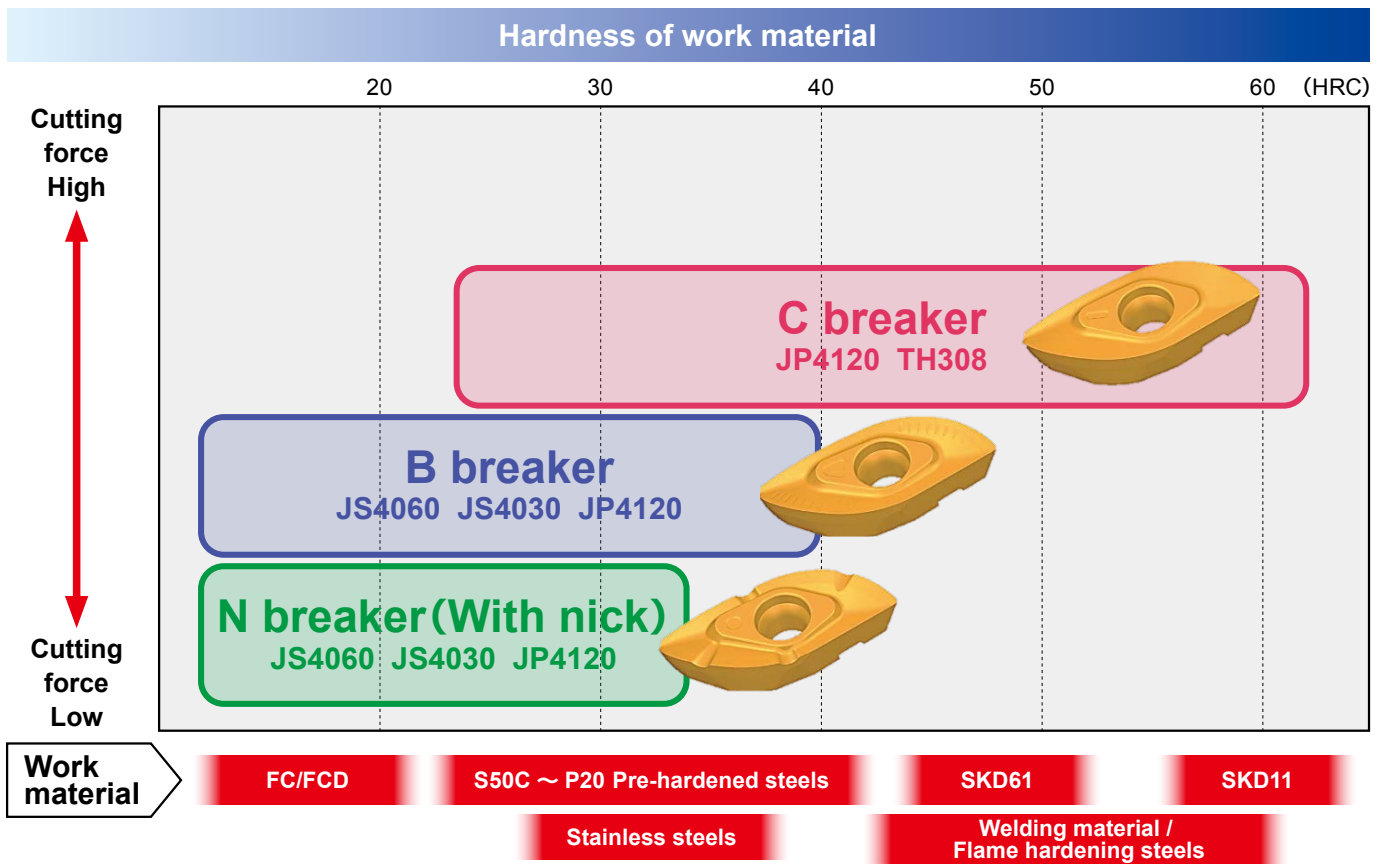
[Note] Please note that the JS Coating does not cause a reaction in conductive touch sensors.

## Insert grade selection

Grade	Application	Features
<b>TH308</b>	High-hardened steels	Features micro grain substrate and TH3 Coating. Offers excellent versatility for cutting high-hardened steels.
<b>JP4120</b>	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.
<b>JS4030</b>	General steel	Features rough grain substrate and JS coating. Suitable for cutting general steel.
<b>JS4060</b>	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.

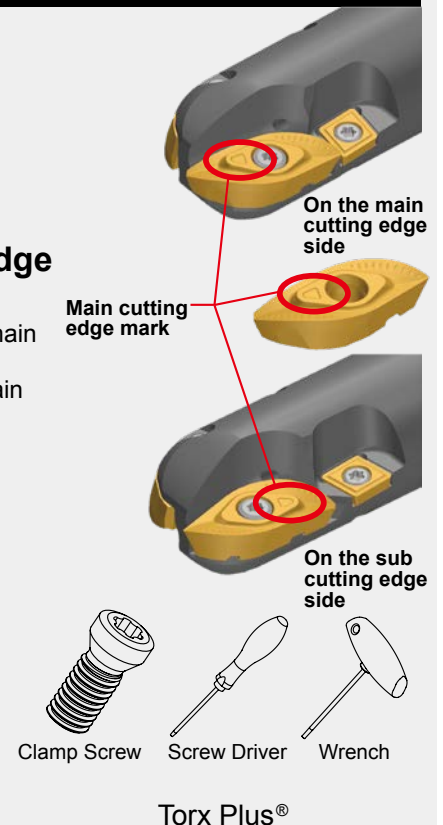
- 2 The insert is formed by integrating a main cutting edge and a sub cutting edge.**

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.**

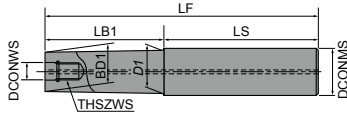
The drive type of the clamp screw is Torx Plus®.  
Use a Torx Plus® wrench.

- 4 This concludes the insert setup.**

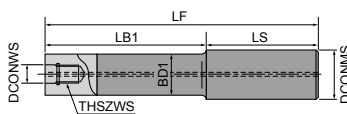


## The Shanks for Modular Mill

### Carbide Shank



A type



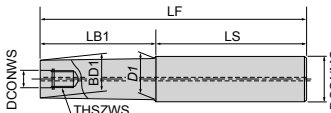
B type

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	●			220	50	170						
ASC20-10.5-270-50Z	●	270	50	220	18.5	20	19.5	A	φ20			
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	●			265	65	200						
ASC25-12.5-315-65	●	315	65	250	23	25	-	B	φ25			
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	80	230						
ASC32-17-360-80	●			360	80	280						

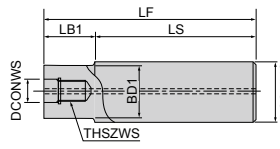
[Note] Commercial milling chucks or shrink-fit holders can be used.

## The Shanks for Modular Mill

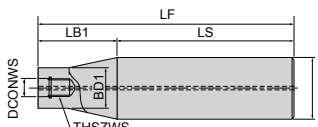
### Steel Shank



A type (Tapered neck)



B type



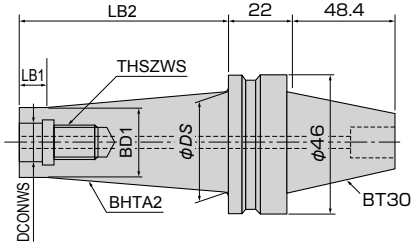
C type

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

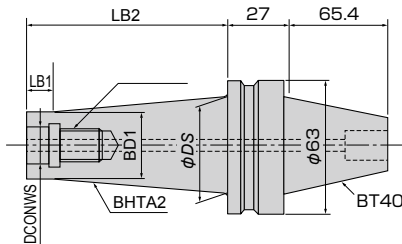


※For neck section, additional machining to user specifications is possible.

Item code	Stock	寸法 Size (mm)						
		DCONWS	THSZWS	BD1	φDS	LB2	LB1	BHTA2
BT30-6.5-30-9.7						30	5	17°
BT30-6.5-55-9.7		6.5	M6	9.7	25	55	10	9.6°
BT30-6.5-85-9.7						80	10	6.2°
BT30-8.5-25-15						25	5	20.6°
BT30-8.5-50-15		8.5	M8	15	30	50	10	10.6°
BT30-8.5-75-15						75	10	6.6°
BT30-10.5-20-18						20	5	29.5°
BT30-10.5-45-18		10.5	M10	18	35	45	10	13.7°
BT30-10.5-70-18						70	10	8.1°
BT30-12.5-15-21						15	5	32.3°
BT30-12.5-40-21		12.5	M12	21	40	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						10	5	31°
BT30-17-35-28		17	M16	28	40	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



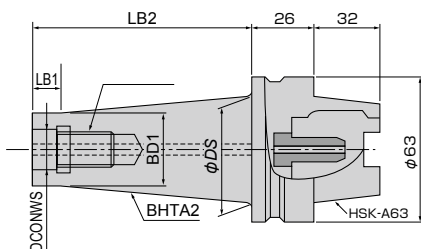
※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm)						
		DCONWS	THSZWS	BD1	φDS	LB2	LB1	BHTA2
BT40-6.5-30-9.7						30	5	17°
BT40-6.5-55-9.7		6.5	M6	9.7	25	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						25	5	20.6°
BT40-8.5-50-15		8.5	M8	15	30	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						20	5	29.5°
BT40-10.5-45-18		10.5	M10	18	35	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						15	5	32.3°
BT40-12.5-40-21		12.5	M12	21	40	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						10	5	45°
BT40-17-35-28		17	M16	28	48	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	●					20.8	30	—	3°
HSK-A63-10.5-70-18	●	10.5	M10	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	●					24.3	35	—	3°
HSK-A63-12.5-65-21	●	12.5	M12	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	●					31.8	40	—	3°
HSK-A63-17-60-28	●	17	M16	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

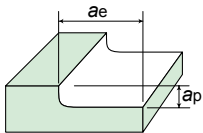
## Steel Shank

Red indicates primary recommended insert grades.

Work material	Recommended inserts grade	Cutting conditions	φ 16			φ 20				φ 25					
			>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 <sup>-1</sup> )	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
		$v_c$ (m/min)	160	220	250	160	220	250	110	95	160	220	250	110	95
		$v_f$ (mm/min)	1,280	880	2,990	1,020	710	2,390	530	370	820	850	1,920	430	300
		$f_z$ (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
		$a_p$ (mm)	3	8	0.5	4	10	0.7	2	1	5	12.5	1	2.5	1.5
		$a_e$ (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 <sup>-1</sup> )	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
		$v_c$ (m/min)	120	130	180	120	130	180	85	70	120	130	180	85	70
		$v_f$ (mm/min)	720	520	2,160	580	420	1,730	330	230	460	500	1,380	270	180
		$f_z$ (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
		$a_p$ (mm)	3	8	0.5	4	10	0.7	2	1	5	12.5	1	2.5	1.5
		$a_e$ (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 <sup>-1</sup> )	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
		$v_c$ (m/min)	160	220	250	160	220	250	110	95	160	220	250	110	95
		$v_f$ (mm/min)	1,280	880	2,990	1,020	710	2,390	530	370	820	850	1,920	430	300
		$f_z$ (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
		$a_p$ (mm)	3	8	0.5	4	10	0.7	2	1	5	12.5	1	2.5	1.5
		$a_e$ (mm)	3	1	1	4	2	1.2	2	1	5	3	2	2.5	1.5
Stainless steels SUS	JS4060 JP4120	$n$ (min <sup>-1</sup> )	1,990	—	2,990	1,600	—	2,390	1,120	960	1,280	—	1,910	900	770
		$v_c$ (m/min)	100	—	150	100	—	150	70	60	100	—	150	70	60
		$v_f$ (mm/min)	600	—	1,800	480	—	1,440	270	200	390	—	1,150	220	160
		$f_z$ (mm/t)	0.15	—	0.3	0.15	—	0.3	0.12	0.1	0.15	—	0.3	0.12	0.1
		$a_p$ (mm)	3	—	0.5	4	—	0.7	2	1	5	—	1	2.5	1.5
		$a_e$ (mm)	3	—	1	4	—	1.2	2	1	5	—	2	2.5	1.5
Hardened steels (45 ~ 55HRC)	JP4120 TH308	$n$ (min <sup>-1</sup> )	1,990	—	2,990	1,600	—	2,390	1,120	960	1,280	—	1,910	900	770
		$v_c$ (m/min)	100	—	150	100	—	150	70	60	100	—	150	70	60
		$v_f$ (mm/min)	480	—	1,800	390	—	1,440	180	140	310	—	1,150	150	110
		$f_z$ (mm/t)	0.12	—	0.3	0.12	—	0.3	0.08	0.07	0.12	—	0.3	0.08	0.07
		$a_p$ (mm)	1.5	—	0.5	2	—	0.7	1	0.5	2.5	—	0.5	1.5	0.7
		$a_e$ (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 <sup>-1</sup> )	1,600	—	2,390	1,280	—	1,910	880	800	1,020	—	1,530	710	640
		$v_c$ (m/min)	80	—	120	80	—	120	55	50	80	—	120	55	50
		$v_f$ (mm/min)	390	—	1,440	310	—	1,150	150	100	250	—	920	120	80
		$f_z$ (mm/t)	0.12	—	0.3	0.12	—	0.3	0.08	0.06	0.12	—	0.3	0.08	0.06
		$a_p$ (mm)	1.5	—	0.5	1.5	—	0.7	0.7	0.5	2	—	0.5	0.7	0.5
		$a_e$ (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 ( $a_p$ ) 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.

$\phi 30$					$\phi 32$			$\phi 40$		$\phi 50$		Work material
>3DC			3DC ~ 5DC	5DC ~	>3DC			General purpose	Full R cutting in high efficiency machining	General purpose	Full R cutting in high efficiency 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					
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

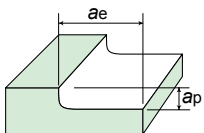
## Modular

Red indicates primary recommended insert grades.

Work material	Recommended inserts grade	Cutting conditions	φ 16			φ 20		
			3DC ~5DC	5DC ~7DC	>7DC	3DC ~5DC	5DC ~7DC	>7DC
Carbon steels Alloy steels (30HRC or less)	<b>JS4030</b> <b>JP4120</b> <b>JS4060</b>	<i>n</i> (min <sup>-1</sup> )	2,190	1,890	1,600	1,760	1,520	1,280
		<i>v<sub>c</sub></i> (m/min)	110	95	80	110	95	80
		<i>vf</i> (mm/min)	1,100	570	320	1,060	610	260
		<i>fz</i> (mm/t)	0.25	0.15	0.1	0.3	0.2	0.1
		<i>a<sub>p</sub></i> (mm)	1	1	1	1	1	1
		<i>a<sub>e</sub></i> (mm)	1.7	1.2	1	2	1.5	1
Alloy steels Tool steels (30 ~ 45HRC)	<b>JP4120</b> <b>JS4030</b> <b>JS4060</b> <b>TH308</b>	<i>n</i> (min <sup>-1</sup> )	1,700	1,400	1,200	1,360	1,120	960
		<i>v<sub>c</sub></i> (m/min)	85	70	60	85	70	60
		<i>vf</i> (mm/min)	680	340	170	550	340	140
		<i>fz</i> (mm/t)	0.2	0.12	0.07	0.2	0.15	0.07
		<i>a<sub>p</sub></i> (mm)	1	1	1	1	1	1
		<i>a<sub>e</sub></i> (mm)	1.7	1.2	1	2	1.5	1
Cast irons FC FCD	<b>JP4120</b> <b>JS4060</b> <b>JS4030</b> <b>TH308</b>	<i>n</i> (min <sup>-1</sup> )	2,190	1,890	1,600	1,760	1,520	1,280
		<i>v<sub>c</sub></i> (m/min)	110	95	80	110	95	80
		<i>vf</i> (mm/min)	1,100	570	320	1,060	610	260
		<i>fz</i> (mm/t)	0.25	0.15	0.1	0.3	0.2	0.1
		<i>a<sub>p</sub></i> (mm)	1	1	1	1	1	1
		<i>a<sub>e</sub></i> (mm)	1.7	1.2	1	2	1.5	1
Stainless steels SUS	<b>JS4060</b> <b>JP4120</b>	<i>n</i> (min <sup>-1</sup> )	1,400	1,200	1,000	1,120	960	800
		<i>v<sub>c</sub></i> (m/min)	70	60	50	70	60	50
		<i>vf</i> (mm/min)	560	290	140	450	290	120
		<i>fz</i> (mm/t)	0.2	0.12	0.07	0.2	0.15	0.07
		<i>a<sub>p</sub></i> (mm)	1	1	1	1	1	1
		<i>a<sub>e</sub></i> (mm)	1.7	1.2	1	2	1.5	1
Hardened steels (45 ~ 55HRC)	<b>JP4120</b> <b>TH308</b>	<i>n</i> (min <sup>-1</sup> )	1,400	1,200	1,000	1,120	960	800
		<i>v<sub>c</sub></i> (m/min)	70	60	50	70	60	50
		<i>vf</i> (mm/min)	280	170	100	230	140	80
		<i>fz</i> (mm/t)	0.1	0.07	0.05	0.1	0.07	0.05
		<i>a<sub>p</sub></i> (mm)	0.5	0.5	0.5	0.5	0.5	0.5
		<i>a<sub>e</sub></i> (mm)	1	0.7	0.5	1.2	0.8	0.5
Hardened steels (55 ~ 62HRC)	<b>TH308</b> <b>JP4120</b>	<i>n</i> (min <sup>-1</sup> )	1,100	1,000	800	880	800	640
		<i>v<sub>c</sub></i> (m/min)	55	50	40	55	50	40
		<i>vf</i> (mm/min)	160	120	80	130	100	70
		<i>fz</i> (mm/t)	0.07	0.06	0.05	0.07	0.06	0.05
		<i>a<sub>p</sub></i> (mm)	0.5	0.5	0.5	0.5	0.5	0.5
		<i>a<sub>e</sub></i> (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<sub>p</sub>*) by 50 to 70%.  
 · Reduce cutting width (*a<sub>e</sub>*) 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.

$\phi 25$			$\phi 30$			$\phi 32$			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

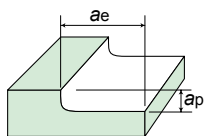
Red indicates primary recommended insert grades.

Mold material	Work material			Recommended inserts grade	Cutting conditions	Steel shank		
	Welding material					$\phi 30$		
	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 <sup>-1</sup> )	1700	1170	1010
					$v_c$ (m/min)	160	110	95
					$v_f$ (mm/min)	1020	470	370
					$f_z$ (mm/t)	0.3	0.2	0.18
					$a_p$ (mm)	~ 3	~ 3	2
					$a_e$ (mm)	3	3	2
	Standard:N/A (TM-2000B)	Mold hardfacing [ for anti-wear and anti-galling ]	37 ~ 39	JP4120 JS4060	$n$ (min <sup>-1</sup> )	1280	910	750
					$v_c$ (m/min)	120	85	70
					$v_f$ (mm/min)	520	260	180
					$f_z$ (mm/t)	0.2	0.14	0.12
					$a_p$ (mm)	~ 3	~ 3	2
					$a_e$ (mm)	3	3	2
	Standard:N/A (TM-2000)	Mold hardfacing [ for anti-wear and anti-galling ]	44 ~ 46	JP4120 JS4060	$n$ (min <sup>-1</sup> )	1070	910	750
					$v_c$ (m/min)	100	85	70
					$v_f$ (mm/min)	370	220	150
					$f_z$ (mm/t)	0.17	0.12	0.1
$a_p$ (mm)					~ 3	2	1	
$a_e$ (mm)					3	2	2	
Standard:N/A (TC-8B) (NIW-5)	Mold hardfacing (for cutting edge)	52 ~ 58	JP4120 TH308	$n$ (min <sup>-1</sup> )	1070	750	640	
				$v_c$ (m/min)	100	70	60	
				$v_f$ (mm/min)	330	150	110	
				$f_z$ (mm/t)	0.15	0.1	0.08	
				$a_p$ (mm)	~ 3	2	1	
				$a_e$ (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 <sup>-1</sup> )	1070	750	640
					$v_c$ (m/min)	100	70	60
					$v_f$ (mm/min)	330	150	110
					$f_z$ (mm/t)	0.15	0.1	0.08
					$a_p$ (mm)	~ 3	2	1
					$a_e$ (mm)	3	2	2
Steel for flame- hardening	Standard:N/A (THW)	Mold hardfacing (for anti-impact wear)	55 ~ 60	JP4120 TH308	$n$ (min <sup>-1</sup> )	850	640	540
					$v_c$ (m/min)	80	60	50
					$v_f$ (mm/min)	170	110	70
					$f_z$ (mm/t)	0.1	0.08	0.06
					$a_p$ (mm)	~ 3	2	1
					$a_e$ (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 <sup>-1</sup> )	850	640	540
					$v_c$ (m/min)	80	60	50
					$v_f$ (mm/min)	170	110	70
					$f_z$ (mm/t)	0.1	0.08	0.06
					$a_p$ (mm)	~ 3	2	1
					$a_e$ (mm)	3	2	2
SKD11 equivalent material	Standard:N/A (THW)	Mold hardfacing (for anti-impact wear)	55 ~ 60	JP4120 TH308	$n$ (min <sup>-1</sup> )	850	640	540
					$v_c$ (m/min)	80	60	50
					$v_f$ (mm/min)	170	110	70
					$f_z$ (mm/t)	0.1	0.08	0.06
					$a_p$ (mm)	~ 3	2	1
					$a_e$ (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 ( $a_p$ ) by 50 to 70%. · Reduce cutting width ( $a_e$ ) 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.

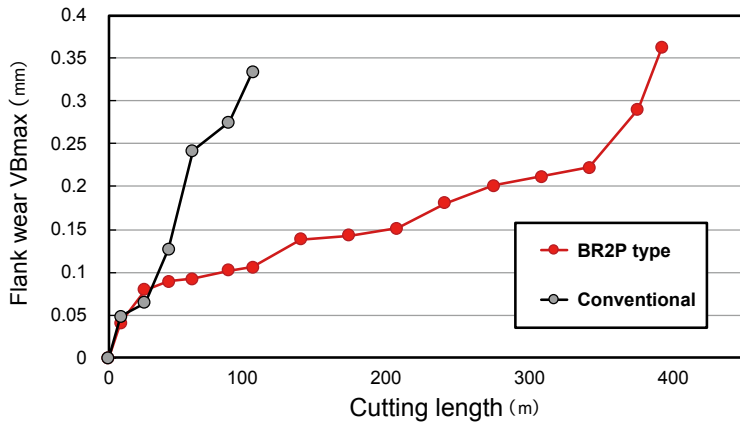
Steel shank			
φ 40		φ 50	
>3DC	3DC ~5DC	>3DC	3DC ~5DC
1280	880	1020	710
160	110	160	110
770	360	620	290
0.3	0.2	0.3	0.2
~ 4	~ 4	~ 5	~ 5
4	4	5	5
960	680	770	550
120	85	120	85
390	200	310	160
0.2	0.14	0.2	0.14
~ 4	~ 4	~ 5	~ 5
4	4	5	5
800	680	640	550
100	85	100	85
280	170	220	140
0.17	0.12	0.17	0.12
~ 4	3	~ 5	4
4	3	5	4
800	560	640	450
100	70	100	70
240	120	200	90
0.15	0.1	0.15	0.1
~ 4	3	~ 5	4
4	3	5	4
800	560	640	450
100	70	100	70
240	120	200	90
0.15	0.1	0.15	0.1
~ 4	3	~ 5	4
4	3	5	4
640	480	510	390
80	60	80	60
130	80	110	70
0.1	0.08	0.1	0.08
~ 4	3	~ 5	4
4	3	5	4
640	480	510	390
80	60	80	60
130	80	110	70
0.1	0.08	0.1	0.08
~ 4	3	~ 5	4
4	3	5	4
640	480	510	390
80	60	80	60
130	80	110	70
0.1	0.08	0.1	0.08
~ 4	3	~ 5	4
4	3	5	4

Modular			Work material
φ 30			Mold material
3DC ~5DC	5DC ~7DC	>7DC	
1170	1010	850	Cast irons FC FCD
110	95	80	
940	610	340	
0.4	0.3	0.2	
1	1	1	
3	2	1	
910	750	640	
85	70	60	
550	300	130	
0.3	0.2	0.1	
1	1	1	
3	2	1	
750	640	540	
70	60	50	
230	130	80	
0.15	0.1	0.07	
0.5	0.5	0.5	
1.5	1	0.5	
750	640	540	
70	60	50	
150	110	90	
0.1	0.08	0.06	
0.5	0.5	0.5	
1.5	1	0.5	
750	640	540	
70	60	50	
150	110	90	
0.1	0.08	0.08	
0.5	0.5	0.5	
1.5	1	0.5	
750	640	540	
70	60	50	
120	80	70	
0.08	0.06	0.06	
0.5	0.5	0.5	
1.5	1	0.5	
750	640	540	
70	60	50	
120	80	70	
0.08	0.06	0.06	
0.5	0.5	0.5	
1.5	1	0.5	
750	640	540	
70	60	50	
120	80	70	
0.08	0.06	0.06	
0.5	0.5	0.5	
1.5	1	0.5	



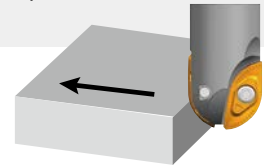
# Field data

## 01 Wear curve



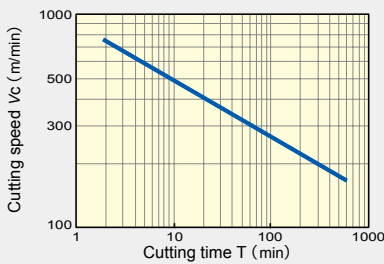
### Cutting conditions

Work material : SKD61 (45HRC)  
 Machine : Vertical type (BT50)  
 Tool  
 Cutter : BR2P3043S32-200-100 JP4120  
 Insert : ZPET150R-C JP4120  
 Cutting speed :  $V_c=200\text{m/min}$   
 Revolution :  $n=2122\text{min}^{-1}$   
 Feed per tooth :  $f_z=0.3\text{mm/t}$   
 Feed speed :  $V_f=1273\text{mm/min}$   
 Radial depth of cut :  $a_p \times a_e=3 \times 3\text{mm}$   
 Air Planing



## 02 Vc-T chart

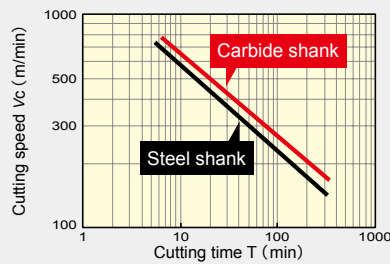
### Vc-T chart for S50C



#### Cutting conditions

Work material : S50C (220HB)  
 Tool  
 Cutter : BR2P3043S32-200-100  
 Insert : ZPET150R-B JS4030  
 Overhang : 120mm  
 Feed per tooth :  $f_z=0.5\text{mm/t}$   
 Radial depth of cut :  $a_p \times a_e=3 \times 3\text{mm}$   
 Machine : Vertical type (BT50)  
 Cutting shape :  
 Contouring cutting on the sloped face 5°  
 Air

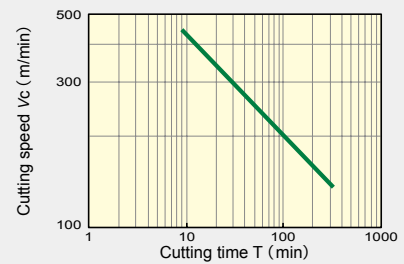
### Vc-T chart for Pre-hardened steels



#### 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 :  $f_z=0.3\text{mm/t}$   
 Radial depth of cut :  $a_p \times a_e=2 \times 1\text{mm}$   
 Machine : Vertical type (HSK-A63)  
 Cutting shape :  
 Contouring cutting on the sloped face 5°  
 Air

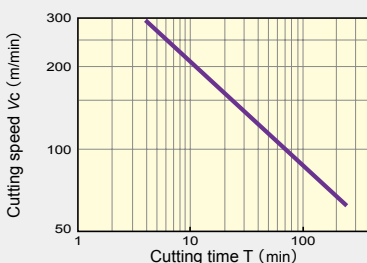
### Vc-T chart for SKD61



#### Cutting conditions

Work material : SKD61 (45HRC)  
 Tool  
 Cutter : BR2P3043S32-200-100  
 Insert : ZPET150R-C JP4120  
 Overhang : 120mm  
 Feed per tooth :  $f_z=0.5\text{mm/t}$   
 Radial depth of cut :  $a_p \times a_e=3 \times 3\text{mm}$   
 Machine : Vertical type (BT50)  
 Cutting shape :  
 Contouring cutting on the sloped face 5°  
 Air

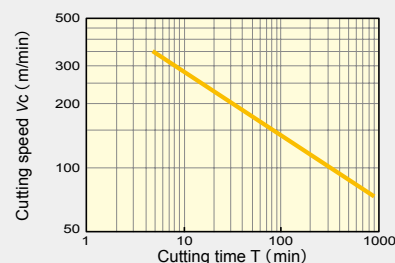
### Vc-T chart for SKD11



#### Cutting conditions

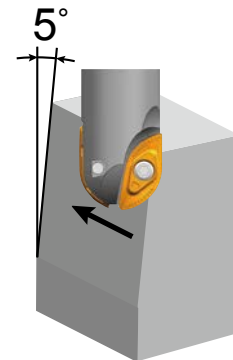
Work material : SKD11 (60HRC)  
 Tool  
 Cutter : BR2P3043S32-200-100  
 Insert : ZPET150R-C TH308  
 Overhang : 120mm  
 Feed per tooth :  $f_z=0.3\text{mm/t}$   
 Radial depth of cut :  $a_p \times a_e=2 \times 1\text{mm}$   
 Machine : Vertical type (BT50)  
 Cutting shape :  
 Contouring cutting on the sloped face 5°  
 Air

### Vc-T chart for SUS304



#### Cutting conditions

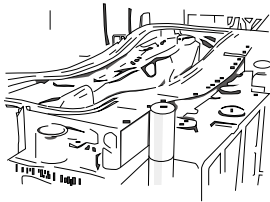
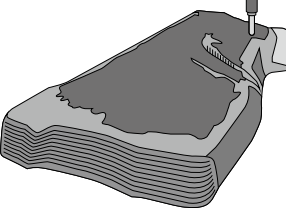
Work material : SUS304  
 Tool  
 Cutter : BR2P3043S32-200-100  
 Insert : ZPET150R-B JS4060  
 Overhang : 120mm  
 Feed per tooth :  $f_z=0.5\text{mm/t}$   
 Radial depth of cut :  $a_p \times a_e=1 \times 1\text{mm}$   
 Machine : Vertical type (BT50)  
 Cutting shape :  
 Contouring cutting on the sloped face 5°  
 Wet



#### Cutting shape

Contouring cutting on the sloped face 5°

## Field Data

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



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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