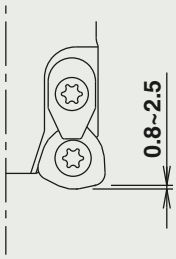
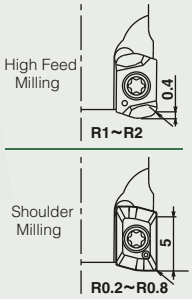
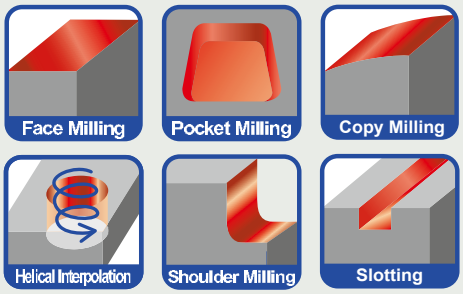
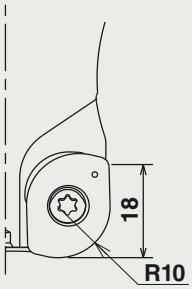
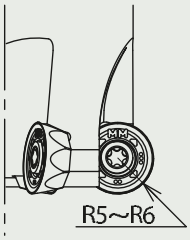
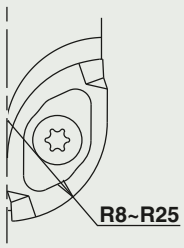
Tooling by DIJET®

Indexable Tools

Indexable Tools - End Mill Type

Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
High Feed Copy Milling	High Feed Diemaster SKS TYPE C036	 φ16~φ32		
High Efficient Copy Milling	QM MILL PME TYPE C092	 φ10~φ14		
High Efficient Roughing	Wild Radius WDR TYPE C101	 φ40		
Roughing for Turbine Blade	Blade Chipper TDM TYPE C136	 φ25~φ32		
Copy Roughing	Swing Ball SWB TYPE C158	 φ16~φ50		

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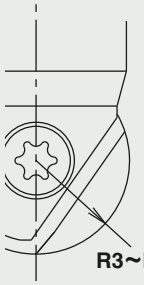
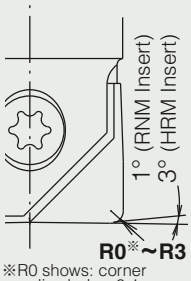
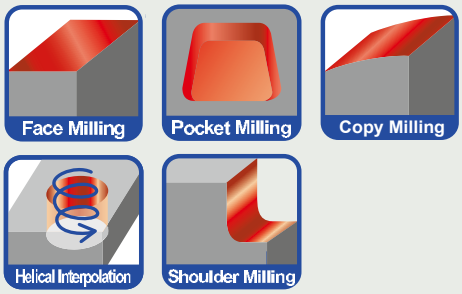
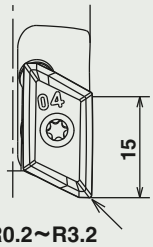
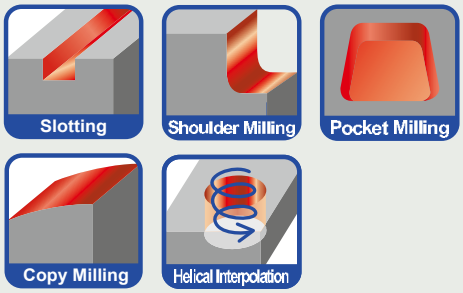
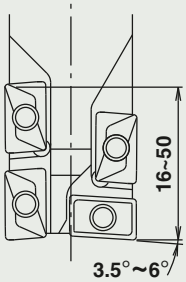
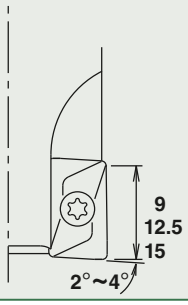
Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
Copy Milling	Mirror Ball BNMTYPE C172	 φ6~φ32	 R3~R16	
Shoulder Finishing & Copy Milling	Mirror Radius RNMTYPE C192	 φ6~φ32	 R0※~R3 ※R0 shows: corner radius below 0.1mm.	
Aerospace Tooling	Aero chipper ALXTYPE C221	G-Body  φ20~φ40	 R0.2~R3.2	
Multi-Functional Cutting	Super End Chipper SECTYPE C227	 φ16~φ50	 3.5°~6°	
Shoulder Milling	Side Chipper SICTYPE C237	 φ16~φ50	 2°~4°	

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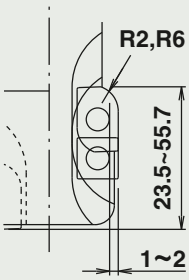
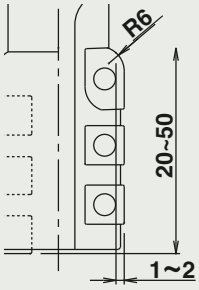
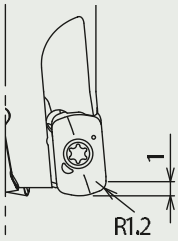
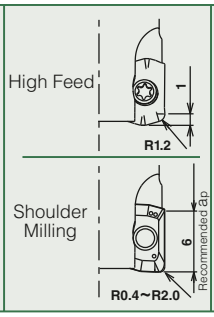
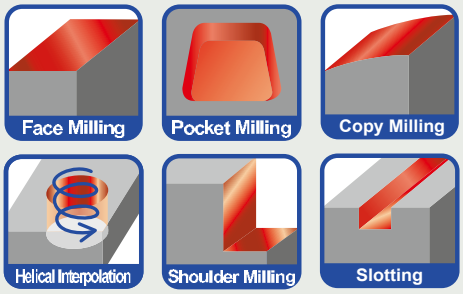
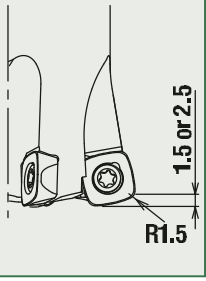
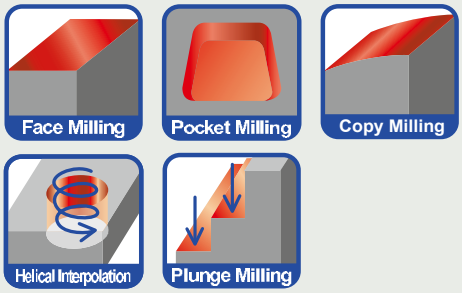
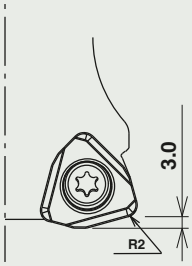
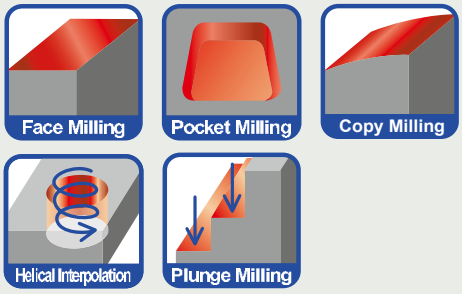
Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
Under Milling	Under Cutter DUM-W※RTYPE C214	 φ25~φ50		
Under Milling	Under Cutter DUMTYPE C214	 φ32~φ50		

Indexable Tools - Face Mill Type

Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
High Efficient Copy Milling	QM MAX G II GMXTYPE C052	G-Body  φ50~φ66		
High Efficient Copy Milling	QM MAX QXPTYPE C056	G-Body  φ40~φ66		
High Feed & Efficient Copy Milling	SKS G II SKGTYPE C014	G-Body  φ50~φ100		
High Feed & Efficient Copy Milling	SKS Extreme EXSKSTYPE C027	G-Body  φ50~φ160		

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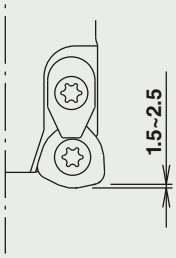
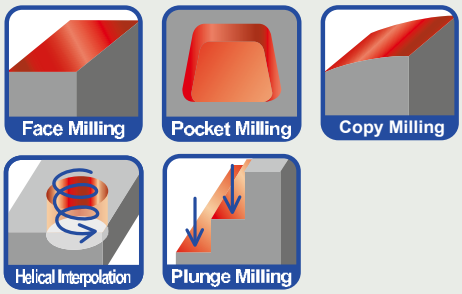
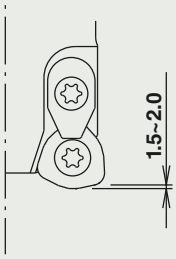
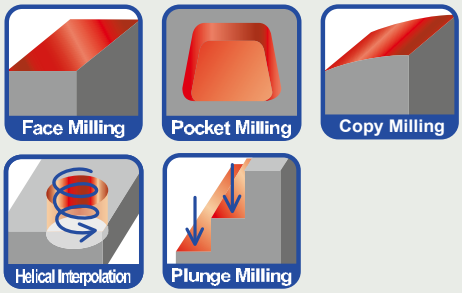
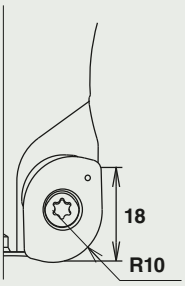
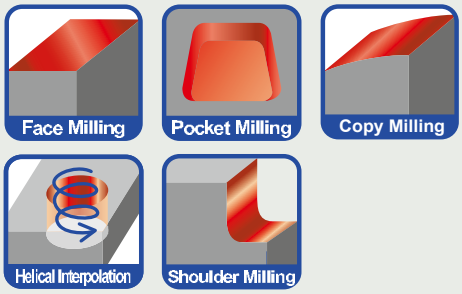
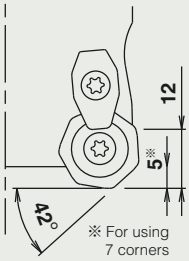
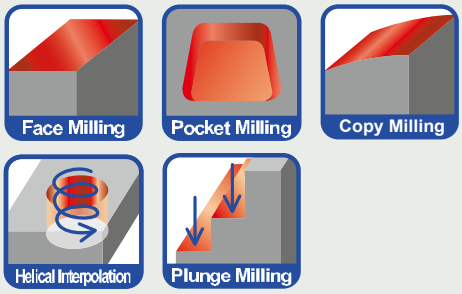
Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
High Feed Copy Milling	High Feed Diemaster SKSTYPE C034	G-Body  φ40~φ160		
High Feed Copy Milling	High Feed Diemaster Fine pitch type SKSTYPE C035	G-Body  φ50~φ80		
High Efficient Roughing	Wild Radius WDRTYPE C100	 φ50~φ125		
High Metal Removal Roughing	Hepta Mill HEPTYPE C108	G-Body  φ50~φ200		

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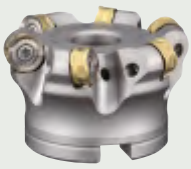
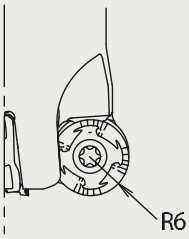
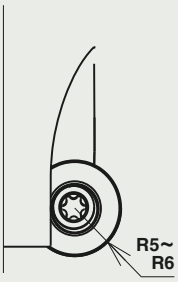
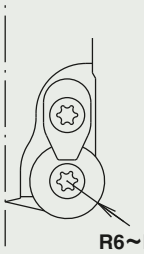
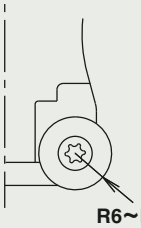
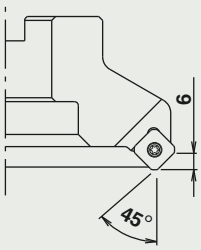
Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
For hard-to-cut Material	TDM EXTREME EXTDMTYPE C130	G-Body  φ50~φ66		
Roughing for Turbine Blade	Blade Chipper TDMTYPE C134	 φ50, φ52		
Copy Milling on common & difficult to cut materials	Super Diemaster Standard type HDMTYPE C143	G-Body  φ50~φ63		
Copy Milling on common & difficult to cut materials	Super Diemaster Fine pitch type HDMTYPE C144	G-Body  φ50~φ80		
Face Milling	DIJET Mill 45 SSE45TYPE C250	G-Body  φ50~φ125		

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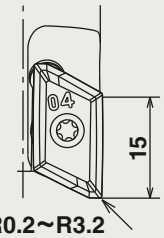
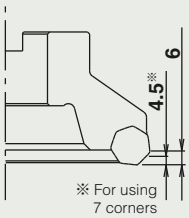
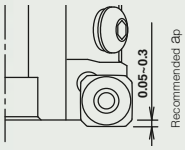
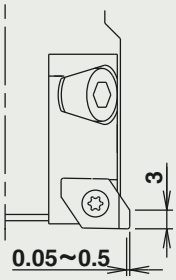
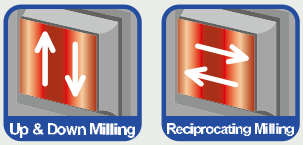
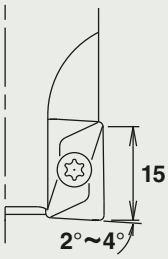
Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
Aerospace Tooling	Aero Chipper ALXTYPE C220	G-Body  φ50~φ63		
High Efficient Face Milling	Nega Hepta NHPTYPE C122	 φ63~φ250		
Super Finishing	Finish Jet Mill FJMTYPE C256	 φ80~φ250		
Up & Down Finishing	Back & Forth Cutter PFCTYPE C263	 φ50~φ80		
Shoulder Milling	Side Chipper SICTYPE C238	 φ50~φ125		

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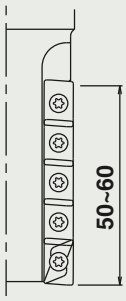
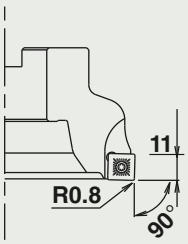
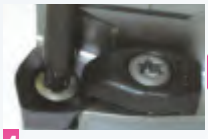
Type	Tool	Type and Range	Entering Angle/Max. ap	Applications
High Efficient Side Milling	Roughing Chipper RFCTYPE C246	G-Body  φ50~φ80		
Shoulder Milling	DIJET Mill 90 SSD90TYPE C254	G-Body  φ50~φ125		 
Milling Inserts	C266-C269			

Insert set up installation points of double clamping mechanism type

1 Clean the insert seat by brush or air blow before installing the insert, and remove the chips and dust completely. In that time, please confirm whether there is neither the deformation nor burr at insert seat.

2 Clean the insert itself.

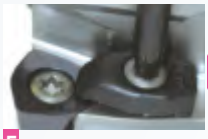
3 Please spread the attached Moly coat on the clamp screw.



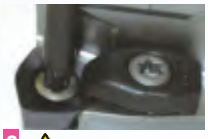
4 Fix the insert to insert seat and confirm.Tighten the clamp screw with torque wrench with specified torque as follows.

Recommended torque for clampscrew

Wrench size	Recommended torque
T15	3.6 N·m
T20	6.0 N·m



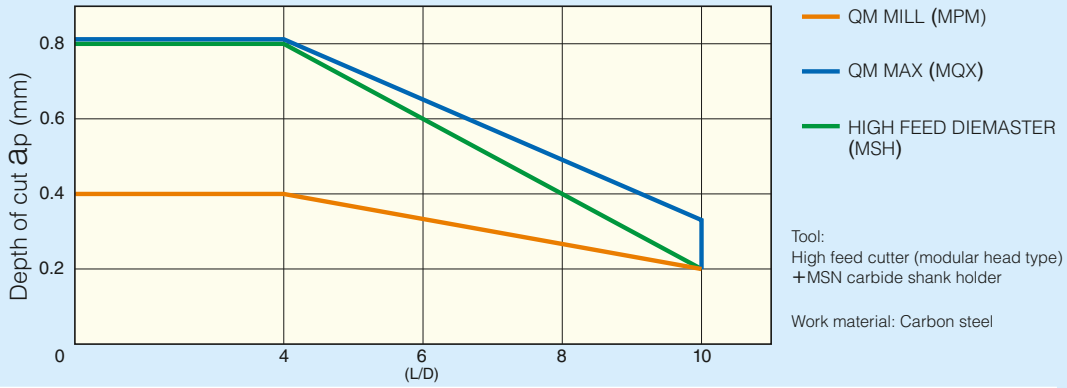
5 Confirm the insert is completely fixed, then tighten the screw for clamp set.
(The insert can be removed if the clamp set loosens even if it doesn't completely detach)



6 ⚠ **Make sure to fix the insert completely by tightening the clamp screw again.**

Guidelines to select the DIJET high feed cutters.

The relation between ap and L/D



▼ Point

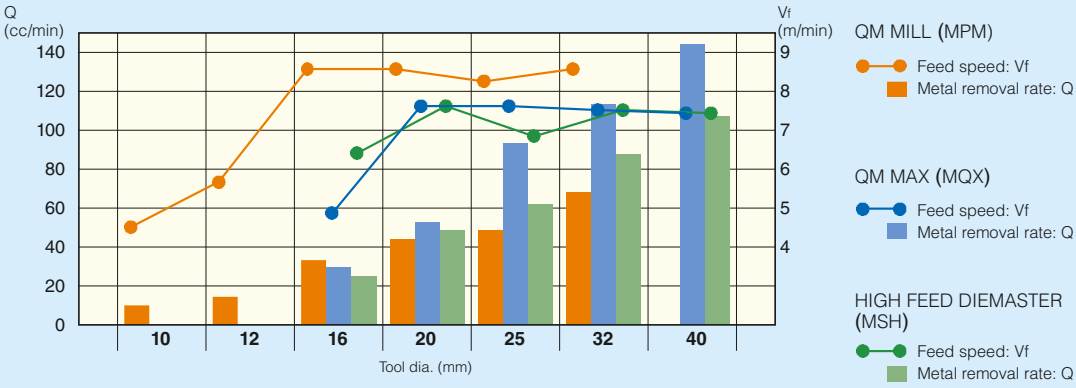
ap (Depth of cut: mm)

- In case of L/D=4 or below, QM MAX (MQX) or HIGH FEED DIEMASTER (MSH) are able to cut deeply at ap=0.8mm.
- In case of QM MILL (MPM), even if L/D is higher, there is no change in ap.

Machine

- In case machine does not have enough power or unrigid for higher L/D, we recommend to use QM MILL (MPM).

Metal removal rate



▼ Point

Metal removal rate

- In case of tool dia. φ16 or below, we recommend to use QM MILL (MPM).
- In case of tool dia. φ16 -φ40, we recommend to use QM MAX (MQX).

Machine

- In case of machining by small machine (BT40 or below), we recommend to use QM MILL (MPM).
- In case of moderate speed machine (Vf≦10m/min), we recommend to use QM MAX (MQX).
- In case of low speed machine (Vf≦6m/min), we recommend to use HIGH FEED DIEMASTER (MSH).

SKS G II

SKG TYPE

Feature of product

"SKS-G II" SKG / MSG type, innovative high feed cutter achieved extremely excellent chip removal rate!

Features 1

Applicable to deep cutting of mold material or high feed machine aircraft parts that made of titanium alloy & stainless steel.

Features 2

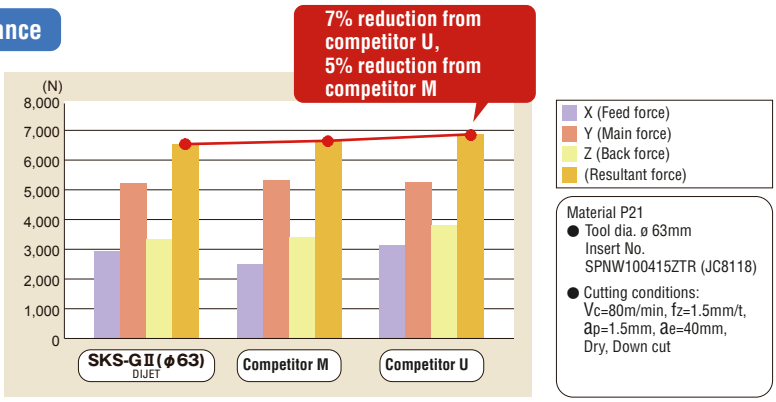
Adopted low cutting force & economical 4 corners positive insert, achieved stable high feed machining.

Features 3

Large ap machining is possible.
(Max. ap=1.5mm in case of using insert 10-type & Max.ap=2.5mm in case of using 14-type insert)

Cutting performance

Cutting force comparison



Material P21
- Tool dia. ø 63mm
  Insert No.
  SPNW100415ZTR (JC8118)
- Cutting conditions:
  Vc=80m/min, fz=1.5mm/t,
  ap=1.5mm, ae=40mm,
  Dry, Down cut

SKS G II

SKG TYPE

Features 4

3 insert grades "JC8118", "JC8050" & "JC7550" can be widely applied from general & mold steel to hard-to-cut materials such as high hardened die steel, titanium alloy & stainless steel.

JC 8118
For mold steel more than 38HRC &high hardened die steel less than 50HRC.

JC 8050
For general & mold steel less than 36HRC.

JC 7550
For titanium alloy & stainless steel.

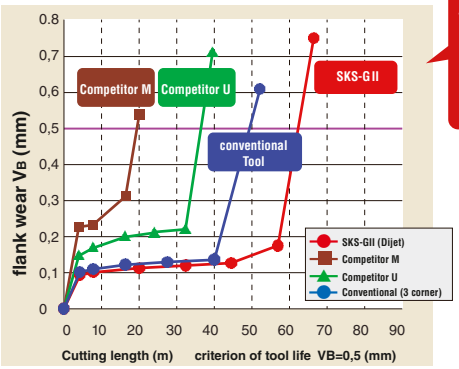
Application

ISO	P					M					K				S				H		
	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	S01	S10	S20	S30	H01	H10	H20
Applicable range		JC8118										JC8118								JC8118	
				JC8050																	
									JC7550								JC7550				

Features 5

Large chip pocket achieved excellent chip removal.

Tool life comparison



SKS-GII achieved 3.2 times longer tool life compared with competitor M, 1.8 times longer compared with competitor U, and 1.2 times longer compared with conventional tool.

(32HRC)
Material: P20

- Tool dia. ø 63mm
  Insert No.
  SPNW100415ZTR (JC8118)
- Cutting conditions:
  Vc=150m/min, fz=1mm/t,
  ap=1.5mm, ae=37.5mm,
  Air blow, Down cut,
  Test by one insert

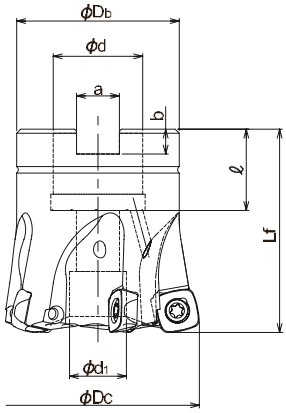
SKS G II

SKG TYPE

G-Body

Through Coolant Hole

■ FACE MILL TYPE (Insert 10-type)



■ BODY

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Set Bolt		Weight (kg)
Metric Bore	SKG-4050R-10-22	●	4	**50**	50	40	22	14	10.4	6.3	20	M10x1.5x35*	Head cap screw (Slim Head)	0.3
	SKG-5050R-10-22	●	5	**50**	50	40	22	14	10.4	6.3	20	M10x1.5x35*		0.3
	SKG-5052R-10-22	●	5	**52**	50	42	22	16.6	10.4	6.3	20	M10	Head cap screw (JIS Standard)	0.3
	SKG-5063R-10-22	□	5	**63**	50	48	22	17	10.4	6.3	20	M10		0.5
	SKG-5063R-10-27	□	5	**63**	50	48	27	20	12.4	7	22	M12x1.75x30*		0.5
	SKG-6063R-10-22	●	6	**63**	50	48	22	17	10.4	6.3	20	M10		0.5
	SKG-6063R-10-27	●	6	**63**	50	48	27	20	12.4	7	22	M12x1.75x30*		0.5
	SKG-6066R-10-27	●	6	**66**	50	50	27	20	12.4	7	22	M12x1.75x30*		0.6
	SKG-6080R-10-27	●	6	**80**	50	60	27	20	12.4	7	22	M12x1.75x30*		0.9

Applicable inserts

SPNW10**
SPET10**
SPMT10**

Parts

Clamp screw

TSW-3509H

Wrench

A-15T

Note) 1. All cutters are supplied without inserts.
2. ★ mark shows: these cutter bodies are equipped with the set bolt because of the specified bolt size.
Except for these cutter bodies, please use the set bolt equipped with arbor.
3. Set bolt (M10x1.5x35*) is slim head type with Ø13 head dia.

Modular Head Type Please refer Page B024

Clamp Screw	Recommended Torque (N·m)
TSW-3509H	3.0

G-Body

Adopted GN surface-hardening treatment on thermal resistant high strength steel gives high hardness over 65HRC and secure insert pocket and holder against thermal deformation, improved body durability and tool life by 30% or more. Make it difficult to be damaged even under severe cutting conditions. Also rust-proof and anti-welding effect is much improved.

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

SKS G II

SKGTYPE

■ Insert 10-type

Fig.1 SPNW100415ZTR

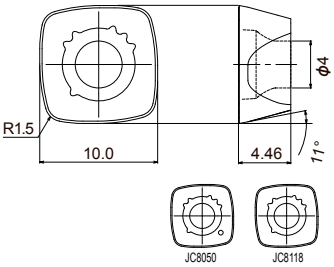


Fig.2 SPET100415ZPER-SM

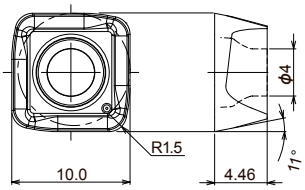
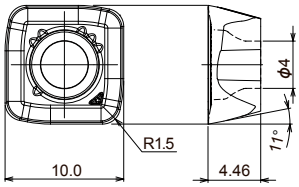


Fig.3 SPMT100415ZPER-SM



Cat. No.	Tolerance	PVD coated			Fig.
		JC7550	JC8050	JC8118	
SPNW100415ZTR	N		●	●	1
SPET100415ZPER-SM	E	●			2
SPMT100415ZPER-SM	M	●			3
SPMT100415ZPTR-PM	M			●	

10 inserts per case.

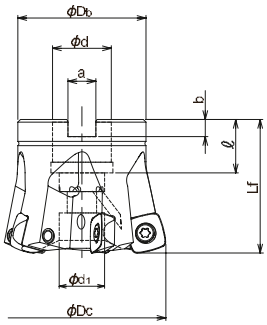
SKS G II

SKG TYPE

G-Body

■ FACE MILL TYPE (Insert 14-type)

Fig.1 Through Coolant Hole



■ BODY

Type	Cat. No.	Stock	No. of inserts	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Set Bolt		Weight (kg)	Fig.
Metric Bore	SKG-4050R-14-22	●	4	**50**	50	40	22	9.6	10.4	6.3	19.05	M10x1.5x35*	Head cap screw (Slim Head)	0.3	1
	SKG-4052R-14-22	●	4	**52**	50	42	22	17	10.4	6.3	19.05	M10x1.5x35*		0.3	1
	SKG-4063R-14-22	●	4	**63**	50	48	22	17	10.4	6.3	20	M10	Head cap screw (JIS Standard)	0.5	1
	SKG-4063R-14-27	●	4	**63**	50	48	27	20	12.4	7	22	M12x1.75x35*		0.5	1
	SKG-5066R-14-27	●	5	**66**	50	50	27	20	12.4	7	22	M12x1.75x35*		0.5	1
	SKG-5080R-14-27	●	5	**80**	50	60	27	37	12.4	7	22	M12x1.75x35*		0.8	1
	SKG-6100R-14-32	●	6	**100**	63	70	32	45	14.4	8	25	M16		1.6	1

Applicable inserts: SPNW 140515ZTR

Parts: Clamp screw

CSW-513H

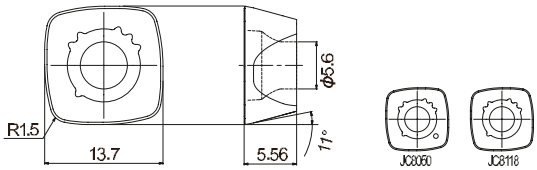
Wrench

A-20

Note) 1. All cutters are supplied without inserts.
2. * mark shows: these cutter bodies are equipped with the set bolt because of the specified bolt size.
Except for these cutter bodies, please use the set bolt equipped with arbor.
3. Set bolt (M10×1.5×35) is slim head type with Ø13 head dia.

Clamp Screw	Recommended Torque (N·m)
CSW-513H	5.5

■ Insert 14-type



Cat. No.	Tolerance	PVD coated JC8050	PVD coated JC8118
SPNW140515ZTR	N	●	●

10 inserts per case.

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

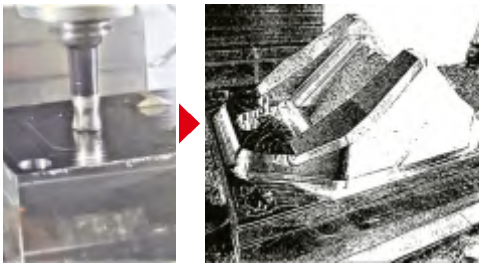
SKS G II

SKGTYPE

■ CUTTING DATA

1. High feed machining on mold steel (Insert 10-type)

Overhung length: 130mm
Contouring & slotting



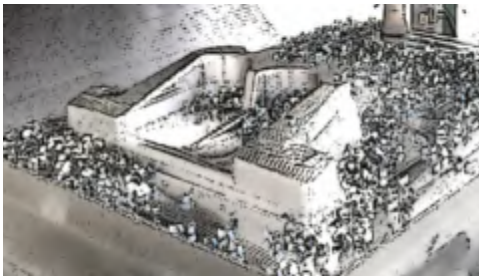
Result

Achieved high metal removal rate (Q=126cm³/min) by 1.8 times compared with competitor's tool. And finished all the job with one corner, no wear or breakage, with a contact time of 3h 40min.

Work	Part name	Plastic mold
	Material	Mold steel (1.2311)
	Hardness	32-34HRC
Tool	Tool No.	MSG-3032-10-M16
	Insert No.	SPNW100415ZTR, JC8118
Cutting conditions	Cutting speed Vc, (n)	201m/min (2,000min^{-1})
	Feed speed Vf, (fz)	6,300mm/min (1.1mm/t)
	ap (mm)	0.8mm
	ae (mm)	25mm
	Coolant	Air blow
	Machine	Vertical MC

2. High feed machining on mold steel (Insert 14-type)

Overhung length: 220mm



Result

Achieved high metal removal rate (Q=330cm³/min) by 1.2 times compared with competitor's tool. And able to machine about 3 hours per 1 corner.

Work	Part name	Plasticmold
	Material	Mold steel (1.2738)
	Hardness	36HRC
Tool	Tool No.	SKG-6080R-14-27
	Insert No.	SPNW140515ZTR, JC8118
Cutting conditions	Cutting speed Vc, (n)	140m/min, (560min^{-1})
	Feed speed Vf, (fz)	4,000mm/min, (1.2mm/t)
	ap (mm)	1.5mm
	ae (mm)	55mm
	Coolant	Air blow
	Machine	Vertical MC

3. High efficient machining on Ti-alloy (Insert 10-type)

Overhung length: 110mm

Result

Machining test piece shaped like aircraft parts. No chatter & smooth cutting, and achieved good chip removal.

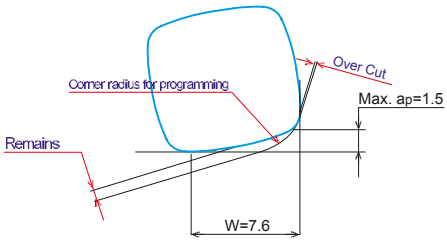
Work	Part name	Test piece
	Material	Ti-6Al-4V
	Hardness	50HRC
Tool	Tool No.	MSG-3032-10-M16
	Insert No.	SPET100415ZPER-SM, JC7550
Cutting conditions	Cutting speed Vc, (n)	60m/min (597min^{-1})
	Feed speed Vf, (fz)	1,075mm/min (0.6mm/t)
	ap (mm)	1mm
	ae (mm)	12.8mm
	Coolant	Wet (internal)
	Machine	Vertical MC

SKS G II

SKG TYPE

■ Definition of corner shape for programming

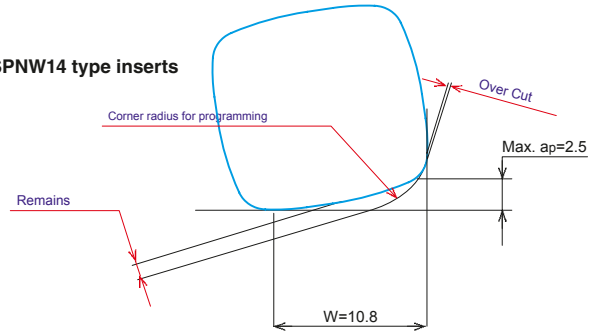
● SPNW10 / SPE(M)T type inserts



(mm)

Corner radius for programming	Over cut	Remains
R3.0	0	0.99
R3.0 (Standard)	0	0.84
R3.5	0.09	0.71
R4.0	0.23	0.59

● SPNW14 type inserts

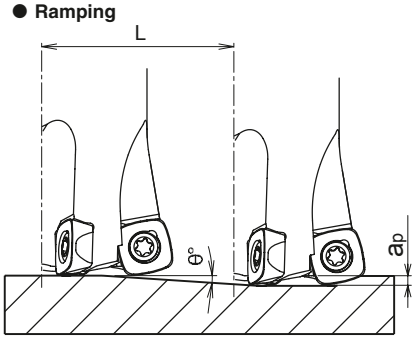


(mm)

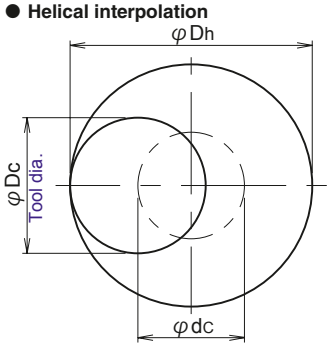
Corner radius for programming	Over cut	Remains
R3.5	0	1.60
R4.0 (Standard)	0	1.46
R4.5	0.06	1.32
R5.0	0.17	1.19

■ Attention for profile milling

● Ramping



● Helical interpolation



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circuit should not exceed max. depth of cut *ap*.

● Down cutting is recommended, so tool pass rotation should be counterclockwise.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Max. depth of cut ap (mm)	Ramping		Helical interpolation	
				Max.ramping angle θ°	Total cutting length L(mm) at max. ap	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)
SKG-*050R-10	50	34.8	1.5	1°	95.5	86	98
SKG-5052R-10	52	36.8	1.5	1°	95.5	90	102
SKG-*063R-10	63	47.8	1.5	0°45'	127.3	112	124
SKG-6066R-10	66	50.8	1.5	0°45'	127.3	118	130
SKG-6080R-10	80	64.8	1.5	0°30'	191	146	158
SKG-4050R-14	50	28.4	2.5	1°	143.2	80	98
SKG-4052R-14	52	30.4	2.5	1°	143.2	84	102
SKG-*063R-14	63	41.4	2.5	0°45'	191	106	124
SKG-5066R-14	66	44.4	2.5	0°45'	191	112	130
SKG-5080R-14	80	58.4	2.5	0°30'	286.5	140	158
SKG-6100R-14	100	78.4	2.5	0°20'	430	180	198
SKG-6125R-14	125	123.4	2.5	0°20'	430	230	248
SKG-7160R-14	160	138.4	2.5	0°15'	573	300	318

SKS G II

SKG TYPE

■ RECOMMENDED CUTTING CONDITIONS

● Facemill type (Insert 10-type)

Work Materials	Insert Grades	Tool dia. (mm) 50 No. of teeth 5N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	50/52 No. of teeth 5N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (C50,C55) Below 250HB	JC8050 (JC8118) SPNW10	~150	1.5	~32	1,020	7,340	~150	1.5	~32	1,020	9,180
		200	1.2	~32	1,020	7,340	200	1.5	~32	1,020	9,180
		250	0.8	~32	890	5,340	250	1.2	~32	890	6,680
		300	0.6	~32	830	4,980	300	1	~32	830	6,230
		350	0.5	~32	830	4,650	350	0.5	~32	830	5,810
Die steel (1.2344,1.2379) Below 255HB	JC8050 (JC8118) SPNW10	~150	1.5	~32	1,020	7,340	~150	1.5	~32	1,020	9,180
		200	1.2	~32	1,020	7,340	200	1.5	~32	1,020	9,180
		250	0.8	~32	890	5,340	250	1.2	~32	890	6,680
		300	0.6	~32	830	4,980	300	1	~32	830	6,230
		350	0.5	~32	830	4,650	350	0.5	~32	830	5,810
Mold steel (1.2311,P20) 30-36HRC	JC8050 (JC8118) SPNW10	~150	1.5	~32	1,020	7,340	~150	1.5	~32	1,020	9,180
		200	1.2	~32	1,020	7,340	200	1.5	~32	1,020	9,180
		250	0.8	~32	890	5,340	250	1.2	~32	890	6,680
		300	0.6	~32	830	4,980	300	1	~32	830	6,230
		350	0.5	~32	830	4,650	350	0.5	~32	830	5,810
Mold steel (1.2311,P21) 38-43HRC	JC8118 (JC8050) SPNW10	~150	1.2	~32	700	4,200	~150	1.2	~32	700	5,250
		200	1	~32	700	4,200	200	1.2	~32	700	5,250
		250	0.7	~32	640	3,840	250	1	~32	640	4,800
		300	0.6	~32	510	2,860	300	0.5	~32	510	3,570
		350	–	–	–	–	350	–	–	–	–
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118 SPNW10	~150	1	~32	640	3,580	~150	1	~32	640	4,480
		200	0.8	~32	640	3,330	200	0.8	~32	640	4,160
		250	0.6	~32	640	3,070	250	0.6	~32	640	3,840
		300	–	–	–	–	300	–	–	–	–
		350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118 SPNW10	~150	1.5	~32	1,150	8,280	~150	1.5	~32	1,150	10,350
		200	1.5	~32	1,150	8,280	200	1.5	~32	1,150	10,350
		250	1.2	~32	1,150	6,900	250	1.2	~32	1,150	8,630
		300	0.8	~32	1,020	6,120	300	0.8	~32	1,020	7,650
		350	0.5	~32	1,020	6,120	350	0.5	~32	1,020	7,650
Stainless steel Below 250HB	JC7550 SPET10 SPMT10	~150	1	~32	950	4,940	~150	1	~32	950	6,180
		200	1	~32	950	4,940	200	1	~32	950	6,180
		250	0.8	~32	830	3,980	250	0.8	~32	830	4,980
		300	0.6	~32	760	3,040	300	0.6	~32	760	3,800
		350	0.4	~32	640	2,560	350	0.4	~32	640	3,200
Titanium alloy (Ti-6Al-4V)	JC7550 SPET10 SPMT10	~150	1	~32	380	910	~150	1	~32	380	1,140
		200	0.8	~32	380	910	200	0.8	~32	380	1,140
		250	0.6	~32	380	760	250	0.6	~32	380	950
		300	0.4	~32	380	610	300	0.4	~32	380	760
		350	–	–	–	–	350	–	–	–	–

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS G II

SKG TYPE

■ RECOMMENDED CUTTING CONDITIONS

● Facemill type (Insert 10-type)

Work Materials	Insert Grades	Tool dia. (mm)														
		63					63/66					80				
		No. of teeth 5N					No. of teeth 6N					No. of teeth 6N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (C50,C55) Below 250HB	JC8050 (JC8118) SPNW10	~150	1.5	~44	810	7,290	~150	1.5	~44	810	8,750	~150	1.5	~60	640	6,910
		200	1.5	~44	810	7,290	200	1.5	~44	810	8,750	200	1.5	~60	640	6,910
		250	1.2	~44	710	5,330	250	1.2	~42	710	6,390	250	1.2	~55	560	5,040
		300	1	~44	660	4,950	300	1	~42	660	5,940	300	1	~55	520	4,680
		350	0.5	~44	660	4,620	350	0.5	~42	660	5,540	350	0.5	~55	520	4,370
Die steel (1.2344,1.2379) Below 255HB	JC8050 (JC8118) SPNW10	~150	1.5	~44	810	7,290	~150	1.5	~44	810	8,750	~150	1.5	~60	640	6,910
		200	1.5	~44	810	7,290	200	1.5	~44	810	8,750	200	1.5	~60	640	6,910
		250	1.2	~44	710	5,330	250	1.2	~42	710	6,390	250	1.2	~55	560	5,040
		300	1	~44	660	4,950	300	1	~42	660	5,940	300	1	~55	520	4,680
		350	0.5	~44	660	4,620	350	0.5	~42	660	5,540	350	0.5	~55	520	4,370
Mold steel (1.2311,P20) 30-36HRC	JC8050 (JC8118) SPNW10	~150	1.5	~44	810	7,290	~150	1.5	~44	810	8,750	~150	1.5	~60	640	6,910
		200	1.5	~44	810	7,290	200	1.5	~44	810	8,750	200	1.5	~60	640	6,910
		250	1.2	~44	710	5,330	250	1.2	~42	710	6,390	250	1.2	~55	560	5,040
		300	1	~44	660	4,950	300	1	~42	660	5,940	300	1	~55	520	4,680
		350	0.5	~44	660	4,620	350	0.5	~42	660	5,540	350	0.5	~55	520	4,370
Mold steel (1.2311,P21) 38-43HRC	JC8118 (JC8050) SPNW10	~150	1.2	~44	560	4,200	~150	1.2	~44	560	5,040	~150	1.2	~60	440	3,960
		200	1.2	~44	560	4,200	200	1.2	~44	560	5,040	200	1.2	~60	440	3,960
		250	1	~44	510	3,830	250	1	~42	510	4,590	250	1	~55	400	3,600
		300	0.5	~44	400	2,800	300	0.5	~42	400	3,360	300	0.5	~55	320	2,690
		350	–	–	–	–	350	–	–	–	–	350	–	–	–	–
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118 SPNW10	~150	1	~44	510	3,570	~150	1	~44	510	4,280	~150	1	~60	400	3,360
		200	0.8	~44	510	3,320	200	0.8	~44	510	3,980	200	0.8	~60	400	3,120
		250	0.6	~44	510	3,060	250	0.6	~42	510	3,670	250	0.6	~55	400	2,880
		300	–	–	–	–	300	–	–	–	–	300	–	–	–	–
		350	–	–	–	–	350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118 SPNW10	~150	1.5	~44	910	8,190	~150	1.5	~44	910	9,830	~150	1.5	~60	720	7,780
		200	1.5	~44	910	8,190	200	1.5	~44	910	9,830	200	1.5	~60	720	7,780
		250	1.2	~44	910	6,830	250	1.2	~42	910	8,190	250	1.2	~55	720	6,480
		300	0.8	~44	810	6,080	300	0.8	~42	810	7,290	300	0.8	~55	640	5,760
		350	0.5	~44	810	6,080	350	0.5	~42	810	7,290	350	0.5	~55	640	5,760
Stainless steel Below 250HB	JC7550 SPET10 SPMT10	~150	1.2	~44	760	5,320	~150	1.2	~44	760	6,380	~150	1.2	~60	600	5,040
		200	1	~44	760	4,940	200	1	~44	760	5,930	200	1	~60	600	4,680
		250	0.8	~44	660	3,960	250	0.8	~42	660	4,750	250	0.8	~55	520	3,740
		300	0.6	~44	610	3,050	300	0.6	~42	610	3,660	300	0.6	~55	480	2,880
		350	0.5	~44	510	2,550	350	0.5	~42	510	3,060	350	0.5	~55	400	2,400
Titanium alloy (Ti-6Al-4V)	JC7550 SPET10 SPMT10	~150	1	~44	300	900	~150	1	~44	300	1,080	~150	1	~60	240	860
		200	0.8	~44	300	900	200	0.8	~44	300	1,080	200	0.8	~60	240	860
		250	0.6	~44	300	750	250	0.6	~42	300	900	250	0.6	~55	240	720
		300	0.4	~44	300	600	300	0.4	~42	300	720	300	0.4	~55	240	580
		350	–	–	–	–	350	–	–	–	–	350	–	–	–	–

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS G II

SKG TYPE

■ RECOMMENDED CUTTING CONDITIONS

● Facemill type (Insert 14-type)

Work Materials	Insert Grades	Tool dia. (mm)									
		50/52					63				
		No. of teeth 4N					No. of teeth 4N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (C50,C55) Below 250HB	JC8050 (JC8118) SPNW14	~150	2	~28	890	6,410	~150	2	~40	710	5,110
		200	1.8	~28	890	6,410	200	1.8	~40	710	5,110
		250	1.5	~28	830	4,980	250	1.5	~40	660	3,960
		300	0.8	~28	760	4,560	300	0.8	~40	610	3,660
		350	0.6	~28	640	3,580	350	0.6	~40	510	2,860
Die steel (1.2344,1.2379) Below 255HB	JC8050 (JC8118) SPNW14	~150	2	~28	890	6,410	~150	2	~40	710	5,110
		200	1.8	~28	890	6,410	200	1.8	~40	710	5,110
		250	1.5	~28	830	4,980	250	1.5	~40	660	3,960
		300	0.8	~28	760	4,560	300	0.8	~40	610	3,660
		350	0.6	~28	640	3,580	350	0.6	~40	510	2,860
Mold steel (1.2311,P20) 30-36HRC	JC8050 (JC8118) SPNW14	~150	2	~28	890	6,410	~150	2	~40	710	5,110
		200	1.8	~28	890	6,410	200	1.8	~40	710	5,110
		250	1.5	~28	830	4,980	250	1.5	~40	660	3,960
		300	0.8	~28	760	4,560	300	0.8	~40	610	3,660
		350	0.6	~28	640	3,580	350	0.6	~40	510	2,860
Mold steel (1.2311,P21) 38-43HRC	JC8118 (JC8050) SPNW14	~150	1.6	~28	640	3,840	~150	1.6	~40	510	3,060
		200	1.4	~28	640	3,840	200	1.4	~40	510	3,060
		250	1.2	~28	640	3,840	250	1.2	~40	510	3,060
		300	0.7	~28	510	2,860	300	0.7	~40	400	2,240
		350	–	–	–	–	350	–	–	–	–
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118 SPNW14	~150	1	~28	570	2,740	~150	1	~40	450	2,160
		200	1	~28	570	2,280	200	1	~40	450	1,800
		250	0.8	~28	570	1,820	250	0.8	~40	450	1,440
		300	0.5	~28	450	1,260	300	0.5	~40	350	980
		350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118 SPNW14	~150	2	~28	1,150	8,280	~150	2	~40	910	6,550
		200	1.8	~28	1,150	8,280	200	1.8	~40	910	6,550
		250	1.5	~28	1,150	6,900	250	1.5	~40	910	5,460
		300	0.8	~28	1,020	6,120	300	0.8	~40	810	4,860
		350	0.6	~28	1,020	5,710	350	0.6	~40	810	4,540

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS G II

SKG TYPE

■ RECOMMENDED CUTTING CONDITIONS

● Facemill type (Insert 14-type)

Work Materials	Insert Grades	Tool dia. (mm)									
		66					80				
		No. of teeth 5N					No. of teeth 5N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (C50,C55) Below 250HB	JC8050 (JC8118) SPNW14	~150	2	~44	680	6,120	~150	2	~56	600	5,400
		200	1.8	~44	680	6,120	200	1.8	~56	600	5,400
		250	1.5	~44	630	4,730	250	1.5	~56	560	4,200
		300	0.8	~44	580	4,350	300	0.8	~56	520	3,900
		350	0.6	~44	480	3,360	350	0.6	~56	440	3,080
Die steel (1.2344,1.2379) Below 255HB	JC8050 (JC8118) SPNW14	~150	2	~44	680	6,120	~150	2	~56	600	5,400
		200	1.8	~44	680	6,120	200	1.8	~56	600	5,400
		250	1.5	~44	630	4,730	250	1.5	~56	560	4,200
		300	0.8	~44	580	4,350	300	0.8	~56	520	3,900
		350	0.6	~44	480	3,360	350	0.6	~56	440	3,080
Mold steel (1.2311,P20) 30-36HRC	JC8050 (JC8118) SPNW14	~150	2	~44	680	6,120	~150	2	~56	600	5,400
		200	1.8	~44	680	6,120	200	1.8	~56	600	5,400
		250	1.5	~44	630	4,730	250	1.5	~56	560	4,200
		300	0.8	~44	580	4,350	300	0.8	~56	520	3,900
		350	0.6	~44	480	3,360	350	0.6	~56	440	3,080
Mold steel (1.2311,P21) 38-43HRC	JC8118 (JC8050) SPNW14	~150	1.6	~44	480	3,600	~150	1.6	~56	400	3,000
		200	1.4	~44	480	3,600	200	1.4	~56	400	3,000
		250	1.2	~44	480	3,600	250	1.2	~56	400	3,000
		300	0.7	~44	390	2,730	300	0.7	~56	320	2,240
		350	–	–	–	–	350	–	–	–	–
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118 SPNW14	~150	1	~44	430	2,580	~150	1	~56	360	2,160
		200	1	~44	430	2,150	200	1	~56	360	1,800
		250	0.8	~44	430	1,720	250	0.8	~56	360	1,440
		300	0.5	~44	340	1,190	300	0.5	~56	280	980
		350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118 SPNW14	~150	2	~44	870	7,830	~150	2	~56	720	6,480
		200	1.8	~44	870	7,830	200	1.8	~56	720	6,480
		250	1.5	~44	870	6,530	250	1.5	~56	720	5,400
		300	0.8	~44	770	5,780	300	0.8	~56	640	4,800
		350	0.6	~44	770	5,390	350	0.6	~56	640	4,480

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS G II

SKG TYPE

■ RECOMMENDED CUTTING CONDITIONS

● Facemill type (Insert 14-type)

Work Materials	Insert Grades	Tool dia. (mm) 100 No. of teeth 6N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	125 No. of teeth 6N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (C50,C55) Below 250HB	JC8050 (JC8118) SPNW14	~150	2	~70	480	5,180	~150	2	~87	380	4,100
		200	1.8	~70	480	5,180	200	1.8	~87	380	4,100
		250	1.5	~70	450	4,050	250	1.5	~87	360	3,240
		300	0.8	~70	410	3,690	300	0.8	~87	330	2,970
		350	0.6	~70	350	2,940	350	0.6	~87	280	2,350
Die steel (1.2344,1.2379) Below 255HB	JC8050 (JC8118) SPNW14	~150	2	~70	480	5,180	~150	2	~87	380	4,100
		200	1.8	~70	480	5,180	200	1.8	~87	380	4,100
		250	1.5	~70	450	4,050	250	1.5	~87	360	3,240
		300	0.8	~70	410	3,690	300	0.8	~87	330	2,970
		350	0.6	~70	350	2,940	350	0.6	~87	280	2,350
Mold steel (1.2311,P20) 30-36HRC	JC8050 (JC8118) SPNW14	~150	2	~70	480	5,180	~150	2	~87	380	4,100
		200	1.8	~70	480	5,180	200	1.8	~87	380	4,100
		250	1.5	~70	450	4,050	250	1.5	~87	360	3,240
		300	0.8	~70	410	3,690	300	0.8	~87	330	2,970
		350	0.6	~70	350	2,940	350	0.6	~87	280	2,350
Mold steel (1.2311,P21) 38-43HRC	JC8118 (JC8050) SPNW14	~150	1.6	~70	320	2,880	~150	1.6	~87	250	2,250
		200	1.4	~70	320	2,880	200	1.4	~87	250	2,250
		250	1.2	~70	320	2,880	250	1.2	~87	250	2,250
		300	0.7	~70	250	2,100	300	0.7	~87	200	1,680
		350	–	–	–	–	350	–	–	–	–
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118 SPNW14	~150	1	~70	290	2,090	~150	1	~87	230	1,660
		200	1	~70	290	1,740	200	1	~87	230	1,380
		250	0.8	~70	290	1,390	250	0.8	~87	230	1,100
		300	0.5	~70	220	920	300	0.5	~87	180	760
		350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118 SPNW14	~150	2	~70	570	6,160	~150	2	~87	460	4,970
		200	1.8	~70	570	6,160	200	1.8	~87	460	4,970
		250	1.5	~70	570	5,130	250	1.5	~87	460	4,140
		300	0.8	~70	510	4,590	300	0.8	~87	410	3,690
		350	0.6	~70	510	4,280	350	0.6	~87	410	3,440

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS G II

SKG TYPE

■ RECOMMENDED CUTTING CONDITIONS

● Facemill type (Insert 14-type)

Work Materials	Insert Grades	Tool dia. (mm)									
		160									
		No. of teeth ZN									
		ℓ (mm)	ap (mm)	ae (mm)	n (min^{-1})	Vf (mm/min)					
Carbon steel (C50,C55) Below 250HB	JC8050 (JC8118) SPNW14	~150	2	~112	300	3,780					
		200	1.8	~112	300	3,780					
		250	1.5	~112	280	2,940					
		300	0.8	~112	260	2,730					
		350	0.6	~112	220	2,160					
Die steel (1.2344,1.2379) Below 255HB	JC8050 (JC8118) SPNW14	~150	2	~112	300	3,780					
		200	1.8	~112	300	3,780					
		250	1.5	~112	280	2,940					
		300	0.8	~112	260	2,730					
		350	0.6	~112	220	2,160					
Mold steel (1.2311,P20) 30-36HRC	JC8050 (JC8118) SPNW14	~150	2	~112	300	3,780					
		200	1.8	~112	300	3,780					
		250	1.5	~112	280	2,940					
		300	0.8	~112	260	2,730					
		350	0.6	~112	220	2,160					
Mold steel (1.2311,P21) 38-43HRC	JC8118 (JC8050) SPNW14	~150	1.6	~112	200	2,100					
		200	1.4	~112	200	2,100					
		250	1.2	~112	200	2,100					
		300	0.7	~112	160	1,570					
		350	–	–	–	–					
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118 SPNW14	~150	1	~112	180	1,510					
		200	1	~112	180	1,260					
		250	0.8	~112	180	1,010					
		300	0.5	~112	140	690					
		350	–	–	–	–					
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118 SPNW14	~150	2	~112	360	4,540					
		200	1.8	~112	360	4,540					
		250	1.5	~112	360	3,780					
		300	0.8	~112	320	3,360					
		350	0.6	~112	320	3,140					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

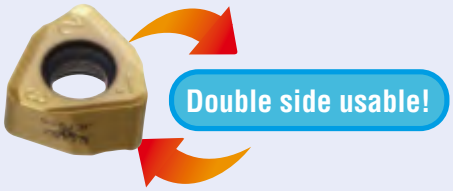
1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS Extreme

EXSKSTYPE

■ FEATURES

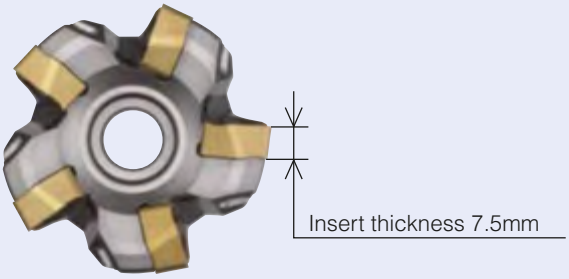
- Achieve high metal removal rate by double side 6 cutting edges insert



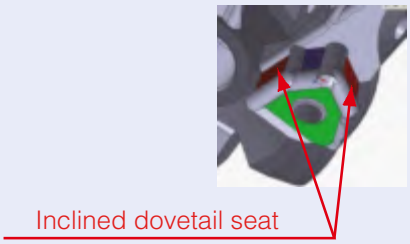
SKS Extreme

EXSKSTYPE

- **Insert thickness 7.5mm gives 1.5 times stronger than conventional tools.**



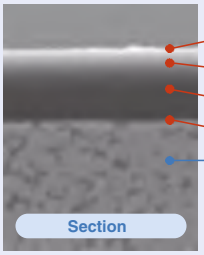
- **Inclined dovetail seat prevents movement of insert.**



- **Stable high feed machining is possible even in case of L/Dc>6.**

- **High efficient pocket milling by excellent ramping and helical interpolation.**

- **PVD coated grade <JC7560> against thermal shock**



Ti based nitride layer with excellent welding resistance and low friction
Al-Cr based nitride layer with oxidation and thermal resistance
Ti-Al based nitride layer with wear and thermal resistance
Adhesion layer
Substrate with thermal crack resistance and thermal shock resistance

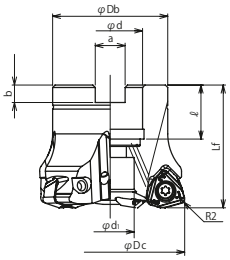
In case of rough milling, JC7560 improve heat fracture resistance and impact strength.

SKS Extreme

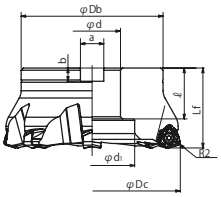
EXSKS TYPE

G-Body

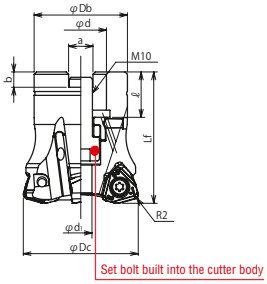
● Fig.1: Through coolant hole



● Fig. 2: Without coolant hole



● Fig. 3: Through coolant hole



■ BODY

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Set Bolt		Weight (kg)	Fig.
Metric Bore	**EXSKS-4050R-22**	●	4	**50**	55	40	22	9.6	10.4	6.3	19	M10x1.5x25*	Head cap screw (JIS Standard)	0.3	3
	EXSKS-4052R-22	●	4	**52**	50	40	22	17	10.4	6.3	20	M10		0.4	1
	EXSKS-5063R-22	●	5	**63**	50	48	22	17	10.4	6.3	20	M10		0.5	1
	EXSKS-5063R-27	●	5	**63**	50	48	27	20	12.4	7	22	M12x1.75x30*		0.5	1
	EXSKS-5066R-27	●	5	**66**	50	48	27	20	12.4	7	22	M12x1.75x30*		0.5	1
	EXSKS-6080R-27	●	6	**80**	55	65	27	37	12.4	7	22	M12		0.9	2
	EXSKS-7100R-32	●	7	**100**	55	85	32	45	14.4	8	32	M16	Clamp bolt	1.7	2
	EXSKS-8125R-40	●	8	**125**	55	100	40	60	16.4	9	35	M20		2.7	2
	EXSKS-9160R-40	●	9	**160**	55	100	40	85	16.4	9	35	M20		3.9	2

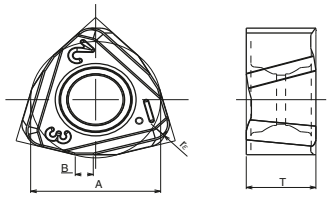
Note) 1. All cutters are supplied without inserts.
2. Please refer page C031-C032 for recommended cutting conditions.
3. * mark shows: these cutter bodies are equipped with the set bolt because of the specified bolt size.
Except for these cutter bodies, please use the set bolt equipped with arbor.

Clamp Screw	Recommended Torque (N·m)
CSW-513H	5.5

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

SKS Extreme EXSKS TYPE

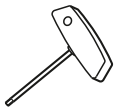
■ INSERTS



Cat. No.	Tolerance	Dimensions (mm)				PVD coated	
		A	T	B	r_ε	JC7560	JC8118
WNMU090720ZER-PM	**M**	14	7.66	1.94	2	●	●

10 inserts per case

■ PARTS

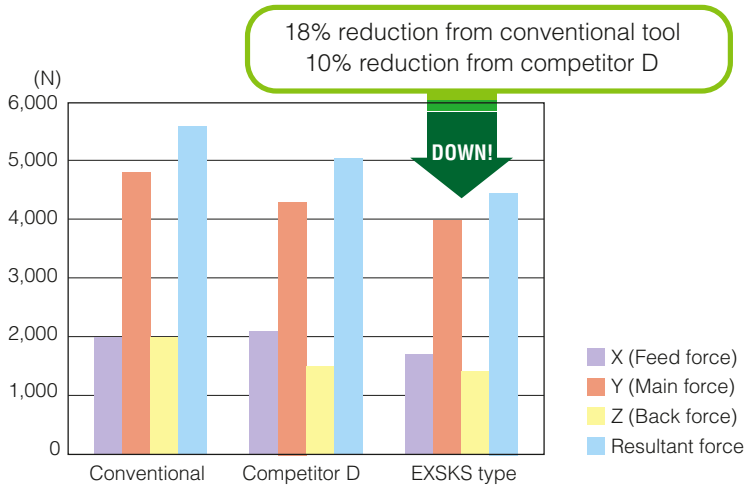
Clamp screw	Wrench
	
CSW-513H	A-20

■ CUTTING PERFORMANCE

Cutting Force Comparison

Cutting condition

Mat'l: S50C (C50)
Tool dia.: φ63mm
Vc=150m/min, fz=1.5mm/t
ap=1.5mm, ae=40mm

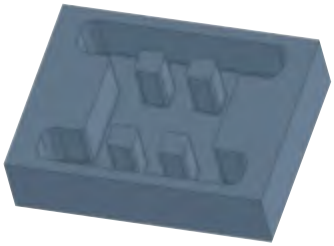


SKS Extreme EXSKSTYPE

■ CASE STUDIES

1. High feed machining on mold steel

Surface roughing



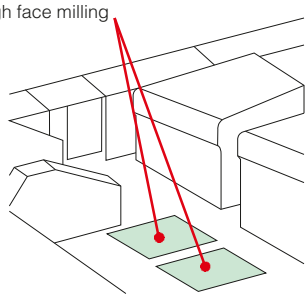
Work	Part name		Cavity mold
	Material		Mold steel (heat-treated)
	Hardness		30-34HRC
Tool	Tool No.		EXSKS-7100R
	Insert No.		WNMU090720ZER-PM (JC7560)
Cutting conditions	Cutting speed	n	325min^{-1}
		Vc	102m/min
	Feed speed	Vf	3,980mm/min
		fz	1.75mm/t
	ap (mm)		2.5mm
	ae (mm)		76mm
	Coolant		Dry
	Machine		Vertical MC (24kW)

Result

EXSKS achieved high metal removal rate (Q=756cm^3/min) by 2.4 times compared with conventional tool and showed normal wear after machining 80min.

2. High feed machining on die structure part

Rough face milling



Overhung length: 220mm

Work	Part name		Die structure part
	Material		FC350 (GG35)
	Hardness		-
Tool	Tool No.		EXSKS-6080R
	Insert No.		WNMU090720ZER-PM (JC7560)
Cutting conditions	Cutting speed	n	500min^{-1}
		Vc	125m/min
	Feed speed	Vf	5,000mm/min
		fz	1.66mm/t
	ap (mm)		3mm
	ae (mm)		47mm
	Coolant		Dry
	Machine		Double column MC

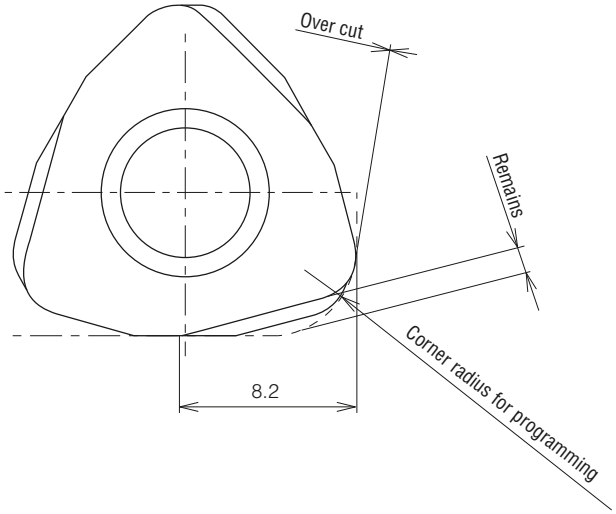
Result

No chatter, very smooth cutting. Achieved high metal removal rate by 1.9 times and longer tool life by 1.5 times compared with competitor D. Able to machining for 5 hours.

SKS Extreme

EXSKS TYPE

■ Definition of corner for programming

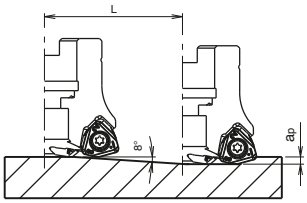


(mm)

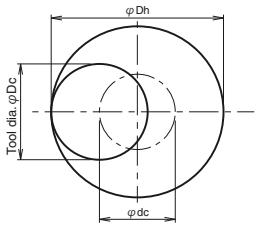
Corner radius for programming	Over cut	Remains
R3.0	0	1.41
R3.5	0	1.30
R4.0	0.025	1.19

■ Instructions for profile milling

● **Ramping**



● **Helical interpolation**



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circle should not exceed max. depth of cut *a*p.

● Down cutting is recommended.Tool pass rotation should be counter-clockwise.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
● In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
● Long continous chips may come out in case of drilling, confirm the safe cutting conditions.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Max. depth of cut ap (mm)	Ramping		Helical interpolation		Max. drilling depth (mm)
				Max.ramping angle θ°	Total cutting length L(m) at max. ap	Min. bore dia. *D*h min (mm)	Max. bore dia. *D*h max (mm)	
EXSKS-*050	50	33.7	3	2°24′	71.6	68	96	2
EXSKS-*052	52	35.7	3	2°24′	71.6	72	100	2
EXSKS-*063	63	46.7	3	3°	57.3	94	122	2
EXSKS-*066	66	49.7	3	2°42′	63.7	100	128	2
EXSKS-*080	80	63.6	3	2°18′	74.7	128	156	2
EXSKS-*100	100	83.6	3	1°42′	101.1	168	196	2
EXSKS-*125	125	108.5	3	1°18′	132.2	218	246	2
EXSKS-*160	160	143.5	3	1°	171.9	288	316	2

SKS Extreme

EXSKSTYPE

■ RECOMMENDED CUTTING CONDITIONS

Work materials	Grades	Tool dia. (mm)														
		50 /52					63 / 66					80				
		No of teeth 4N					No. of teeth 5N					No. of teeth 6N				
		ℓ (mm)	a_p (mm)	n (min⁻¹)	V_f (mm/min)	P_c (kW)	ℓ (mm)	a_p (mm)	n (min⁻¹)	V_f (mm/min)	P_c (kW)	ℓ (mm)	a_p (mm)	n (min⁻¹)	V_f (mm/min)	P_c (kW)
Carbon steel (C50,C55) Below 250HB	JC7560 (JC8118)	~150	2	950	7,600	12.4	~150	2	750	7,500	15.4	~150	2	600	7,200	18.7
		200	1.5	800	6,400	7.8	200	1.8	680	6,800	12.5	200	1.8	540	6,480	15.2
		250	1	650	3,900	3.2	250	1.5	600	6,000	9.2	250	1.8	480	5,760	13.5
		300	0.6	650	2,600	1.3	300	1	550	5,500	5.6	300	1.5	440	5,280	10.3
		350	—	—	—	—	350	0.6	550	4,125	2.5	350	1	440	5,280	6.9
		400	—	—	—	—	400	0.4	550	2,750	1.1	400	0.6	440	3,960	3.1
Die steel (1.2344,1.2379) Below 255HB	JC7560 (JC8118)	~150	2	950	7,600	12.4	~150	2	750	7,500	15.4	~150	2	600	7,200	18.7
		200	1.5	800	6,400	7.8	200	1.8	680	6,800	12.5	200	1.8	540	6,480	15.2
		250	1	650	3,900	3.2	250	1.5	600	6,000	9.2	250	1.8	480	5,760	13.5
		300	0.6	650	2,600	1.3	300	1	550	5,500	5.6	300	1.5	440	5,280	10.3
		350	—	—	—	—	350	0.6	550	4,125	2.5	350	1	440	5,280	6.9
		400	—	—	—	—	400	0.4	550	2,750	1.1	400	0.6	440	3,960	3.1
Mold steel (1.2311,P20) 30-36HRC	JC7560 (JC8118)	~150	2	830	6,640	12.3	~150	2	650	6,500	15.2	~150	2	520	6,240	18.5
		200	1.5	700	5,600	7.8	200	1.8	580	5,800	12.2	200	1.8	470	5,640	15.1
		250	1	570	3,420	3.2	250	1.5	520	5,200	9.1	250	1.8	420	5,040	13.5
		300	0.6	570	2,280	1.3	300	1	460	4,600	5.4	300	1.5	360	4,320	9.6
		350	—	—	—	—	350	0.6	460	3,450	2.4	350	1	360	4,320	6.4
		400	—	—	—	—	400	0.4	460	2,300	1.1	400	0.6	360	3,240	2.9
Mold steel (1.2311,P21) 38-43HRC	JC8118	~150	1.5	700	2,800	6.8	~150	1.5	550	2,750	8.4	~150	1.5	430	2,580	10.1
		200	1	600	2,400	3.9	200	1.2	500	2,500	6.1	200	1.2	390	2,340	7.3
		250	0.7	490	1,960	2.2	250	1	440	2,200	4.5	250	1.2	340	2,040	6.4
		300	0.4	490	980	0.6	300	0.7	380	1,900	2.7	300	1	300	1,800	4.7
		350	—	—	—	—	350	0.5	380	1,900	1.9	350	0.7	300	1,800	3.3
		400	—	—	—	—	400	—	—	—	—	400	0.4	300	1,800	1.9
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118	~150	1.5	510	2,040	6.6	~150	1.5	400	2,000	8.2	~150	1.5	320	1,920	10.0
		200	1	460	1,840	4.0	200	1.2	360	1,800	5.9	200	1.2	290	1,740	7.2
		250	0.7	420	1,680	2.5	250	1	320	1,600	4.4	250	1.2	260	1,560	6.5
		300	0.4	420	840	0.7	300	0.7	280	1,400	2.7	300	1	220	1,320	4.6
		350	—	—	—	—	350	0.5	280	1,400	1.9	350	0.7	220	1,320	3.2
		400	—	—	—	—	400	—	—	—	—	400	0.4	220	1,320	1.8
Grey cast iron (GG25, GG30) Below 300HB	JC8118 (JC7560)	~150	2.5	950	7,600	12.4	~150	2.5	750	7,500	15.4	~150	2.5	600	7,200	18.7
		200	2	800	6,400	8.3	200	2	680	6,800	11.1	200	2	540	6,480	13.5
		250	1.5	650	3,900	3.8	250	1.5	600	6,000	7.4	250	2	480	5,760	12.0
		300	1	650	2,600	1.7	300	1	550	5,500	4.5	300	1.5	440	5,280	8.2
		350	—	—	—	—	350	0.6	550	4,125	2.0	350	1	440	5,280	5.5
		400	—	—	—	—	400	0.4	550	2,750	0.9	400	0.6	440	3,960	2.5
Nodular cast iron (GGG50, GGG70) Below 300HB	JC8118	~150	2.5	950	7,600	12.4	~150	2.5	750	7,500	15.4	~150	2.5	600	7,200	18.7
		200	2	800	6,400	8.3	200	2	680	6,800	11.1	200	2	540	6,480	13.5
		250	1.5	650	3,900	3.8	250	1.5	600	6,000	7.4	250	2	480	5,760	12.0
		300	1	650	2,600	1.7	300	1	550	5,500	4.5	300	1.5	440	5,280	8.2
		350	—	—	—	—	350	0.6	550	4,125	2.0	350	1	440	5,280	5.5
		400	—	—	—	—	400	0.4	550	2,750	0.9	400	0.6	440	3,960	2.5
Stainless steel Below 250HB	JC7560	~150	2	950	5,700	14.8	~150	2	750	5,625	18.4	~150	2	600	5,400	22.5
		200	1.5	800	4,800	9.4	200	1.8	680	5,100	15.0	200	1.8	540	4,860	18.2
		250	1	650	2,600	3.4	250	1.5	600	4,500	11.1	250	1.8	480	4,320	16.2
		300	0.6	650	2,600	2.0	300	1	550	3,300	5.4	300	1.5	440	3,960	12.4
		350	—	—	—	—	350	0.6	550	2,750	2.7	350	1	440	3,168	6.6
		400	—	—	—	—	400	0.4	550	2,750	1.8	400	0.6	440	2,640	3.3

ℓ: Overhung length, a_p: Depth of cut, n: Spindle speed, V_f: Feed speed, P_c: Net power consumption

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

SKS Extreme

EXSKSTYPE

■ RECOMMENDED CUTTING CONDITIONS

Work materials	Grades	Tool dia. (mm)														
		100					125					160				
		No. of teeth 7N					No. of teeth 8N					No. of teeth 9N				
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel (C50,C55) Below 250HB	JC7560 (JC8118)	~150	2	480	6,720	21.8	~150	2	380	6,080	24.7	~150	2	300	5,400	28.1
		200	2	430	6,020	19.6	200	2	340	5,440	22.1	200	2	270	4,860	25.3
		250	2	380	5,320	17.3	250	2	300	4,800	19.5	250	2	240	4,320	22.5
		300	1.5	350	4,900	11.9	300	2	280	4,480	18.2	300	2	220	3,960	20.6
		350	1.5	350	4,900	11.9	350	1.5	280	4,480	13.7	350	2	220	3,960	20.6
		400	1	350	4,900	8.0	400	1.5	280	4,480	13.7	400	1.5	220	3,960	15.4
Die steel (1.2344,1.2379) Below 255HB	JC7560 (JC8118)	~150	2	480	6,720	21.8	~150	2	380	6,080	24.7	~150	2	300	5,400	28.1
		200	2	430	6,020	19.6	200	2	340	5,440	22.1	200	2	270	4,860	25.3
		250	2	380	5,320	17.3	250	2	300	4,800	19.5	250	2	240	4,320	22.5
		300	1.5	350	4,900	11.9	300	2	280	4,480	18.2	300	2	220	3,960	20.6
		350	1.5	350	4,900	11.9	350	1.5	280	4,480	13.7	350	2	220	3,960	20.6
		400	1	350	4,900	8.0	400	1.5	280	4,480	13.7	400	1.5	220	3,960	15.4
Mold steel (1.2311,P20) 30-36HRC	JC7560 (JC8118)	~150	2	410	5,740	21.3	~150	2	330	5,280	24.5	~150	2	260	4,680	27.8
		200	2	370	5,180	19.2	200	2	300	4,800	22.3	200	2	230	4,140	24.6
		250	2	330	4,620	17.2	250	2	260	4,160	19.3	250	2	210	3,780	22.5
		300	1.5	280	3,920	10.9	300	2	230	3,680	17.1	300	2	180	3,240	19.3
		350	1.5	280	3,920	10.9	350	1.5	230	3,680	12.8	350	2	180	3,240	19.3
		400	1	280	3,920	7.3	400	1.5	230	3,680	12.8	400	1.5	180	3,240	14.4
Mold steel (1.2311,P21) 38-43HRC	JC8118	~150	1.5	350	2,450	11.9	~150	1.5	280	2,240	13.7	~150	1.5	220	1,980	15.4
		200	1.5	310	2,170	10.6	200	1.5	250	2,000	12.2	200	1.5	200	1,800	14.0
		250	1.2	280	1,960	7.6	250	1.5	220	1,760	10.7	250	1.5	180	1,620	12.6
		300	1	250	1,750	5.7	300	1.5	200	1,600	9.8	300	1.5	150	1,350	10.5
		350	1	250	1,750	5.7	350	1	200	1,600	6.5	350	1.5	150	1,350	10.5
		400	0.7	250	1,750	4.0	400	1	200	1,600	6.5	400	1	150	1,350	7.0
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118	~150	1.5	250	1,750	11.4	~150	1.5	200	1,600	13.0	~150	1.5	160	1,440	15.0
		200	1.5	230	1,610	10.5	200	1.5	180	1,440	11.7	200	1.5	150	1,350	14.0
		250	1.2	200	1,400	7.3	250	1.5	160	1,280	10.4	250	1.5	130	1,170	12.2
		300	1	180	1,260	5.5	300	1.5	140	1,120	9.1	300	1.5	110	990	10.3
		350	1	180	1,260	5.5	350	1	140	1,120	6.1	350	1.5	110	990	10.3
		400	0.7	180	1,260	3.8	400	1	140	1,120	6.1	400	1	110	990	6.9
Grey cast iron (GG25, GG30) Below 300HB	JC8118 (JC7560)	~150	2.5	480	6,720	21.8	~150	2.5	380	6,080	24.7	~150	2.5	300	5,400	28.1
		200	2.5	430	6,020	19.6	200	2.5	340	5,440	22.1	200	2.5	270	4,860	25.3
		250	2	380	5,320	13.8	250	2.5	300	4,800	19.5	250	2.5	240	4,320	22.5
		300	2	350	4,900	12.7	300	2	280	4,480	14.6	300	2.5	220	3,960	20.6
		350	1.5	350	4,900	9.6	350	1.5	280	4,480	10.9	350	2	220	3,960	16.5
		400	1	350	4,900	6.4	400	1.5	280	4,480	10.9	400	1.5	220	3,960	12.4
Nodular cast iron (GGG50, GGG70) Below 300HB	JC8118	~150	2.5	480	6,720	21.8	~150	2.5	380	6,080	24.7	~150	2.5	300	5,400	28.1
		200	2.5	430	6,020	19.6	200	2.5	340	5,440	22.1	200	2.5	270	4,860	25.3
		250	2	380	5,320	13.8	250	2.5	300	4,800	19.5	250	2.5	240	4,320	22.5
		300	2	350	4,900	12.7	300	2	280	4,480	14.6	300	2.5	220	3,960	20.6
		350	1.5	350	4,900	9.6	350	1.5	280	4,480	10.9	350	2	220	3,960	16.5
		400	1	350	4,900	6.4	400	1.5	280	4,480	10.9	400	1.5	220	3,960	12.4
Stainless steel Below 250HB	JC7560	~150	2	480	5,040	26.2	~150	2	380	4,560	29.6	~150	2	300	4,050	33.7
		200	2	430	4,515	23.5	200	2	340	4,080	26.5	200	2	270	3,645	30.3
		250	2	380	3,990	20.7	250	2	300	3,600	23.4	250	2	240	3,240	27.0
		300	1.5	350	3,675	14.3	300	2	280	3,360	21.8	300	2	220	2,970	24.7
		350	1.5	350	3,675	14.3	350	1.5	280	3,360	16.4	350	2	220	2,970	24.7
		400	1	350	3,675	9.6	400	1.5	280	3,360	16.4	400	1.5	220	2,970	18.5

ℓ: Overhung length, ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

High Feed Diemaster SKSTYPE

■ FEATURES

■ **High efficient machining is possible with long overhung by controlling the cutting forces in case of deeper machining.**

- Positive axial rake (+8 degree): Over φ20mm
- Adopted new double clamp system
- 3 cutting edges economical insert

■ **10 type insert for severe interrupted cutting.**

- Larger size Inserts version for severe interrupted cutting and large size cutter.
- In case of over 250mm overhung length and severe interrupted cutting, recommend to use 10 type insert.

WDMW080520ZTR

WDMW10X620ZTR

08 type insert (left) & 10 type insert (right)

High Feed Diemaster SKS TYPE

G-Body

Standard Type

Fig.1 Through Coolant Hole

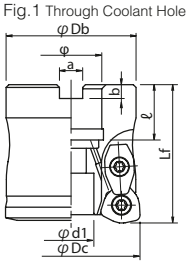


Fig.2 Without Coolant Hole

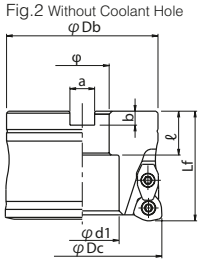
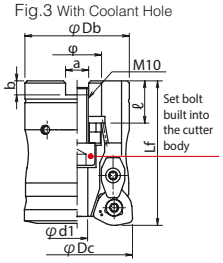


Fig.3 With Coolant Hole



■ BODY/FACE MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Weight (kg)	Applicable Inserts	Fig.
Metric Bore	SKS-3040R-06-16	●	3	40	45	37	16	14	8.4	5.6	18	0.3	WD※※06...	1
	SKS-3050R-08-22	●	3	50	50	47	22	16.5	10.4	6.3	20	0.4		1
	SKS-4050R-08-22	●	4	50	50	47	22	16.5	10.4	6.3	20	0.4		1
	SKS-4052R-08-22	●	4	52	50	47	22	17	10.4	6.3	20	0.4		1
	SKS-4063R-08-22	●	4	63	50	60	22	17	10.4	6.3	20	0.7	WD※※08...	1
	SKS-4063R-08-27	●	4	63	50	60	27	20	12.4	7	22	0.7		1
	SKS-4066R-08-27	●	4	66	50	61	27	20	12.4	7	22	0.7		1
	SKS-5080R-08-27	●	5	80	55	76	27	37	12.4	7	22	1.6		2
	SKS-6100R-08-32	●	6	100	55	96	32	45	14.4	8	32	1.9		2
	SKS-3050R-10-22	□	3	50	65	47	22	9.6	10.4	6.3	19	0.7		3
	SKS-4063R-10-22	●	4	63	50	60	22	17	10.4	6.3	20	0.5		1
	SKS-4063R-10-27	●	4	63	50	60	27	20	12.4	7	22	0.5		1
	SKS-5080R-10-27	●	5	80	55	76	27	37	12.4	7	22	1.4	WD※※10...	2
	SKS-6100R-10-32	●	6	100	55	96	32	45	14.4	8	32	1.7		2
	SKS-6125R-10-40	●	6	125	55	85	40	60	16.4	9	35	3.1		2
	SKS-7160R-10-40	●	7	160	55	120	40	85	16.4	9	35	4.6		2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C027-C032 for recommended cutting conditions.
3. In case of using double clamp type please refer page C009.

Modular Head Type Please refer Page B012

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

High Feed Diemaster SKS TYPE

G-Body Fine Pitch Type

Fig.1 Through Coolant Hole

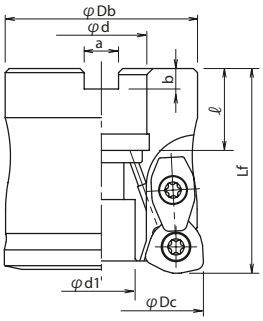
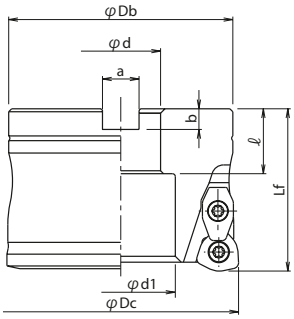


Fig.2 Without Coolant Hole



■ BODY/FACE MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Weight (kg)	Applicable Inserts	Fig.
Metric Bore	**SKS-5050R-06-22**	●	5	**50**	50	47	22	16.5	10.4	6.3	20	0.4	WD※※06...	1
	SKS-5052R-06-22	●	5	**52**	50	47	22	17	10.4	6.3	20	0.6	WD※※06...	1
	SKS-5063R-08-22	●	5	**63**	50	60	22	17	10.4	6.3	20	0.7	WD※※08...	1
	SKS-5063R-08-27	●	5	**63**	50	60	27	20	12.4	7	22	0.7	WD※※08...	1
	SKS-5066R-08-27	●	5	**66**	50	61	27	20	12.4	7	22	0.7	WD※※08...	1
	SKS-6080R-08-27	●	6	**80**	55	76	27	37	12.4	7	22	1.2	WD※※08...	2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C027-C032 for recommended cutting conditions.
3. In case of using double clamping mechanism type, please refer page C009.

Modular Head Type Please refer Page B012

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

High Feed Diemaster SKS TYPE

Through Coolant Hole

(φ16, φ17)

Fig.1

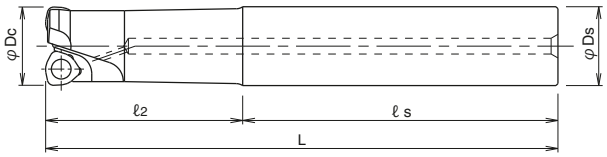
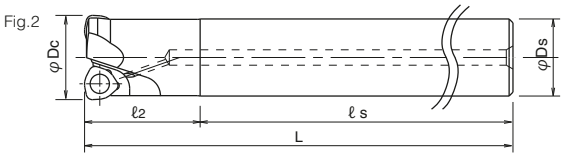


Fig.2



■ BODY/END MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	ℓ2	ℓs	L	φDs	Applicable Inserts	Fig.
Regular type	SKS-2016-20-S15	●	2	**16**	20	90	110	15	WO※※04...	2
	SKS-2016-50-S16	●	2	**16**	50	60	110	16		1
	SKS-2017-20-S16	●	2	**17**	20	90	110	16		2
	SKS-2020-50-S20	●	2	**20**	50	80	130	20	WD※※05...	1
	SKS-2021-50-S20	●	2	**21**	50	80	130	20		1
	SKS-2025-60-S25	●	2	**25**	60	80	140	25	WD※※06...	3
	SKS-2026-60-S25	●	2	**26**	60	80	140	25		3
	SKS-2032-70-S32	●	2	**32**	70	80	150	32	WD※※08...	3
	SKS-3032-70-S32	●	3	**32**	70	80	150	32	WD※※06...	3
Long type	SKS-2016-20L-S15	●	2	**16**	20	130	150	15	WO※※04...	2
	SKS-2016-70-S16	●	2	**16**	70	80	150	16		1
	SKS-2017-20L-S16	●	2	**17**	20	130	150	16		2
	SKS-2020-100-S20	●	2	**20**	100	80	180	20	WD※※05...	1
	SKS-2021-50L-S20	●	2	**21**	50	130	180	20		1
	SKS-2025-120-S25	●	2	**25**	120	80	200	25	WD※※06...	3
	SKS-2026-60L-S25	●	2	**26**	60	140	200	25		3

Note) 1. All cutters are supplied without inserts.
2. Please refer page C027-C029, C033-C034 for recommended cutting conditions.
3. In case of using double clamping mechanism type, please refer page C009.

Modular Head Type Please refer Page B012

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

High Feed Diemaster SKSTYPE

Through Coolant Hole

Fig.3

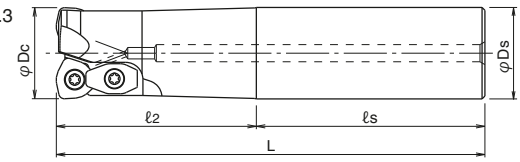
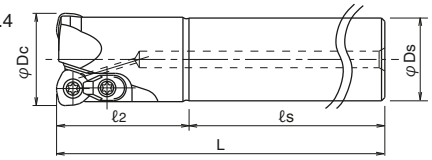


Fig.4



■ BODY/END MILL TYPE

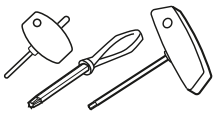
Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	ℓ2	ℓs	L	φDs	Applicable Inserts	Fig.
Long	**SKS-2032-120-S32**	●	2	**32**	120	80	200	32	WD※※08...	3
type	**SKS-3032-120-S32**	●	3	**32**	120	80	200	32	WD※※06...	3
	SKS-2020-130-S20	●	2	**20**	130	120	250	20	WD※※05...	1
	SKS-2021-50E-S20	□	2	**21**	50	200	250	20		1
Extra	**SKS-2025-180-S25**	●	2	**25**	180	120	300	25	WD※※06...	3
Long	**SKS-2026-60E-S25**	□	2	**26**	60	240	300	25		3
	SKS-2032-180-S32	□	2	**32**	180	120	300	32	WD※※08...	3
	SKS-3032-180-S32	●	3	**32**	180	120	300	32	WD※※06...	3

Note) 1. All cutters are supplied without inserts.
2. Please refer page C027-C029, C033-C034 for recommended cutting conditions.
3. In case of using double clamping mechanism type, please refer page C009.

Modular Head Type Please refer Page B012

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

■ PARTS

Applicable Inserts	Clamp screw	Clamp set	Wrench
			
WO※※04...	TSW-2556H	–	A-08SD
WD※※05...	DSW-306H	–	A-10
WD※※06...	CSW-408H	DCM-18	A-15T FaceMillType A-15 EndMillType
WD※※08...	DSW-4510H	DCM-17	A-20 FaceMillType A-20SD EndMillType
WD※※10...	DSW-4512H	DCM-17	A-20

Clamp Screw	Recommended Torque (N·m)
TSW-2556H	0.9
DSW-306H	1.8
CSW-408H	3.6
DSW-4510H	6.0
DSW-4512H	6.0

High Feed Diemaster SKSTYPE

■ INSERT WITHOUT CHIPBREAKER

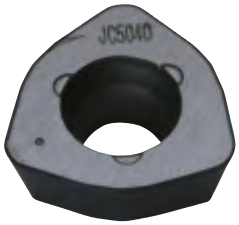


Fig.1

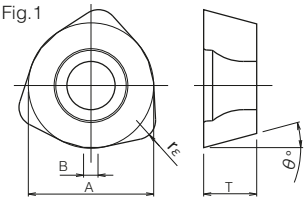


Fig.2

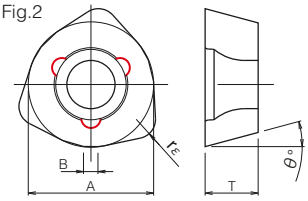


Fig.3

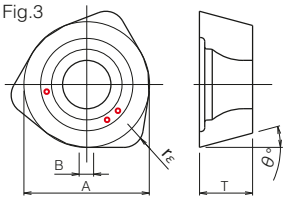


Fig.4

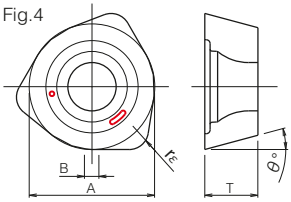


Fig.5

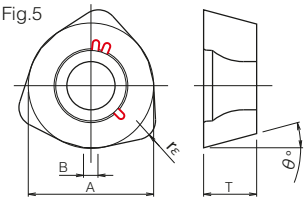


Fig.6

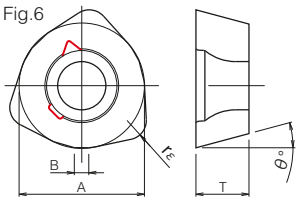


Fig.7

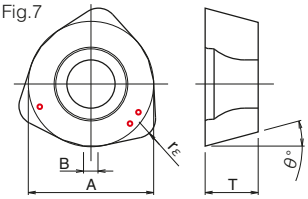
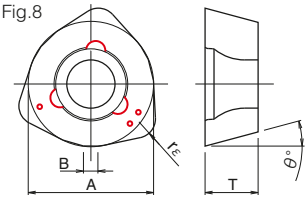


Fig.8



Cat.No.	Tolerance	Dimensions (mm)					PVD coated				
		A	T	B	rε	θ°	JC7560	JC8015	JC8050	JC8118	JC5040
WOMW04T215ZER		6.5	2.8	0.8	1.5	13	● Fig.1	● Fig.1	● Fig.1	●	● Fig.2
WDMW050316ZER		8	3.2	1	1.6	15			● Fig.4		
WDMW050316ZTR		8	3.2	1	1.6	15	● Fig.1	● Fig.1	● Fig.1	●	● Fig.2
WDMW06T320ZER		10	3.97	1.2	2	15			● Fig.4		
WDMW06T320ZTR	M	10	3.97	1.2	2	15	● Fig.1	● Fig.1	● Fig.1	●	● Fig.2
WDMW080520ZER		13	5.5	1.5	2	15			● Fig.4		
WDMW080520ZTR		13	5.5	1.5	2	15	● Fig.5	● Fig.5	● Fig.5	●	● Fig.6
WDMW10X620ZER		16	6	2	2	15			● Fig.4		
WDMW10X620ZTR		16	6	2	2	15	● Fig.7	● Fig.7	● Fig.7	●	● Fig.8

10 inserts per case

◎ : First Choice, Good Condition ● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

High Feed Diemaster SKSTYPE

■ INSERT WITH CHIPBREAKER

PVD Coated

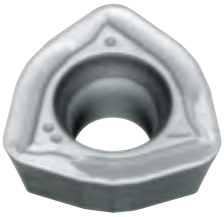


Fig.9

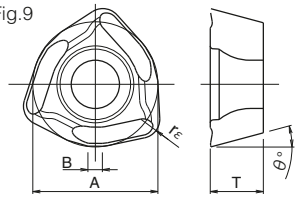


Fig.10

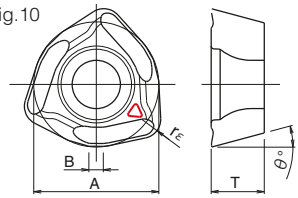
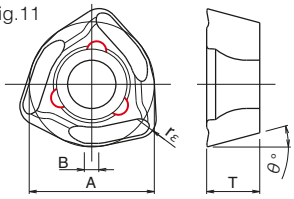


Fig.11



Cat. No.	Tolerance	Dimensions (mm)					PVD coated			
		A	T	B	rε	θ°	JC7560	JC8015	JC8050	JC8118
WOMT04T215ZER	M	6.5	2.8	0.8	1.5	13	● Fig.11	● Fig.9	● Fig.11	●
WDMT050316ZER		8	3.2	1	1.6	15	● Fig.10	● Fig.9	● Fig.10	●
WDMT06T320ZER		10	3.97	1.2	2	15	● Fig.10	● Fig.9	● Fig.10	●
WDMT080520ZER		13	5.5	1.5	2	15	● Fig.10	● Fig.9	● Fig.10	●
WDMT10X620ZER		16	6	2	2	15	● Fig.10	● Fig.9	● Fig.10	●

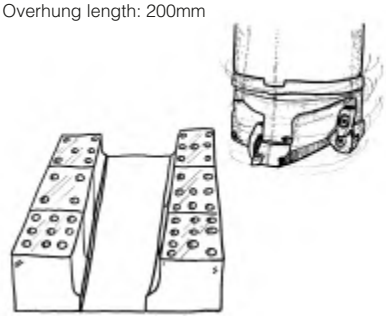
10 inserts per case

High Feed Diemaster SKSTYPE

■ CASE STUDIES

1. Machining tough die steel with bore for stamping die.

Overhung length: 200mm



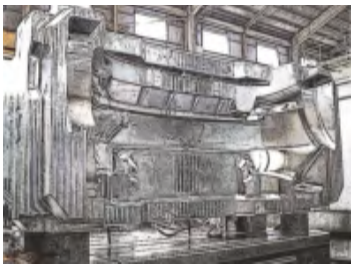
Result

Rough machining comparison among 3 competitors. Competitors got 60m & 90m tool life, SKS achieved 150m and was still able to continue.

Work	Part name	Stamping die
	Material	SKD11
	Hardness	Raw material
Tool	Tool No.	SKS-4063R-08
	Grade	WDMW080520ZTR, JC5040
Cutting conditions	Vc, (n)	178m/min (900min^{-1})
	Vf, (fz)	2,520mm/min (0.7mm/t)
	ap (mm)	1mm
	ae (mm)	40mm
	Coolant	Dry
	Machine	Vertical MC

2. Improved tool life on plastic mold.

Roughing
Metal removal rate: Q=115cm^3/min Overhung length: 150mm



Result

Competitor's cutter (φ63-6N) got 80m tool life. After machining 160m, SKS showed normal wear (VB: only 0.09mm) and was still able to continue. SKS achieved over 2 times longer tool life compared with competitor's cutter.

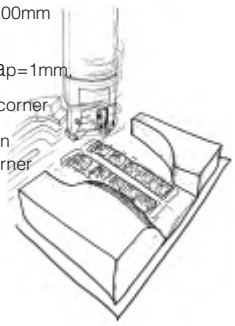
Work	Part name	Plasticmold
	Material	NAK80 Pre-hardened steel
	Hardness	39HRC
Tool	Tool No.	SKS-4063R-10-22 (4N)
	Grade	WDMW10X620ZER, JC5118
Cutting conditions	Vc, (n)	138m/min, (700min^{-1})
	Vf, (fz)	3,200mm/min, (1.14mm/t)
	ap (mm)	0.8mm
	ae (mm)	45mm
	Coolant	Air blow
	Machine	Horizontal MC

3. Improved efficiency & tool life on forging die by modular head + carbide shank.

Overhung length: 100mm

Radius cutter:
Vf=2,800mm/min, ap=1mm,
Q=70cc/min,
Tool life: 45-60min/corner

SKS:Q=122.5cc/min
Tool life: 190min/corner



Result

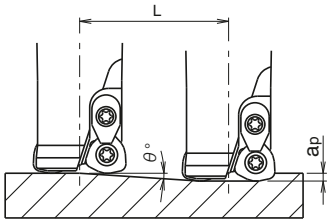
Improved the efficiency by 1.75 times and tool life by 3 times or more compared with radius cutter by combination of modular head + carbide shank.

Work	Part name	Forging die
	Material	1.2714 Hot work tool steel
	Hardness	285HB
Tool	Tool No.	MSH-3032-M16 + MSN-M16-55-S32C
	Grade	WDMW06T320ZTR, JC5040
Cutting conditions	Vc, (n)	180m/min, (1,790min^{-1})
	Vf, (fz)	7,000mm/min, (3.9mm/rev, 1.3mm/t)
	ap (mm)	0.7mm
	ae (mm)	25mm
	Coolant	Air blow
	Machine	Vertical MC 11kw

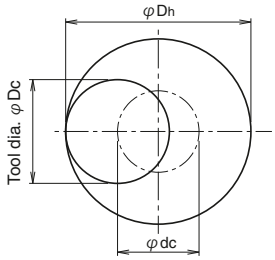
High Feed Diemaster SKSTYPE

■ Instructions for profile milling

● Ramping



● Helical interpolation



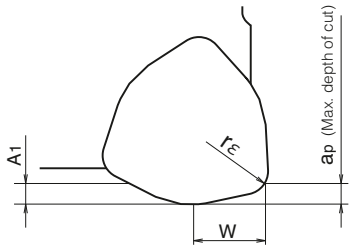
- Calculation of tool pass dia.
  $\varphi dc = \varphi Dh - \varphi Dc$
  (Tool pass dia. = Bore dia. − Tool dia.)
- Depth of cut per one circle should not exceed max. depth of cut ap.
- Down cutting is recommended & tool pass rotation should be counterclockwise.

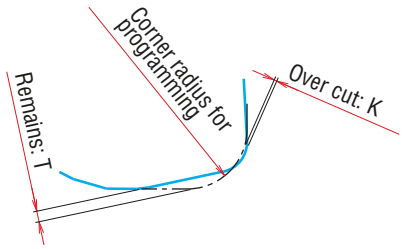
- In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
- In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
- Long continous chips may come out in case of drilling, confirm the safe cutting conditions.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Max. depth of cut ap (mm)	Ramping		Helical interpolation		Max. drilling depth (mm)
				Max. ramping angle θ°	Total cutting length L(mm) at max.ap	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)	
SKS-2016	16	10.5	0.8	2°30′	20.6	25	29	0.3
SKS-2017	17	11.5	0.8	2°	25.7	27	31	0.3
SKS-2020	20	12.7	1.2	3°	22.9	30	37	0.5
SKS-2021	21	13.7	1.2	2°30′	27.5	32	39	0.5
SKS-2025	25	15.9	1.5	4°	21.5	33	46	1
SKS-2026	26	16.9	1.5	3°30′	24.5	35	48	1
SKS-2030	30	20.9	1.5	2°30′	34.4	43	56	1
SKS-2032	32	20	2	4°	28.6	41	60	1.5
SKS-3032	32	22.8	1.5	2°15′	38.1	47	60	1
SKS-3040-06	40	30.8	1.5	1°36′	53.7	63	76	1
SKS-*050	50	38	2	2°	57.3	77	96	1.5
SKS-3050-*-10	50	35.1	2.3	2°18′	57.3	71	96	1.8
SKS-5050-06	50	40.8	1.5	1°09′	59.8	83	96	1
SKS-*052	52	40	2	2°	57.3	81	100	1.5
SKS-5052-06	52	42.8	1.5	1°06′	62.5	87	100	1
SKS-*063	63	51	2	1°30′	76.4	103	122	1.5
SKS-*063-10	63	48	2.3	2°24′	48.8	97	122	1.8
SKS-*066	66	54	2	1°42′	81.8	109	128	1.5
SKS-*080	80	68	2	1°12′	95.5	137	156	1.5
SKS-*080-10	80	65	2.3	2°	65.9	131	156	1.8
SKS-*100	100	88	2	1°	114.6	177	196	1.5
SKS-*100-10	100	85	2.3	1°30′	87.8	171	196	1.8
SKS-*125-10	125	110	2.3	1°12′	109.8	221	246	1.8
SKS-*160-10	160	145	2.3	0°54′	146.4	291	316	1.8

High Feed Diemaster SKSTYPE

■ Definition of corner radius for programming





	Corner radius for programming	T	K	rε	W	ap	A1
04Type	R1.5 (Recommended)	0.29	0	1.5	2.7	0.8	0.8
	R2	0.19	0.04				
05Type	R2 (Recommended)	0.35	0	1.6	3.6	1.25	1.2
	R2.5	0.25	0.12				
06Type	R2.5 (Recommended)	0.44	0	2.0	4.5	1.5	1.5
	R3	0.34	0.1				
08Type	R3 (Recommended)	0.63	0	2.0	6.0	2.0	2.0
	R3.5	0.54	0.14				
	R4	0.45	0.32				
10Type	R3 (Recommended)	0.91	0	2.0	7.4	2.5	2.5
	R3.5	0.82	0.05				
	R4	0.72	0.19				

■ Guidelines for selection of the Inserts

Work Materials	Carbon steel S50C, S55C (C50, C55) Below 250HB			Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC			Mold steel NAK80, HPM1 (1.2311, P20) 38-43HRC		Die steel SKD61, SKD11 (1.2344,1.2379) Below 250HB		
Cat. No. / Grades	JC5040	JC8050	JC7560	JC5118	JC8050	JC7560	JC5118	JC8015	JC5040	JC8050	JC7560
WOMW04T215ZER	○	○	◎	◎	●	○	◎	○	○	○	◎
WOMT04T215ZER		☆	☆	☆	☆		☆	☆		☆	☆
WDMW050316ZTR	○	○	◎	○	●	○	○	○	○	○	◎
WDMW050316ZER		●		◎			◎			●	
WDMT050316ZER		☆	☆	☆	☆	☆	☆	☆		☆	☆
WDMW06T320ZTR	○	○	◎	○	●	○	○	○	○	○	◎
WDMW06T320ZER		●		◎			◎			●	
WDMT06T320ZER		☆	☆	☆	☆	☆	☆	☆		☆	☆
WDMW080520ZTR	○	○	◎	○	●	○	○	○	○	○	◎
WDMW080520ZER		●		◎			◎			●	
WDMT080520ZER		☆	☆	☆	☆	☆	☆	☆		☆	☆
WDMW10X620ZTR	○	○	◎	○	●	○	○	○	○	○	◎
WDMW10X620ZER		●		◎			◎			●	
WDMT10X620ZER		☆	☆	☆	☆	☆	☆	☆		☆	☆

High Feed Diemaster SKSTYPE

Work Materials	Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB			Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300 HB		Stainless steel SUS304 Below 250HB		
Cat. No. / Grades	JC5118	JC8015	JC7560	JC5118	JC8015	JC8050	JC7560	JC5118
WOMW04T215ZER	◎	○	○	◎	○	●		○
WOMT04T215ZER	☆	☆	☆	☆	☆	○	◎	
WDMW050316ZTR	●	○	○	●	○			
WDMW050316ZER	◎			◎		●		○
WDMT050316ZER	☆	☆	☆	☆	☆	○	◎	
WDMW06T320ZTR	●	○	○	●	○			
WDMW06T320ZER	◎			◎		●		○
WDMT06T320ZER	☆	☆	☆	☆	☆	○	◎	
WDMW080520ZTR	●	○	○	●	○			
WDMW080520ZER	◎			◎		●		○
WDMT080520ZER	☆	☆	☆	☆	☆	○	◎	
WDMW10X620ZTR	●	○	○	●	○			
WDMW10X620ZER	◎			◎		●		○
WDMT10X620ZER	☆	☆	☆	☆	☆	○	◎	

Work Materials	Hardened die steel SKD61, DAC, DHA (1.2344,1.2379) 40-50HRC	
Cat. No. / Grades	JC5118	JC8015
WOMW04T215ZER	◎	○
WOMT04T215ZER	×	×
WDMW050316ZTR	●	○
WDMW050316ZER	◎	
WDMT050316ZER	×	×
WDMW06T320ZTR	●	○
WDMW06T320ZER	◎	
WDMT06T320ZER	×	×
WDMW080520ZTR	●	○
WDMW080520ZER	◎	
WDMT080520ZER	×	×
WDMW10X620ZTR	●	○
WDMW10X620ZER	◎	
WDMT10X620ZER	×	×

• WD (O) MW Type: Without chipbreaker • WD (O) MT Type: With chipbreaker
◎ : First Choice, Good Condition ○ : Moderate Condition ● : Unfavorable Condition ☆ : Light Cutting × : No good

High Feed Diemaster SKS TYPE

■ RECOMMENDED CUTTING CONDITIONS

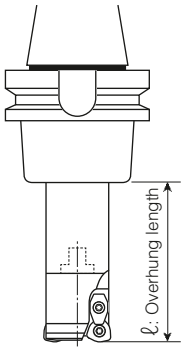
● FACE MILL TYPE

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia. (mm) 40 No. of teeth 3N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	50/52 No. of teeth 3N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	No. of teeth 4N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	No. of teeth 5N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC7560 (JC5040) (JC8050)	150	0.8	1,200	3,600	4.0	1.2	830	3,730	8	1.2	830	4,970	10.7	1	950	6,500	11.2
		200	0.6	800	3,000	2.5	1	700	3,150	5.6	1	700	4,200	7.5	0.8	950	6,000	8.3
		250	0.4	600	2,700	1.5	1	570	2,570	4.6	1	570	3,420	6.1	0.6	830	5,240	5.4
		300	–	–	–	–	0.6	570	3,420	3.7	0.6	570	3,990	4.3	0.4	760	4,800	3.3
		350	–	–	–	–	0.4	570	3,420	2.5	0.4	570	3,990	2.9	0.3	760	4,800	2.5
		400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-40HRC	JC5118 (JC7560) (Below 36HRC)	150	0.8	1,200	3,600	4.4	1.2	830	3,730	8.6	1.2	830	4,980	11.5	1	950	6,500	12.5
		200	0.6	800	3,000	2.8	1	700	3,150	6.1	1	700	4,200	8.1	0.8	950	6,000	9.2
		250	0.3	600	2,700	1.2	0.8	570	2,570	4	0.8	570	3,420	5.3	0.6	830	5,240	6
		300	–	–	–	–	0.5	570	2,900	2.8	0.5	570	3,420	3.3	0.4	760	4,800	3.7
		350	–	–	–	–	0.3	570	2,900	1.7	0.3	570	3,420	2	0.3	760	4,800	2.8
		400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC5040) (JC8050)	150	0.8	1,200	3,600	4.1	1.2	830	3,730	8	1.2	830	4,980	10.7	1	950	6,500	11.6
		200	0.6	800	3,000	2.6	1	700	3,150	5.6	1	700	4,200	7.5	0.8	950	6,000	8.6
		250	0.3	600	2,700	1.2	0.8	570	2,570	3.7	0.8	570	3,420	4.9	0.6	830	5,240	5.6
		300	–	–	–	–	0.5	570	2,900	2.6	0.5	570	3,420	3.1	0.4	760	4,800	3.4
		350	–	–	–	–	0.3	570	2,900	1.6	0.3	570	3,420	1.8	0.3	760	4,800	2.6
		400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015	100	0.8	640	1,500	2.7	1	570	1,720	4.8	1	570	2,280	6.3	0.8	600	3,000	6.7
		150	0.6	500	1,200	1.6	0.8	450	1,340	3	0.8	450	1,800	4	0.6	480	2,160	3.6
		200	0.3	400	960	0.6	0.6	380	1,150	1.9	0.6	380	1,520	2.5	0.4	400	1,800	2
		250	–	–	–	–	0.4	380	920	1	0.4	380	1,220	1.4	0.3	400	1,800	1.5
		300	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 JC8015 (JC7560)	150	1.2	1,000	4,500	5.5	1.5	830	4,480	8.6	1.5	830	5,980	11.5	1.2	950	7,600	11.7
		200	0.8	800	3,600	3.0	1.2	700	3,780	6.1	1.2	700	5,040	8.1	1	950	7,120	9.1
		250	0.5	600	2,700	1.4	1.2	570	3,080	4.7	1.2	570	4,100	6.3	1	830	6,220	8
		300	–	–	–	–	0.8	570	3,420	3.5	0.8	570	4,560	4.7	0.6	760	5,700	4.4
		350	–	–	–	–	0.6	570	3,420	2.6	0.6	570	4,560	3.5	0.5	760	5,700	3.7
		400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Stainless steel SUS304 Below 250HB	JC7560 (JC5118) (JC8050)	150	0.8	1,200	3,600	4.4	1.2	950	3,730	8.6	1.2	950	4,980	11.5	1	950	6,000	11.5
		200	0.6	800	3,000	2.8	1.0	800	3,150	6.0	1.0	800	4,200	8.1	0.8	950	5,260	8.1
		250	0.3	600	2,250	1.0	0.8	570	2,250	3.5	0.8	570	3,000	4.6	0.6	830	4,600	5.3
		300	–	–	–	–	0.5	570	2,250	2.2	0.5	570	3,000	2.9	0.4	760	4,210	3.2
		350	–	–	–	–	0.3	570	2,250	1.3	0.3	570	3,000	1.7	0.3	760	4,210	2.4
		400	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of over 250mm overhung length and severe interrupted cutting, use 10 type insert cutter.
7) In case of unfavourable conditions, insert grade JC8050 is recommended.



High Feed Diemaster SKS TYPE

■ RECOMMENDED CUTTING CONDITIONS

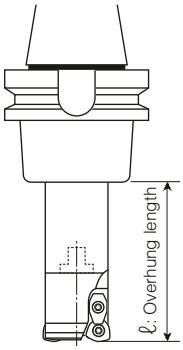
● FACE MILL TYPE

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia. (mm) 63 No. of teeth 3N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	63/66 No. of teeth 4N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	No. of teeth 5N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	80 No. of teeth 5N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC7560 (JC5040) (JC8050)	150	1.2	760	4,050	13.8	1.2	760	5,400	14.6	1	830	7,000	15.2	1.2	720	5,400	18.5
		200	1.2	680	3,060	9	1.2	680	4,090	11	1	830	6,200	13.5	1.2	600	4,500	15.4
		250	1	600	2,700	6.1	1	600	3,600	8.1	0.8	830	6,200	10.8	1.2	520	3,900	13.4
		300	1	460	2,050	5.1	1	460	2,730	6.8	0.6	610	4,560	5.9	1	440	3,300	9.4
		350	0.8	460	2,390	4.3	0.8	460	3,190	5.7	0.5	610	4,560	5	1	360	2,700	7.7
		400	0.4	460	2,730	2.5	0.4	460	3,640	3.3	0.3	610	4,560	3	0.6	360	2,700	4.6
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-40HRC	JC5118 (JC7560) (Below 36HRC)	150	1.2	760	3,420	9.9	1.2	760	4,560	13.3	1	830	6,200	15	1.2	600	4,500	16.6
		200	1.2	680	3,060	8.9	1.2	680	4,080	11.9	1	830	6,200	15	1.2	520	3,900	14.4
		250	1	600	2,700	6.5	1	600	3,600	8.7	0.8	830	6,200	12	1.2	440	3,300	12.2
		300	0.8	460	2,050	4	0.8	460	2,730	5.3	0.6	610	4,560	6.6	1	360	2,700	8.3
		350	0.6	460	2,390	3.5	0.6	460	3,090	4.5	0.5	610	4,560	5.5	0.8	360	2,700	6.6
		400	0.4	460	2,390	2.3	0.4	460	3,090	3	0.3	610	4,560	3.3	0.6	360	2,700	5
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC5040) (JC8050)	150	1.2	760	3,420	9.2	1.2	760	4,560	12.3	1	830	6,200	14	1.2	600	4,500	15.4
		200	1.2	680	3,060	8.3	1.2	680	4,080	11	1	830	6,200	14	1.2	520	3,900	13.4
		250	1	600	2,700	6.1	1	600	3,600	8.1	0.8	830	6,200	11.2	1.2	440	3,300	11.3
		300	0.8	460	2,050	3.7	0.8	460	2,730	4.9	0.6	610	4,560	6.2	1	360	2,700	7.7
		350	0.6	460	2,390	3.2	0.6	460	3,090	4.2	0.5	610	4,560	5.1	0.8	360	2,700	6.2
		400	0.4	460	2,390	2.2	0.4	460	3,090	2.8	0.3	610	4,560	3.1	0.6	360	2,700	4.6
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015	100	1	450	1,350	4.7	1	450	1,800	6.3	0.8	480	2,400	6.7	1	360	1,800	8
		150	1	380	1,140	4	1	380	1,520	5.3	0.8	400	2,000	5.6	1	360	1,800	8
		200	0.8	380	1,140	3.2	0.8	380	1,520	4.3	0.6	400	2,000	4.2	1	300	1,500	6.7
		250	0.7	300	900	2.2	0.7	300	1,200	2.9	0.5	320	1,600	2.8	0.9	240	1,200	4.8
		300	0.5	300	720	1.3	0.5	300	960	1.7	0.4	320	1,280	1.8	0.7	240	960	3
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 JC8015 (JC7560)	150	1.5	910	4,910	11.9	1.5	910	6,550	15.9	1.2	910	8,200	15.9	1.5	720	6,480	19.9
		200	1.5	680	3,670	8.9	1.5	680	4,900	11.9	1.2	910	7,500	14.5	1.5	600	5,400	16.6
		250	1.5	600	3,150	7.6	1.5	600	4,200	10.2	1.2	660	5,450	10.6	1.5	520	4,680	14.4
		300	1.2	460	2,480	4.8	1.2	460	3,310	6.4	1	600	4,950	8	1.5	440	3,960	12.2
		350	1	460	2,760	4.5	1	460	3,680	5.9	0.8	600	4,950	6.4	1.2	360	4,320	10.6
		400	0.6	460	2,760	2.7	0.6	460	3,680	3.6	0.5	600	4,950	4	0.8	360	4,320	7.1
Stainless steel SUS304 Below 250HB	JC7560 (JC5118) (JC8050)	150	1,2	760	3,000	8.7	1.2	760	4,000	11.6	1	830	5,440	13.2	1.2	600	3,900	14.4
		200	1,2	680	2.670	7.8	1.2	680	3,560	10.3	1	830	5,440	13.2	1.2	520	3,380	12.5
		250	1,0	600	2,350	5.7	1.0	600	3,130	7.6	0.8	830	5,440	10.5	1.2	440	2,860	10.5
		300	0.8	460	1,800	3.5	0.8	460	2,400	4.6	0.6	610	4,000	5.8	1.0	360	2,340	7.2
		350	0.6	460	1,800	2.6	0.6	460	2,400	3.5	0.5	610	4,000	4.8	0.8	360	2,340	5.8
		400	0.4	460	1,800	1.8	0.4	460	2,400	2.3	0.3	610	4,000	2.9	0.6	360	2,340	4.3

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of over 250mm overhung length and severe interrupted cutting, use 10 type insert cutter.
7) In case of unfavourable conditions, insert grade JC8050 is recommended.



High Feed Diemaster SKS TYPE

■ RECOMMENDED CUTTING CONDITIONS

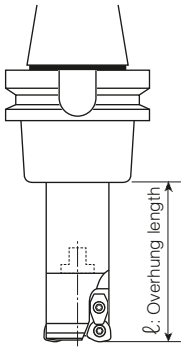
● FACE MILL TYPE

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia.(mm) 80 No. of teeth 6N				100 No. of teeth 6N				125 No. of teeth 6N				160 No. of teeth 7N			
			ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC7560 (JC5040) (JC8050)	150	1	720	6,900	19.1	1.2	570	5,130	22	1.5	460	4,140	27.7	1.5	360	3,780	32.4
		200	1	720	6,400	17.7	1.2	480	4,320	18.5	1.5	460	4,140	27.7	1.5	360	3,780	32.4
		250	0.8	720	6,400	14.1	1.2	420	3,730	16	1.5	400	3,600	24.1	1.5	360	3,780	32.4
		300	0.6	480	4,270	7.1	1	350	3,150	11.3	1.5	380	3,420	22.9	1.5	320	3,360	28.8
		350	0.5	480	4,270	5.9	1	290	2,610	9.3	1.2	380	3,420	18.3	1.5	300	3,150	27
		400	0.3	480	4,270	3.5	0.6	290	2,610	5.6	1	380	3,420	15.3	1.2	300	3,150	21.6
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-40HRC	JC5118 (JC7560) (Below 36HRC)	150	1	720	6,400	19.7	1.2	480	4,320	19.9	1.5	400	3,000	21.6	1.5	320	2,800	25.8
		200	1	720	6,400	19.7	1.2	420	3,780	17.4	1.5	400	3,000	21.6	1.5	320	2,800	25.8
		250	0.8	720	6,400	15.8	1.2	350	3,150	14.5	1.5	380	2,850	20.6	1.5	320	2,800	25.8
		300	0.6	480	4,270	7.9	1	290	2,610	10	1.2	350	2,630	15.2	1.5	280	2,450	22.6
		350	0.5	480	4,270	6.6	0.8	290	2,610	8	1	350	2,630	12.6	1.2	280	2,450	18.1
		400	0.3	480	4,270	3.9	0.6	290	2,610	6	0.8	350	2,630	10.1	1	280	2,450	15.1
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC5040) (JC8050)	150	1	720	6,900	19.7	1.2	480	4,320	18.5	1.5	400	3,000	20.1	1.5	320	2,800	24
		200	1	720	6,400	18.3	1.2	420	3,780	16.2	1.5	400	3,000	20.1	1.5	320	2,800	24
		250	0.8	720	6,400	14.6	1.2	350	3,150	13.5	1.5	380	2,850	19.1	1.5	320	2,800	24
		300	0.6	480	4,270	7.3	1	290	2,610	9.3	1.2	350	2,630	14.1	1.5	280	2,450	21
		350	0.5	480	4,270	6.1	0.8	290	2,610	7.5	1	350	2,630	11.7	1.2	280	2,450	16.8
		400	0.3	480	4,270	3.7	0.6	290	2,610	5.6	0.8	350	2,630	9.4	1	280	2,450	14
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015	100	0.8	380	2,280	8.1	1	290	1,740	9.7	1	230	1,380	9.6	1	180	1,260	11.2
		150	0.8	380	1,900	6.8	1	290	1,740	9.7	1	230	1,380	9.6	1	180	1,260	11.2
		200	0.7	380	1,900	5.9	1	240	1,440	8	1	230	1,380	9.6	1	180	1,260	11.2
		250	0.6	250	1,500	4	0.9	190	1,140	5.7	1	190	1,140	7.9	1	150	1,050	9.3
		300	0.5	250	1,200	2.7	0.7	190	910	3.5	0.8	190	1,140	6.3	0.8	150	1,050	7.4
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 JC8015 (JC7560)	150	1.2	720	8,000	19.7	1.5	570	6,160	23.7	1.8	420	4,500	26	1.8	330	4,160	30.7
		200	1.2	720	7,130	17.6	1.5	480	5,180	19.9	1.8	420	4,500	26	1.8	330	4,160	30.7
		250	1.2	520	5,150	12.7	1.5	420	4,480	17.2	1.8	380	4,100	23.7	1.8	330	4,160	30.7
		300	1.2	470	4,650	11.4	1.5	350	3,780	14.5	1.5	380	4,100	19.7	1.8	300	3,780	27.9
		350	1	470	4,650	9.5	1.2	290	4,180	12.9	1.2	350	3,780	14.5	1.5	300	3,780	23.3
		400	0.6	470	4,650	5.7	0.8	290	4,180	8.6	1	350	3,780	12.1	1.2	270	3,400	16.7
Stainless steel SUS304 Below 250HB	JC7560 (JC5118) (JC8050)	150	1	720	5,550	17.1	1.2	480	3,750	17.3	1.5	380	2,850	20.6	1.5	300	2,630	24.3
		200	1	720	5,550	17.1	1.2	420	3,280	15.1	1.5	380	2,850	20.6	1.5	300	2,630	24.3
		250	0.8	720	5,550	13.7	1.2	350	2,730	12.6	1.5	350	2,630	19	1.5	300	2,630	24.3
		300	0.6	480	3,700	6.8	1.0	290	2,270	8.7	1.2	320	2,400	13.8	1.5	270	2,360	21.8
		350	0.5	480	3,700	5.7	0.8	290	2,270	7.0	1	320	2,400	11.5	1.2	270	2,360	17.4
		400	0.3	480	3,700	3.4	0.6	290	2,270	5.2	0.8	320	2,400	9.2	1	270	2,360	14.5

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of over 250mm overhung length and severe interrupted cutting, use 10 type insert cutter.
7) In case of unfavourable conditions, insert grade JC8050 is recommended.



High Feed Diemaster SKS TYPE

■ RECOMMENDED CUTTING CONDITIONS

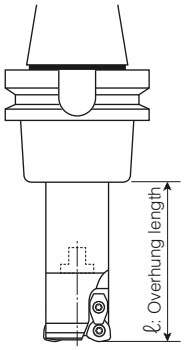
● END MILL TYPE

Work Materials	Insert Grades	Tool dia. (mm)											
		16/17				20/21/22				25/26			
		No. of teeth 2N				No. of teeth 2N				No. of teeth 2N			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC7560 (JC5040) (JC8050)	30	0.6	3,580	3,580	70	0.7	2,850	4,600	70	0.7	2,300	4,600
		70	0.5	2,980	2,380	120	0.5	2,400	3,800	120	0.5	1,900	3,800
		100	0.4	2,580	1,550	190	0.3	1,250	1,500	220	0.3	1,000	1,600
Moldsteel HPM7, PX5, NAK80, P20 (1.2311,P20) 30-43HRC	JC5118 (JC7560) (Below 36HRC)	30	0.6	3,580	3,580	70	0.7	2,850	4,600	70	0.7	2,300	4,600
		70	0.5	2,980	2,380	120	0.5	2,400	3,800	120	0.5	1,900	3,800
		100	0.4	2,580	1,550	190	0.3	1,250	1,500	220	0.3	1,000	1,600
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC5040) (JC8050)	30	0.6	3,580	3,580	70	0.7	2,850	4,600	70	0.7	2,300	4,600
		70	0.5	2,980	2,380	120	0.5	2,400	3,800	120	0.5	1,900	3,800
		100	0.4	2,580	1,550	190	0.3	1,250	1,500	220	0.3	1,000	1,600
Stainless steel SUS304 Below 250HB	JC7560 (JC5118) (JC8050)	30	0.5	2,980	2,980	70	0.7	2,400	3,840	70	0.7	1,900	3,800
		70	0.3	2,980	2,380	120	0.5	2,400	3,840	120	0.5	1,900	3,800
		100	0.3	2,580	1,550	190	0.3	1,250	1,500	220	0.3	1,000	1,600
Hardened die steel SKD61, DAC, DHA (1.23441, 1.2379) 40-50HRC	JC5118 JC8015	30	0.3	2,380	2,380	70	0.5	1,100	1,100	70	0.6	1,000	1,400
		70	0.2	2,380	1,900	120	0.3	1,100	1,100	120	0.4	1,000	1,200
		100	–	–	–	190	–	–	–	220	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 JC8015 (JC7560)	30	0.7	3,580	3,580	70	0.8	1,900	3,000	70	1	1,650	3,300
		70	0.6	2,980	2,380	120	0.6	1,750	2,800	120	0.8	1,400	2,800
		100	0.5	2,580	1,550	190	0.4	1,400	2,200	220	0.5	1,150	2,300

ℓ: Overhung length, ap: Depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (In case of BT40 or below, recommend to use tool dia. below φ33)
2) In case of chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of unfavourable conditions, insert grade JC8050 is recommended.



High Feed Diemaster SKS TYPE

■ RECOMMENDED CUTTING CONDITIONS

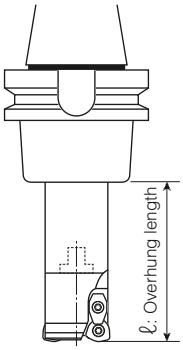
● END MILL TYPE

Work Materials	Insert Grades	Tool dia. (mm)							
		32				32			
		No. of teeth 2N				No. of teeth 3N			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC7560 (JC5040) (JC8050)	70	0.8	1,800	3,600	70	0.7	1,800	4,300
		120	0.6	1,000	3,000	120	0.5	1,500	3,600
		220	0.4	500	2,000	220	0.3	900	2,160
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC5118 (JC7560) (Below36HRC)	70	0.8	1,800	3,600	70	0.7	1,800	4,300
		120	0.6	1,000	3,000	120	0.5	1,500	3,600
		220	0.3	500	2,000	220	0.3	900	2,160
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC5040) (JC8050)	70	0.8	1,800	3,600	70	0.7	1,800	4,300
		120	0.6	1,000	3,000	120	0.5	1,500	3,600
		220	0.3	500	2,000	220	0.3	900	2,160
Stainless steel SUS304 Below 250HB	JC7560 (JC5118) (JC8050)	70	0.8	1,500	3,600	70	0.7	1,500	4,000
		120	0.6	1,250	3,000	120	0.5	1,250	3,400
		220	0.3	600	1,800	220	0.3	600	1,800
Hardened die steel SKD61, DAC, DHA (1.23441, 1.2379) 40-50HRC	JC5118 JC8015	70	0.8	800	1,300	70	0.6	800	1,680
		120	0.6	700	1,100	120	0.4	700	1,260
		220	0.3	500	800	220	0.2	500	900
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	JC5118 JC8015 (JC7560)	70	1.2	1,300	3,900	70	1.0	1,300	4,300
		120	1	1,100	3,300	120	0.8	1,100	3,600
		220	0.6	900	2,200	220	0.5	900	2,500

ℓ: Overhung length, ap: Depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (In case of BT40 or below, recommend to use tool dia. below φ33)
2) In case of chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of unfavourable conditions, insert grade JC8050 is recommended.



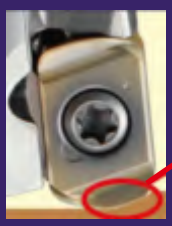
QM MAX G II

GMX TYPE

Feature of product

"QM MAX G II" GMX / MXG type, indexable cutter with high efficient roughing.

- Low cutting force inserts with optimum cutting edge for high feed machining.
  * Compared with conventional positive type cutter, chips thickness of QM MAX G II reduces by 14% (in case of ap=0.6mm).



Negative insert

Optimum cutting edge

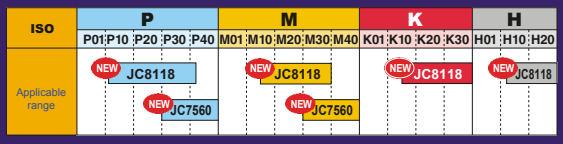
- Insert thickness: 4mm improved strength by 1.2 times compared with conventional tool.
- Economical double-side insert (4 corners).
- New strong edge type "PH breaker insert" is excellent in fracture resistance and applicable to heavy cutting.

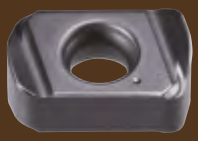
NEW PH Breaker

Double-side usable!

Insert thickness: 4mm

- 2 insert grades "JC8118" & "JC7560" can be widely applied from general & mold steel to hardened die steel & high strength stainless steel.
- Application





<JC8118>

for high hardened steel less than 50HRC & high strength stainless steel.

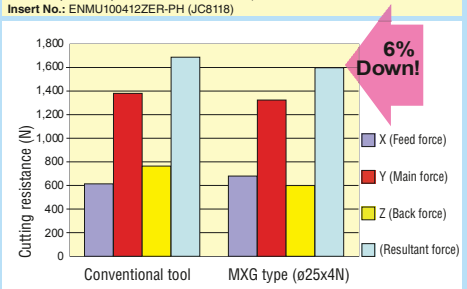
<JC7560>

for general & mold steel less than 35HRC.

Cutting performance

Cutting force comparison

Material: S50C C50
Cutting conditions: Vc=120/min, fz=1.0mm/t, ap=0,6mm, ae=15mm
Down cut, Air blow, Tool No.: MXG-4025-M12,
Insert No.: ENMU100412ZER-PH (JC8118)



Feed limit comparison

Material: SKD61 (46HRC) 1.2344
Cutting conditions: Vc=95m/min, **ap=1,0mm,** ae=0–19mm
Up & down cut, Air blow
Tool No.: MXG-4025-M12
Insert No.: ENMU100412ZER-PH (JC8118)

	fz=1.1mm/t	fz=1.4mm/t	fz=1.6mm/t
NEW PH breaker	○	○	○

New strong edge type "PH breaker insert" is excellent in fracture resistance and possible to higher feed machining than conventional tool.

QM MAX G II

GMX TYPE

Greatly improved metal removal rate!

- Possible to stable high feed machining in case of long overhung length over L/D=6.
- Excellent in ramping and helical interpolation, and possible to high efficient pocket milling.

* Possible to Max. ramping angle 1° in case of using ø 25 mm tool dia.

G-Body

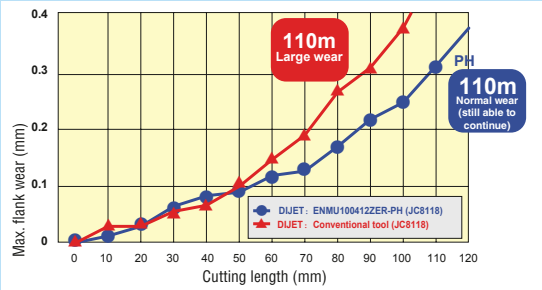
Adopted GN surface-hardening treatment on thermal resistant high strength steel gives high hardness over 65HRC and secure insert pocket and holder against thermal deformation, improved body durability and tool life by 30% or more. Make it difficult to be damaged even under severe cutting conditions. Also rust-proof and anti-welding effect is much improved.

Cutting performance

- Tool life comparison

Material: SKD11 (1.2379, **Cutting conditions:** Vc=180mm/min, fz=1.2mm/t, ap=0,8mm,
Pocket milling: 75x60x30mm, **Down cut, Air blow**
Overhung length: 60mm, **Ramping angle:** 1°
Tool No.: MXG-4025-M12, **Insert No.:** ENMU100412ZER-PH (JC8118)

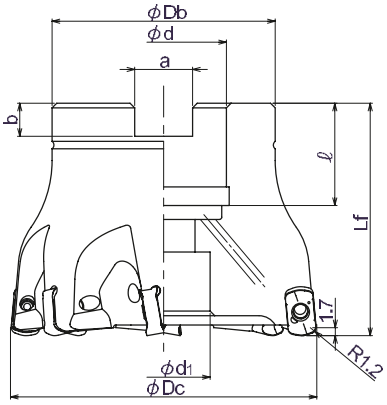
New strong edge type "PH breaker insert" supressed small chipping and achieved longer tool life compared with conventional tool.



QM MAX G II GMX TYPE

G-Body Through Coolant Hole

■ FACE MILL TYPE



Type	Cat. No.	Stock	No. of inserts	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Applicable inserts	Parts
Metric Bore	GMX-7050R-22	●	7	50	50	40	22	17	10.4	6.3	20	ENMU100412 ZER-PH	Clamp screw  TSW-2567H; Wrench  A-08
	GMX-7052R-22	●	7	52	50	40	22	17	10.4	6.3	20		
	GMX-7063R-22	●	7	63	50	48	22	17	10.4	6.3	20		
	GMX-7066R-22	●	7	66	50	48	22	17	10.4	6.3	20		
	GMX-7066R-27	●	7	66	50	48	27	20	12.4	7	22		

Note) All cutters are supplied without inserts.

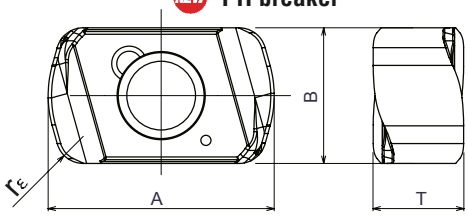
Modular Head Type Please refer Page B080

Clamp Screw	Recommended Torque (N·m)
TSW-2567H	1.1

GMX TYPE

■ Inserts

NEW PH breaker

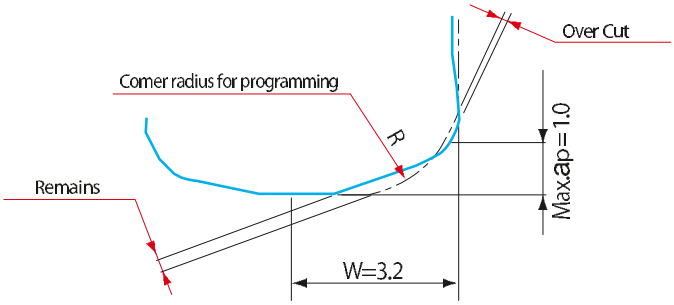


Cat. No.	Tolerance	PVD coated NEW JC8118	NEW JC7560	Dimensions (mm) A	T	B	rε
NEW ENMU100412ZER-PH	M	●	●	10	4	6	1.2

10 inserts per case

QM MAX G II GMXTYPE

■ Definition of corner shape for programming

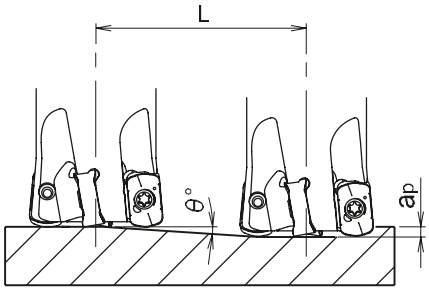


(mm)

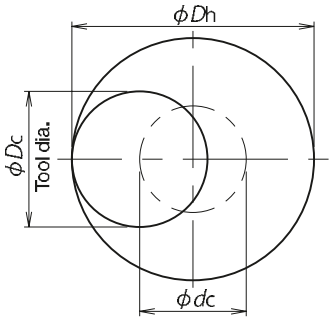
Corner radius for programming	Over cut	Remains
R1.0	0	0.52
R1.5 (Standard)	0	0.38
R2.0	0.08	0.24

■ Attention for profile milling

● **Ramping**



● **Helical interpolation**



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circuit should not exceed max. depth of cut *ap*.

● Down cutting is recommended, so tool pass rotation should be counterclockwise.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
● In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
● Long consecutive chips may come out in case of drilling, confirm the safe condition sufficiently.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Max. depth of cut ap (mm)	Ramping		Helical interpolation	
				Max.ramping angle θ°	Total cutting length L(mm) at max. ap	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)
GMX-7050	50	43.8	1	0° 24’	143.2	90	98
GMX-7052	52	45.8	1	0° 24’	143.2	94	102
GMX-7063	63	56.8	1	0° 18’	190.9	116	124
GMX-7066	66	59.8	1	0° 18’	190.9	122	130

QM MAX G II GMXTYPE

■ RECOMMENDED CUTTING CONDITIONS

● GMX type (facemill type)

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia. (mm) 50 / 52 No. of teeth 7N ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	63 / 66 No. of teeth 7N ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel (C50, C55) Below 250HB	JC7560 (JC8118)	~150	1	~40	1,020	8,570	1	~50	810	6,800
		200	0.8	~40	1,020	8,570	0.8	~50	810	6,800
		250	0.6	~40	890	7,480	0.6	~50	710	5,960
		300	0.5	~40	830	6,970	0.5	~50	660	5,540
		350	0.4	~40	830	6,970	0.4	~50	660	5,540
Die steel (1.2344, 1.2379) Below 255HB	JC7560 (JC8118)	~150	1	~40	1,020	8,570	1	~50	810	6,800
		200	0.8	~40	1,020	8,570	0.8	~50	810	6,800
		250	0.6	~40	890	7,480	0.6	~50	710	5,960
		300	0.5	~40	830	6,970	0.5	~50	660	5,540
		350	0.4	~40	830	6,970	0.4	~50	660	5,540
Mold steel (1.2311, P20) 30-36HRC	JC7560 (JC8118)	~150	1	~40	1,020	8,570	1	~50	810	6,800
		200	0.8	~40	1,020	8,570	0.8	~50	810	6,800
		250	0.6	~40	890	7,480	0.6	~50	710	5,960
		300	0.5	~40	830	6,970	0.5	~50	660	5,540
		350	0.4	~40	830	6,970	0.4	~50	660	5,540
Mold steel (1.2311, P21) 38-43HRC	JC8118	~150	0.8	~40	540	4,160	0.8	~50	430	3,310
		200	0.6	~40	540	4,160	0.6	~50	430	3,310
		250	0.4	~40	510	3,210	0.4	~50	400	2,520
		300	0.3	~40	480	3,020	0.3	~50	380	2,390
		350	0.3	~40	480	2,690	0.3	~50	380	2,130
Hardened die steel (1.2344, 1.2379) 42-52HRC	JC8118	~150	0.6	~40	540	4,160	0.6	~50	430	3,310
		200	0.4	~40	540	4,160	0.4	~50	430	3,310
		250	0.2	~40	510	3,210	0.2	~50	400	2,520
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Grey & Nodular cast iron (GG, GGG) Below 300HB	JC8118	~150	1	~40	1,150	12,080	1	~50	910	9,560
		200	0.8	~40	1,150	12,080	0.8	~50	910	9,560
		250	0.6	~40	1,020	10,710	0.6	~50	810	8,510
		300	0.5	~40	950	9,980	0.5	~50	760	7,980
		350	0.4	~40	950	7,980	0.4	~50	760	6,380
Stainless steel Below 250HB	JC7560 (JC8118)	~150	0.8	~40	760	5,320	0.8	~50	610	4,270
		200	0.6	~40	760	5,320	0.6	~50	610	4,270
		250	0.4	~40	640	4,480	0.4	~50	510	3,570
		300	0.3	~40	640	4,480	0.3	~50	510	3,570
		350	0.3	~40	640	3,580	0.3	~50	510	2,860

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE for EPMT/W type insert

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Spindle speed and keep feed per tooth.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

New genaration high feed mill

QM MAX

QXP TYPE

Quick & Mini MAX

G-Body

Low cutting force

Adopted unique 3D geometry inserts with low cutting force (25% lower than coventional tool).
QM MAX achieved high efficient machining up to ap=1mm.
Maintain stable cutting force & power consumption in case of deep cavity milling.

Multi blades

Multi blades achieves Q=144cc/min. (In case of using of φ32 modular head type)

Vibration free

"QM MAX" MQX type can achieve high efficient machining and longer tool life by controlling the vibration with the combination of MSN carbide shank holder.

Insert variation

High feed and Shoulder milling is possible with the same body.
By mounting "MIRROR INSERT", high efficient finishing of side & bottom face is possible.

High feed insert

EPMT100312ZER

High feed insert for unfavorable condition

EPMW100312ZER EPMW100312ZTR

Shoulder milling insert

Deflection: Below 0.03mm

ZPMT1003…ZER (Corner Radius 0.4, 0.8, 2.0)

For high hardened steel insert

EPHW100316ZTR

"MIRROR INSERT" for finishing side & bottom face

YPHW1003…ZER-…

Shoulder milling insert (From semi-finishing to finishing)

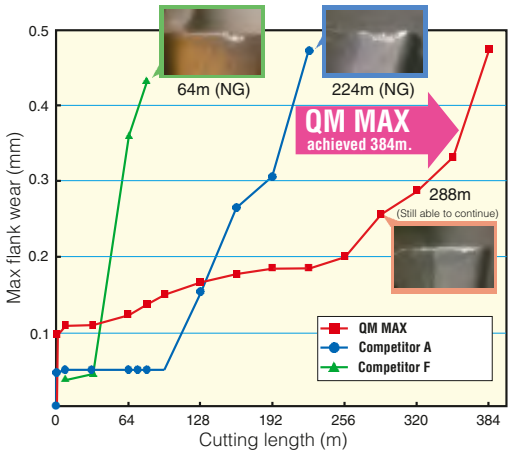
ZPMT100308ZER-PL

"JC5118" can cut general steel, hardened material, Titanium alloy and heat-resistant alloy. Tough grade "JC8050" for interrupted cutting. "JC7560" improved heat-fracture and impact strength for rough milling. "DH102" for hardened steel at high speed machining. "JC8015" and cermet grade "CX75" are available for "MIRROR INSERT" YPHW type.

■ Cutting performance of QM MAX against competitor

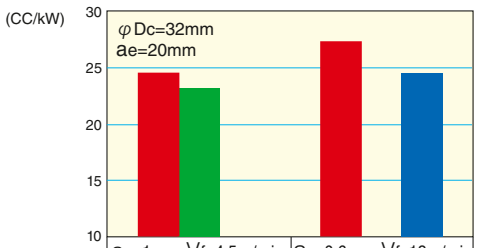
Tool life comparison

Material: NAK80, 40HRC
Insert No.: EPMT100312ZER (JC8050)
Cutting conditions:
Dc=32mm, Vc=120.6m/min (n=1,200min^{-1}),
f=3mm/rev (Vf=3,600mm/min) (6N), ap=0.6mm, ae=19mm, Q=41cc/min
Overhung length: ℓ=100mm, Shoulder milling, Down cut, Dry (Air blow)



Metal removal rate comparison

Metal removal rate / 1kW on S50C



	ap=1mm, Vf=4.5m/min	ap=0.6mm, Vf=12m/min
QM MAX	24.59	27.27
Competitor A	23.08	
Competitor F		24.49

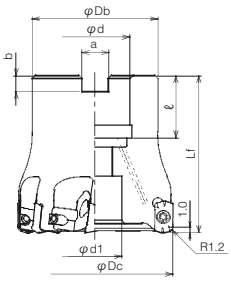
Metal removal rate Q / kW of QM MAX is 6%-10% more than the competitor's tool. And also, Power consumption of QM MAX is lower than competitors.

Power Saving Features

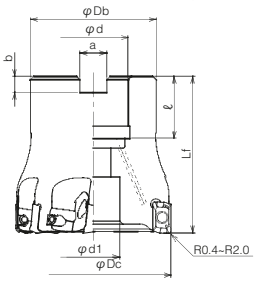
QM MAX QXP TYPE

G-Body Through Coolant Hole

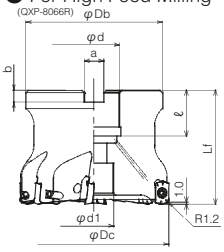
● For High Feed Milling



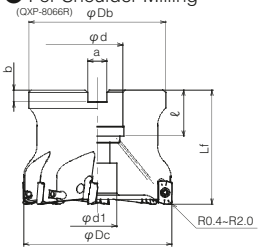
● For Shoulder Milling



● For High Feed Milling



● For Shoulder Milling



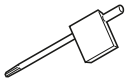
■ BODY/FACE MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Inserts
Metric Bore	QXP-6040R-16	●	6	**40**	45	35	16	14	8.4	5.6	18	EP**1003**Z*R ZPMT1003**ZER YPHW1003**ZER-**
	QXP-7040R-16	●	7	**40**	45	35	16	14	8.4	5.6	18	
	QXP-7050R-22	●	7	**50**	50	40	22	17	10.4	6.3	20	
	QXP-8050R-22	●	8	**50**	50	40	22	17	10.4	6.3	20	
	QXP-8052R-22	●	8	**52**	50	40	22	17	10.4	6.3	20	
	QXP-8063R-22	●	8	**63**	50	48	22	17	10.4	6.3	20	
	QXP-8066R-27	●	8	**66**	50	48	27	20	12.4	7	22	

Note) 1. All cutters are supplied without inserts.
2. Please refer page C038-C069 for recommended cutting conditions.

Modular Head Type Please refer Page B030

■ PARTS

Clamp Screw	Wrench
	
DSW-2563H	A-08

Clamp Screw	Recommended Torque N•m
DSW-2563H	0.9

QM MAX

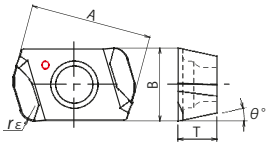
QXP TYPE

MQX / QXP TYPE

■ INSERTS

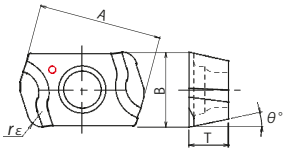
High feed insert (EPMT100312ZER)

Cutting condition C060-C062



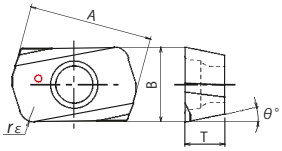
High feed insert for unfavorable condition (EPMW100312ZER)

Cutting condition C060-C062



High feed insert for unfavorable condition (EPMW100312ZTR)

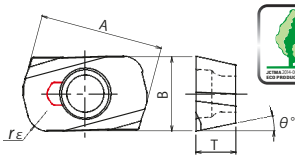
Cutting condition C060-C062



(JC7560)

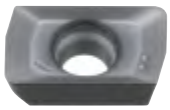
High hardened steel (EPHW100316ZTR)

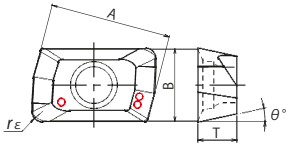
Cutting condition C063-C064



Shoulder milling insert (EPMT1003ZER)**

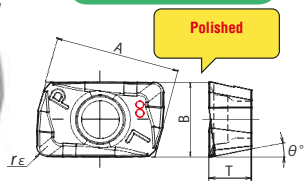
Cutting condition C065-C070





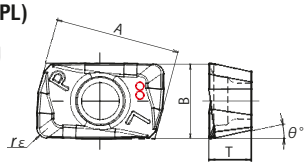
NEW **Shoulder milling insert for aluminum alloy**

Cutting condition C090



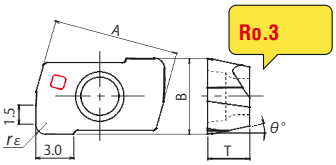
NEW **Shoulder milling insert (From semi-finishing to finishing) (ZPMT100308ZER-PL)**

Cutting condition C084-C089

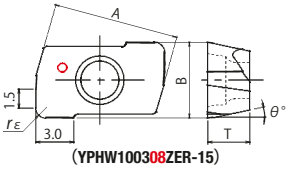


"MIRROR INSERT" for finishing side & bottom face (YPHW1003ZER-15) (YPHW100308ZTR-F1) (YPHW100308ZER-F)**

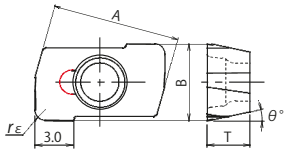
Cutting condition C071-C078



(YPHW100303ZER-15)



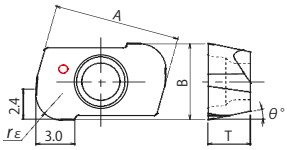
(YPHW100308ZER-15)



(YPHW100308ZER-F)

"MIRROR INSERT" for finishing side & bottom face / contouring milling (YPHW100320ZER-24)

Cutting condition C079-C083



QM MAX QXP TYPE

Type	Cat. No.	Tole-rance	PVD coated						Uncoated		Cermet	Dimensions (mm)				
			JC5118	JC8118	DH102	JC7560	JC8015	JC8050	FZ15	FC18	CX75	A	T	B	r ε	θ°
High feed insert	EPMT100312ZER	M	○	●		●		●				10	3.2	6	1.2	11°
High feed insert for unfavourable condition	EPMW100312ZER	M	○	●				●				10	3.2	6	1.2	11°
	EPMW100312ZTR	M	○	●		●		●								
High hardened steel	EPHW100316ZTR	H		●	●							10	3.2	6	1.6	11°
Shouldermilling insert	ZPMT100304ZER	M	●					●				10	3.2	6	0.4	11°
	ZPMT100308ZER	M	●					●				10	3.2	6	0.8	11°
	ZPMT100320ZER	M	●					●				10	3.2	6	2.0	11°
Shoulder milling insert for aluminum alloy	NEW ZPMT100304ZER-NL	M								●		10	3.4	6	0.4	11°
	ZPMT100308ZER-NL	M							○	◎		10	3.4	6	0.8	11°
	NEW ZPMT100320ZER-NL	M								●		10	3.4	6	2.0	11°
"MIRROR INSERT" for finishing side & bottom face/ contouring milling	NEW YPHW100303ZER-15	H			●		●				●	10	3.35	6	0.3	11°
	YPHW100308ZER-15	H			●						●	10	3.35	6	0.8	11°
	YPHW100308ZER-F	H					●					10	3.35	6	0.8	11°
	YPHW100320ZER-24	H			●		●					10	3.35	6	2.0	11°

10 inserts per case, but grade JBN795 insert is packed in 1 piece per case.

Discrimination of grade for MQX / QXP insert

Each grade shows different mark around the hole for fool proof.

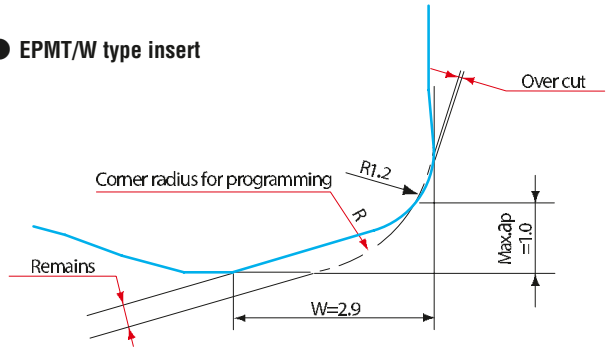
Type	Cat. No.	Tole-rance	PVD coated						Uncoated		Cermet	Dimensions (mm)				
			JC5118	JC8118	DH102	JC7560	JC8015	JC8050	FZ15	FC18	CX75	A	T	B	r ε	θ°
Shoulder milling insert from semi-finishing to finishing	NEW ZPMT100304ZER-PL	M		●	●							10	3.4	6	0.4	11°
	ZPMT100308ZER-PL	M		●	●		○					10	3.4	6	0.8	11°
	NEW ZPMT100320ZER-PL	M		●	●							10	3.4	6	2.0	11°

● Standard stock items ◎: soon to be stocked ○: Soon to be deleted

QM MAX QXP TYPE

■ Definition of corner radius for programming

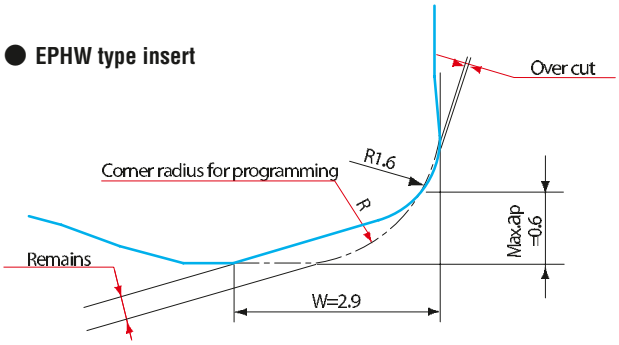
● EPMT/W type insert



(mm)

Corner radius for programming	Over cut	Remains
R1.0	0	0.57
R1.5 (Recommended)	0	0.45
R2.0	0.04	0.33
R2.5	0.21	0.21
R3.0	0.40	0.09

● EPHW type insert

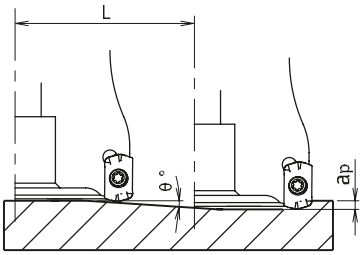


(mm)

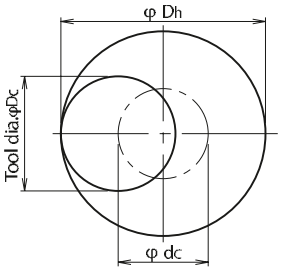
Corner radius for programming	Over cut	Remains
R1.0	0	0.42
R1.5 (Recommended)	0	0.33
R2.0	0.01	0.23
R2.5	0.17	0.14
R3.0	0.37	0.05

■ Instructions for profile milling with EMPT/W type insert

● Ramping



● Helical interpolation



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circle should not exceed max.depth of cut ap.

● Down cutting is recommended. Tool pass rotation should be counter-clockwise.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
● In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
● Long continous chips may come out in case of drilling, confirm the safe cutting conditions.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Max. depth of cut ap (mm)	Ramping		Helical interpolation	
				Max. ramping angle θ°	Total cutting length L(mm) at max. ap	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)
QXP-*040R-16	40	34.1	1	0°30′	114.6	70	80
QXP-*050R(-22)	50	44.1	1	0°24′	143.2	90	98
QXP-8052R-22	52	46.1	1	0°21′	163.7	94	102
QXP-8063R(-22)	63	57.1	1	0°18′	191	116	124
QXP-8066R(-27)	66	60.1	1	0°18′	191	122	130

Note) The ramping angle 0.5° or less is recommended (please refer to the above table).

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● EPMT/W type insert

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia. (mm) 40							
			No. of teeth 6N				No. of teeth 7N			
			ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC7560 (JC8050) (JC5118)	~150	0.8	~32	1,250	6,000	0.8	~32	1,250	7,000
		200	0.6	~32	1,100	5,300	0.6	~32	1,100	6,200
		250	0.5	~32	1,000	4,800	0.5	~32	1,000	5,600
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC8050) (JC5118)	~150	0.8	~32	1,250	6,000	0.8	~32	1,250	7,000
		200	0.6	~32	1,100	5,300	0.6	~32	1,100	6,200
		250	0.5	~32	1,000	4,800	0.5	~32	1,000	5,600
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC7560 (JC8050) (JC5118)	~150	0.8	~32	1,250	6,000	0.8	~32	1,250	7,000
		200	0.6	~32	1,100	5,300	0.6	~32	1,100	6,200
		250	0.5	~32	1,000	4,800	0.5	~32	1,000	5,600
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8050 (JC5118)	~150	0.6	~32	680	2,850	0.6	~32	680	3,300
		200	0.4	~32	640	2,650	0.4	~32	640	3,100
		250	0.3	~32	600	2,500	0.3	~32	600	2,900
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC5118 (JC8050)	~150	0.4	~32	520	1,550	0.4	~32	520	1,800
		200	0.2	~32	520	1,550	0.2	~32	520	1,800
		250	—	—	—	—	—	—	—	—
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	JC5118 EPMW type	~150	0.15	~32	240	230	0.15	~32	240	270
		200	0.1	~32	220	210	0.1	~32	220	250
		250	—	—	—	—	—	—	—	—
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 (JC7560)	~150	0.8	~32	1,100	6,600	0.8	~32	1,100	7,700
		200	0.6	~32	1,000	6,000	0.6	~32	1,000	7,000
		250	0.5	~32	900	5,400	0.5	~32	900	6,300
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Stain less steel SUS304 Below 250HB	JC7560 (JC8050)	~150	0.6	~32	1,200	5,400	0.6	~32	1,200	6,300
		200	0.4	~32	1,100	4,950	0.4	~32	1,100	5,800
		250	0.3	~32	1,000	4,450	0.3	~32	1,000	5,200
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Titanium alloy (Ti-6Al-4V)	JC7560 (JC5118) (JC8050)	~150	0.6	~32	480	1,150	0.6	~32	480	1,350
		200	0.4	~32	440	1,050	0.4	~32	440	1,230
		250	0.3	~32	440	1,050	0.3	~32	440	1,230
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Inconel (INCO718)	JC5118 (JC8050) (JC7560)	~150	0.6	~32	240	430	0.6	~32	240	500
		200	0.4	~32	200	360	0.4	~32	200	420
		250	0.3	~32	200	360	0.3	~32	200	420
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

Please refer page C043.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● EPMT/W type insert

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia. (mm) 50 No. of teeth 7N ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	50/52 No. of teeth 8N ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC7560 (JC8050) (JC5118)	~150	1	~40	1,000	6,300	1	~40	1,000	7,200
		200	0.8	~40	1,000	5,950	0.8	~40	1,000	6,800
		250	0.6	~40	900	5,350	0.6	~40	900	6,100
		300	0.5	~40	800	4,750	0.5	~40	800	5,450
		350	0.4	~40	800	4,750	0.4	~40	800	5,450
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC8050) (JC5118)	~150	1	~40	1,000	6,300	1	~40	1,000	7,200
		200	0.8	~40	1,000	5,950	0.8	~40	1,000	6,800
		250	0.6	~40	900	5,350	0.6	~40	900	6,100
		300	0.5	~40	800	4,750	0.5	~40	800	5,450
		350	0.4	~40	800	4,750	0.4	~40	800	5,450
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC7560 (JC8050) (JC5118)	~150	1	~40	1,000	6,300	1	~40	1,000	7,200
		200	0.8	~40	1,000	5,950	0.8	~40	1,000	6,800
		250	0.6	~40	900	5,350	0.6	~40	900	6,100
		300	0.5	~40	800	4,750	0.5	~40	800	5,450
		350	0.4	~40	800	4,750	0.4	~40	800	5,450
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8050 (JC5118)	~150	0.8	~40	540	2,600	0.8	~40	540	3,000
		200	0.6	~40	540	2,600	0.6	~40	540	3,000
		250	0.4	~40	510	2,500	0.4	~40	510	2,850
		300	0.3	~40	480	2,350	0.3	~40	480	2,700
		350	0.3	~40	480	2,000	0.3	~40	480	2,300
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC5118 (JC8050)	~150	0.6	~40	400	1,400	0.6	~40	400	1,600
		200	0.4	~40	400	1,400	0.4	~40	400	1,600
		250	0.2	~40	400	1,400	0.2	~40	400	1,600
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	JC5118 EPMW-type	~150	0.15	~40	190	210	0.15	~40	190	240
		200	0.15	~40	170	190	0.15	~40	170	220
		250	0.1	~40	170	190	0.1	~40	170	220
		300	—	—	—	—	—	—	—	—
		350	—	—	—	—	—	—	—	—
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 (JC7560)	~150	1	~40	900	7,500	1	~40	900	8,600
		200	0.8	~40	900	6,300	0.8	~40	900	7,200
		250	0.6	~40	850	5,950	0.6	~40	850	6,800
		300	0.5	~40	800	5,600	0.5	~40	800	6,400
		350	0.4	~40	800	5,600	0.4	~40	800	6,400
Stainless steel SUS304 Below 250HB	JC7560 (JC8050)	~150	0.8	~40	950	5,600	0.8	~40	950	6,400
		200	0.6	~40	950	5,000	0.6	~40	950	5,700
		250	0.4	~40	900	4,700	0.4	~40	900	5,400
		300	0.3	~40	900	4,700	0.3	~40	900	5,400
		350	0.3	~40	850	4,450	0.3	~40	850	5,100
Titanium alloy (Ti-6Al-4V)	JC7560 (JC5118) (JC8050)	~150	0.8	~40	380	1,050	0.8	~40	380	1,220
		200	0.6	~40	380	1,050	0.6	~40	380	1,220
		250	0.4	~40	350	980	0.4	~40	350	1,120
		300	0.3	~40	350	980	0.3	~40	350	1,120
		350	0.3	~40	320	890	0.3	~40	320	1,020
Inconel (INCO718)	JC5118 (JC8050) (JC7560)	~150	0.8	~40	190	390	0.8	~40	190	450
		200	0.6	~40	190	390	0.6	~40	190	450
		250	0.4	~40	160	330	0.4	~40	160	380
		300	0.3	~40	160	330	0.3	~40	160	380
		350	0.3	~40	130	270	0.3	~40	130	310

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

Please refer page C043.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● EPMT/W type insert

Work Materials	Insert Grades	Over-hung Length ℓ (mm)	Tool dia. (mm) 63/66 No. of teeth 8N ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC7560 (JC8050) (JC5118)	~200	1	~50	800	5,750
		250	0.8	~50	800	5,450
		300	0.6	~50	720	4,900
		350	0.5	~50	640	4,350
		400	0.4	~50	640	4,350
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC8050) (JC5118)	~200	1	~50	800	5,750
		250	0.8	~50	800	5,450
		300	0.6	~50	720	4,900
		350	0.5	~50	640	4,350
		400	0.4	~50	640	4,350
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC7560 (JC8050) (JC5118)	~200	1	~50	800	5,750
		250	0.8	~50	800	5,450
		300	0.6	~50	720	4,900
		350	0.5	~50	640	4,350
		400	0.4	~50	640	4,350
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8050 (JC5118)	~200	0.8	~50	430	2,400
		250	0.6	~50	430	2,400
		300	0.4	~50	410	2,300
		350	0.3	~50	370	2,100
		400	0.3	~50	370	1,800
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC5118 (JC8050)	~200	0.6	~50	320	1,300
		250	0.4	~50	320	1,300
		300	0.2	~50	320	1,300
		350	—	—	—	—
		400	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	JC5118 EPMW-type	~200	0.15	~50	150	190
		250	0.15	~50	130	170
		300	0.1	~50	130	170
		350	—	—	—	—
		400	—	—	—	—
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 (JC7560)	~200	1	~50	720	6,900
		250	0.8	~50	720	5,750
		300	0.6	~50	680	5,450
		350	0.5	~50	640	5,100
		400	0.4	~50	640	5,100
Stainless steel SUS304 Below 250HB	JC7560 (JC8050)	~200	0.8	~50	750	5,050
		250	0.6	~50	750	4,500
		300	0.4	~50	710	4,250
		350	0.3	~50	710	4,250
		400	0.3	~50	670	4,000
Titanium alloy (Ti-6Al-4V)	JC7560 (JC5118) (JC8050)	~200	0.8	~50	300	960
		250	0.6	~50	300	960
		300	0.4	~50	280	900
		350	0.3	~50	280	900
		400	0.3	~50	250	800
Inconel (INCO718)	JC5118 (JC8050) (JC7560)	~200	0.8	~50	150	350
		250	0.6	~50	150	350
		300	0.4	~50	130	310
		350	0.3	~50	130	310
		400	0.3	~50	100	240

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

Please refer page C043.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/HIGH SPEED MACHINING

● EPHW type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		40					40				
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8118	~100	0.3	~32	720	3,460	~100	0.3	~32	720	4,030
		150	0.25	~32	650	2,500	150	0.25	~32	650	2,910
		200	0.20	~32	580	1,670	200	0.20	~32	580	1,950
		250	0.1	~32	580	1,670	250	0.1	~32	580	1,950
		300	—	—	—	—	300	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~100	0.2	~32	640	1,150	~100	0.2	~32	640	1,340
		150	0.15	~32	580	940	150	0.15	~32	580	1,100
		200	0.1	~32	510	740	200	0.1	~32	510	860
		250	—	—	—	—	250	—	—	—	—
		300	—	—	—	—	300	—	—	—	—

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

● EPHW type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		50					50/52				
		No. of teeth 7N					No. of teeth 8N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n(min-1)	Vf (mm/min)
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8118	~150	0.3	~40	570	3,190	~150	0.3	~40	570	3,650
		200	0.25	~40	510	2,280	200	0.25	~40	510	2,610
		250	0.20	~40	460	1,550	250	0.20	~40	460	1,770
		300	0.1	~40	460	1,550	300	0.1	~40	460	1,770
		350	—	—	—	—	350	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	0.2	~40	510	1,070	~150	0.2	~40	510	1,220
		200	0.15	~40	460	870	200	0.15	~40	460	990
		250	0.1	~40	410	690	250	0.1	~40	410	790
		300	—	—	—	—	300	—	—	—	—
		350	—	—	—	—	350	—	—	—	—

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/HIGH SPEED MACHINING

● EPHW type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8118	~200	0.3	~50	450	2,880					
		250	0.25	~50	410	2,100					
		300	0.2	~50	360	1,380					
		350	0.1	~50	360	1,380					
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~200	0.2	~50	400	960					
		250	0.15	~50	360	780					
		300	0.1	~50	320	610					
		350	—	—	—	—					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

■ NOTE for EPMT/W type insert

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● ZPMT type insert

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC5118 (JC8050)	~100	~6.0	~28.0	1,270	920	~100	~6.0	~28.0	1,270	1,070
		150	~5.0	~20.0	1,140	750	150	~5.0	~20.0	1,140	880
		200	~4.0	~10.0	1,010	610	200	~4.0	~10.0	1,010	710
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~100	~6.0	~28.0	1,190	590	~100	~6.0	~28.0	1,190	690
		150	~5.0	~20.0	1,070	450	150	~5.0	~20.0	1,070	520
		200	~4.0	~10.0	950	320	200	~4.0	~10.0	950	370
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 (JC5118)	~100	~6.0	~28.0	950	570	~100	~6.0	~28.0	950	660
		150	~5.0	~20.0	860	460	150	~5.0	~20.0	860	530
		200	~4.0	~10.0	760	360	200	~4.0	~10.0	760	420
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~100	~6.0	~32.0	1,190	860	~100	~6.0	~32.0	1,190	1,000
		150	~5.0	~24.0	1,070	710	150	~5.0	~24.0	1,070	820
		200	~4.0	~12.0	950	570	200	~4.0	~12.0	950	670
Stainless steel SUS304 Below 250HB	JC8050	~100	~6.0	~28.0	1,190	590	~100	~6.0	~28.0	1,190	690
		150	~5.0	~20.0	1,070	450	150	~5.0	~20.0	1,070	520
		200	~4.0	~10.0	950	320	200	~4.0	~10.0	950	370

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● ZPMT type insert

Work Materials	Insert Grades	Tool dia. (mm) 50 No. of teeth 7N					50/52 No. of teeth 8N				
		ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC5118 (JC8050)	~150	~6.0	~35.0	1,020	860	~150	~6.0	~35.0	1,020	980
		200	~5.0	~25.0	920	710	200	~5.0	~25.0	920	810
		250	~4.0	~12.0	820	570	250	~4.0	~12.0	820	650
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~150	~6.0	~35.0	950	670	~150	~6.0	~35.0	950	760
		200	~5.0	~25.0	860	540	200	~5.0	~25.0	860	620
		250	~4.0	~12.0	760	430	250	~4.0	~12.0	760	490
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 (JC5118)	~150	~6.0	~35.0	760	530	~150	~6.0	~35.0	760	610
		200	~5.0	~25.0	680	430	200	~5.0	~25.0	680	490
		250	~4.0	~12.0	610	340	250	~4.0	~12.0	610	390
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~150	~6.0	~40.0	950	800	~150	~6.0	~40.0	950	910
		200	~5.0	~30.0	860	670	200	~5.0	~30.0	860	760
		250	~4.0	~15.0	760	530	250	~4.0	~15.0	760	610
Stainless steel SUS304 Below 250HB	JC8050	~150	~6.0	~35.0	950	670	~150	~6.0	~35.0	950	760
		200	~5.0	~25.0	860	540	200	~5.0	~25.0	860	620
		250	~4.0	~12.0	760	430	250	~4.0	~12.0	760	490

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● ZPMT type insert

Work Materials	Insert Grades	Tool dia. (mm) 63/66 No. of teeth 8N ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)					
Carbon steel S55C, S50C (C50, C55) Below 250HB	JC5118 (JC8050)	~200	~6.0	~42.0	800	770					
		250	~5.0	~30.0	720	630					
		300	~4.0	~16.0	640	500					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~200	~6.0	~42.0	750	600					
		250	~5.0	~30.0	680	490					
		300	~4.0	~16.0	600	390					
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 (JC5118)	~200	~6.0	~42.0	600	480					
		250	~5.0	~30.0	540	390					
		300	~4.0	~16.0	480	300					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~200	~6.0	~48.0	750	720					
		250	~5.0	~35.0	680	600					
		300	~4.0	~18.0	600	480					
Stainless steel SUS304 Below 250HB	JC8050	~200	~6.0	~42.0	750	600					
		250	~5.0	~30.0	680	490					
		300	~4.0	~16.0	600	390					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/LOW DEPTH OF CUT AND HIGH FEED

● ZPMT100320ZER insert

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC5118 (JC8050)	~100	0.4	~32	1,350	4,860	~100	0.4	~32	1,350	5,670
		150	0.3	~32	1,350	4,860	150	0.3	~32	1,350	5,670
		200	0.25	~32	1,220	3,940	200	0.25	~32	1,220	4,590
		250	0.15	~32	1,080	3,110	250	0.15	~32	1,080	3,630
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~100	0.4	~32	1,270	4,570	~100	0.4	~32	1,270	5,330
		150	0.3	~32	1,270	4,570	150	0.3	~32	1,270	5,330
		200	0.25	~32	1,140	3,700	200	0.25	~32	1,140	4,320
		250	0.15	~32	1,020	2,920	250	0.15	~32	1,020	3,410
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8050 (JC5118)	~100	0.4	~32	1,270	4,570	~100	0.4	~32	1,270	5,330
		150	0.3	~32	1,270	4,570	150	0.3	~32	1,270	5,330
		200	0.25	~32	1,140	3,700	200	0.25	~32	1,140	4,320
		250	0.15	~32	1,020	2,920	250	0.15	~32	1,020	3,410
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~100	0.4	~32	1,190	5,000	~100	0.4	~32	1,190	5,830
		150	0.35	~32	1,190	5,000	150	0.35	~32	1,190	5,830
		200	0.3	~32	1,070	4,050	200	0.3	~32	1,070	4,720
		250	0.2	~32	950	3,200	250	0.2	~32	950	3,730
Stainless steel SUS304 Below 250HB	JC8050	~100	0.4	~32	1,350	4,860	~100	0.4	~32	1,350	5,670
		150	0.3	~32	1,350	4,860	150	0.3	~32	1,350	5,670
		200	0.25	~32	1,220	3,940	200	0.25	~32	1,220	4,590
		250	0.15	~32	1,080	3,110	250	0.15	~32	1,080	3,630
Titanium alloy (Ti-6Al-4V)	JC5118 (JC8050)	~100	0.3	~32	480	1,150	~100	0.3	~32	480	1,340
		150	0.2	~32	480	1,150	150	0.2	~32	480	1,340
		200	0.15	~32	440	1,050	200	0.15	~32	440	1,220
		250	0.1	~32	440	1,050	250	0.1	~32	440	1,220
Inconel (INCO718)	JC5118 (JC8050)	~100	0.3	~32	240	430	~100	0.3	~32	240	500
		150	0.2	~32	240	430	150	0.2	~32	240	500
		200	0.15	~32	200	360	200	0.15	~32	200	420
		250	0.1	~32	200	360	250	0.1	~32	200	420

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/LOW DEPTH OF CUT AND HIGH FEED

● ZPMT100320ZER insert

Work Materials	Insert Grades	Tool dia. (mm)									
		50					50/52				
		No. of teeth 7N					No. of teeth 8N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC5118 (JC8050)	~150	0.4	~40	1,080	4,540	~150	0.4	~40	1,080	5,190
		200	0.3	~40	1,080	4,540	200	0.3	~40	1,080	5,190
		250	0.25	~40	970	3,680	250	0.25	~40	970	4,200
		300	0.2	~40	860	2,910	300	0.2	~40	860	3,320
		350	0.15	~40	860	2,910	350	0.15	~40	860	3,320
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~150	0.4	~40	1,020	4,280	~150	0.4	~40	1,020	4,890
		200	0.3	~40	1,020	4,280	200	0.3	~40	1,020	4,890
		250	0.25	~40	920	3,470	250	0.25	~40	920	3,960
		300	0.2	~40	820	2,740	300	0.2	~40	820	3,130
		350	0.15	~40	820	2,740	350	0.15	~40	820	3,130
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8050 (JC5118)	~150	0.4	~40	1,020	4,280	~150	0.4	~40	1,020	4,890
		200	0.3	~40	1,020	4,280	200	0.3	~40	1,020	4,890
		250	0.25	~40	920	3,470	250	0.25	~40	920	3,960
		300	0.2	~40	820	2,740	300	0.2	~40	820	3,130
		350	0.15	~40	820	2,740	350	0.15	~40	820	3,130
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~150	0.4	~40	950	4,660	~150	0.4	~40	950	5,330
		200	0.35	~40	950	4,660	200	0.35	~40	950	5,330
		250	0.3	~40	860	3,770	250	0.3	~40	860	4,320
		300	0.25	~40	760	2,980	300	0.25	~40	760	3,410
		350	0.2	~40	760	2,980	350	0.2	~40	760	3,410
Stainless steel SUS304 Below 250HB	JC8050	~150	0.4	~40	1,080	4,540	~150	0.4	~40	1,080	5,190
		200	0.3	~40	1,080	4,540	200	0.3	~40	1,080	5,190
		250	0.25	~40	970	3,680	250	0.25	~40	970	4,200
		300	0.15	~40	970	3,680	300	0.15	~40	970	4,200
		350	0.15	~40	860	2,910	350	0.15	~40	860	3,320
Titanium alloy (Ti-6Al-4V)	JC5118 (JC8050)	~150	0.3	~40	380	1,050	~150	0.3	~40	380	1,220
		200	0.25	~40	380	1,050	200	0.25	~40	380	1,220
		250	0.15	~40	350	980	250	0.15	~40	350	1,120
		300	0.1	~40	350	980	300	0.1	~40	350	1,120
		350	0.1	~40	320	890	350	0.1	~40	320	1,020
Inconel (INCO718)	JC5118 (JC8050)	~150	0.3	~40	190	390	~150	0.3	~40	190	450
		200	0.25	~40	190	390	200	0.25	~40	190	450
		250	0.15	~40	160	330	250	0.15	~40	160	380
		300	0.1	~40	160	330	300	0.1	~40	160	380
		350	0.1	~40	130	270	350	0.1	~40	130	310

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/LOW DEPTH OF CUT AND HIGH FEED

● ZPMT100320ZER insert

Work Materials	Insert Grades	Tool dia. (mm)									
		63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)					
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC5118 (JC8050)	~200	0.4	~50	860	4,130					
		250	0.3	~50	860	4,130					
		300	0.25	~50	770	3,350					
		350	0.2	~50	770	3,350					
		400	0.15	~50	640	2,640					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~200	0.4	~50	810	3,890					
		250	0.3	~50	810	3,890					
		300	0.25	~50	730	3,150					
		350	0.2	~50	730	3,150					
		400	0.15	~50	650	2,490					
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8050 (JC5118)	~200	0.4	~50	810	3,890					
		250	0.3	~50	810	3,890					
		300	0.25	~50	730	3,150					
		350	0.2	~50	730	3,150					
		400	0.15	~50	650	2,490					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~200	0.4	~50	760	4,260					
		250	0.35	~50	760	4,260					
		300	0.3	~50	680	3,450					
		350	0.25	~50	680	3,450					
		400	0.2	~50	610	2,730					
Stainless steel SUS304 Below 250HB	JC8050	~200	0.4	~50	860	4,130					
		250	0.3	~50	860	4,130					
		300	0.25	~50	770	3,350					
		350	0.2	~50	770	3,350					
		400	0.15	~50	640	2,640					
Titanium alloy (Ti-6Al-4V)	JC5118 (JC8050)	~200	0.3	~50	300	960					
		250	0.25	~50	300	960					
		300	0.2	~50	280	900					
		350	0.15	~50	280	900					
		400	0.1	~50	250	800					
Inconel (INCO718)	JC5118 (JC8050)	~200	0.3	~50	150	350					
		250	0.25	~50	150	350					
		300	0.2	~50	130	310					
		350	0.15	~50	130	310					
		400	0.1	~50	100	240					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/UP & DOWN FINISHING

● YPHW-15/-F type insert

Work Materials	Insert Grades	Tool dia. (mm)														
		40										50				
		No. of teeth 6N					No. of teeth 7N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015 (DH102)	~150	0.88	<0.2	3,580	3,870	~150	0.88	<0.2	3,580	4,520	~150	1	<0.2	2,860	3,600
		200	0.88	<0.2	3,580	3,870	200	0.88	<0.2	3,580	4,520	200	1	<0.2	2,860	3,600
		250	0.88	<0.2	3,580	3,220	250	0.88	<0.2	3,580	3,760	250	1	<0.2	2,860	3,600
		300	0.88	<0.2	2,790	2,010	300	0.88	<0.2	2,790	2,350	300	1	<0.2	2,860	3,000
		350	—	—	—	—	350	—	—	—	—	350	1	<0.2	2,860	3,000
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015 (DH102)	~150	0.88	<0.2	3,180	3,430	~150	0.88	<0.2	3,180	4,000	~150	1	<0.2	2,550	3,210
		200	0.88	<0.2	3,180	3,430	200	0.88	<0.2	3,180	4,000	200	1	<0.2	2,550	3,210
		250	0.88	<0.2	3,180	2,860	250	0.88	<0.2	3,180	3,340	250	1	<0.2	2,550	3,210
		300	0.88	<0.2	2,390	1,720	300	0.88	<0.2	2,390	2,010	300	1	<0.2	2,550	2,680
		350	—	—	—	—	350	—	—	—	—	350	1	<0.2	2,550	2,680
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	0.88	<0.2	2,790	2,510	~150	0.88	<0.2	2,790	2,930	~150	1	<0.2	2,230	2,340
		200	0.88	<0.2	2,790	2,510	200	0.88	<0.2	2,790	2,930	200	1	<0.2	2,230	2,340
		250	0.88	<0.2	2,790	2,010	250	0.88	<0.2	2,790	2,350	250	1	<0.2	2,230	2,340
		300	0.88	<0.2	1,990	1,190	300	0.88	<0.2	1,990	1,390	300	1	<0.2	2,230	1,870
		350	—	—	—	—	350	—	—	—	—	350	1	<0.2	2,230	1,870
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~150	0.88	<0.2	1,990	1,430	~150	0.88	<0.2	1,990	1,430	~150	1	<0.2	1,590	1,340
		200	0.88	<0.2	1,990	1,430	200	0.88	<0.2	1,990	1,430	200	1	<0.2	1,590	1,340
		250	0.88	<0.2	1,990	1,150	250	0.88	<0.2	1,990	1,150	250	1	<0.2	1,590	1,340
		300	0.88	<0.2	1,420	680	300	0.88	<0.2	1,420	680	300	1	<0.2	1,590	1,070
		350	—	—	—	—	350	—	—	—	—	350	1	<0.2	1,590	1,070
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~150	0.88	<0.15	1,350	810	~150	0.88	<0.15	1,350	950	~150	1	<0.15	1,080	760
		200	0.88	<0.15	1,350	810	200	0.88	<0.15	1,350	950	200	1	<0.15	1,080	760
		250	0.88	<0.15	1,350	650	250	0.88	<0.15	1,350	760	250	1	<0.15	1,080	760
		300	0.88	<0.15	960	390	300	0.88	<0.15	960	460	300	1	<0.15	1,080	610
		350	—	—	—	—	350	—	—	—	—	350	1	<0.15	1,080	610
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	0.88	<0.2	4,380	5,260	~150	0.88	<0.2	4,380	6,140	~150	1	<0.2	3,500	5,390
		200	0.88	<0.2	4,380	5,260	200	0.88	<0.2	4,380	6,140	200	1	<0.2	3,500	5,390
		250	0.88	<0.2	3,580	4,300	250	0.88	<0.2	3,580	5,020	250	1	<0.2	3,500	5,390
		300	0.88	<0.2	3,580	3,220	300	0.88	<0.2	3,580	3,760	300	1	<0.2	2,860	4,000
		350	—	—	—	—	350	—	—	—	—	350	1	<0.2	2,860	4,000

ℓ: Overhunglength, Pf: Pick feed, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX

QXP TYPE

■ RECOMMENDED CUTTING CONDITIONS/UP & DOWN FINISHING

● YPHW-15/-F type insert

Work Materials	Insert Grades	Tool dia. (mm)															
		50/52					63/66										
		No. of teeth 8N					No. of teeth 8N										
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)						
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015 (DH102)	~150	1	<0.2	2,860	4,110	~200	1.12	<0.2	2,270	3,260						
		200	1	<0.2	2,860	4,110	250	1.12	<0.2	2,270	3,260						
		250	1	<0.2	2,860	4,110	300	1.12	<0.2	2,270	3,260						
		300	1	<0.2	2,860	3,430	350	1.12	<0.2	2,270	2,720						
		350	1	<0.2	2,860	3,430	400	1.12	<0.2	2,270	2,720						
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015 (DH102)	~150	1	<0.2	2,550	3,670	~200	1.12	<0.2	2,020	2,910						
		200	1	<0.2	2,550	3,670	250	1.12	<0.2	2,020	2,910						
		250	1	<0.2	2,550	3,670	300	1.12	<0.2	2,020	2,910						
		300	1	<0.2	2,550	3,060	350	1.12	<0.2	2,020	2,420						
		350	1	<0.2	2,550	3,060	400	1.12	<0.2	2,020	2,420						
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	1	<0.2	2,230	2,670	~200	1.12	<0.2	1,770	2,120						
		200	1	<0.2	2,230	2,670	250	1.12	<0.2	1,770	2,120						
		250	1	<0.2	2,230	2,670	300	1.12	<0.2	1,770	2,120						
		300	1	<0.2	2,230	2,140	350	1.12	<0.2	1,770	1,700						
		350	1	<0.2	2,230	2,140	400	1.12	<0.2	1,770	1,700						
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~150	1	<0.2	1,590	1,530	~200	1.12	<0.2	1,260	1,210						
		200	1	<0.2	1,590	1,530	250	1.12	<0.2	1,260	1,210						
		250	1	<0.2	1,590	1,530	300	1.12	<0.2	1,260	1,210						
		300	1	<0.2	1,590	1,220	350	1.12	<0.2	1,260	970						
		350	1	<0.2	1,590	1,220	400	1.12	<0.2	1,260	970						
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~150	1	<0.15	1,080	870	~200	1.12	<0.15	860	690						
		200	1	<0.15	1,080	870	250	1.12	<0.15	860	690						
		250	1	<0.15	1,080	870	300	1.12	<0.15	860	690						
		300	1	<0.15	1,080	700	350	1.12	<0.15	860	550						
		350	1	<0.15	1,080	700	400	1.12	<0.15	860	550						
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	1	<0.2	3,500	6,160	~200	1.12	<0.2	2,780	4,890						
		200	1	<0.2	3,500	6,160	250	1.12	<0.2	2,780	4,890						
		250	1	<0.2	3,500	6,160	300	1.12	<0.2	2,780	4,890						
		300	1	<0.2	2,860	4,570	350	1.12	<0.2	2,270	3,630						
		350	1	<0.2	2,860	4,570	400	1.12	<0.2	2,270	3,630						

ℓ: Overhung length, Pf: Pick feed, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FACE FINISHING

● YPHW-15/-F type insert

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015) (DH102)	~150	1.5	<0.2	5,170	4,650	~150	1.5	<0.2	5,170	5,430
		200	1.5	<0.2	5,170	4,650	200	1.5	<0.2	5,170	5,430
		250	1	<0.2	3,580	2,580	250	1	<0.2	3,580	3,010
		300	0.7	<0.2	3,580	2,360	300	0.7	<0.2	3,580	2,750
		350	—	—	—	—	350	—	—	—	—
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015) (DH102)	~150	1.5	<0.2	3,580	3,220	~150	1.5	<0.2	3,580	3,760
		200	1.5	<0.2	3,580	3,220	200	1.5	<0.2	3,580	3,760
		250	1	<0.2	2,790	2,010	250	1	<0.2	2,790	2,350
		300	0.7	<0.2	2,790	1,670	300	0.7	<0.2	2,790	1,950
		350	—	—	—	—	350	—	—	—	—
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	1.5	<0.2	3,580	3,220	~150	1.5	<0.2	3,580	3,760
		200	1.5	<0.2	3,580	3,220	200	1.5	<0.2	3,580	3,760
		250	1	<0.2	2,790	2,010	250	1	<0.2	2,790	2,350
		300	0.7	<0.2	2,790	1,670	300	0.7	<0.2	2,790	1,950
		350	—	—	—	—	350	—	—	—	—
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~150	1.5	<0.2	3,180	2,290	~150	1.5	<0.2	3,180	2,670
		200	1.5	<0.2	3,180	2,290	200	1.5	<0.2	3,180	2,670
		250	1	<0.2	2,790	1,670	250	1	<0.2	2,790	1,950
		300	0.7	<0.2	2,790	1,340	300	0.7	<0.2	2,790	1,560
		350	—	—	—	—	350	—	—	—	—
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015 (DH102)	~150	1.5	<0.2	1,590	950	~150	1.5	<0.2	1,590	1,110
		200	1.5	<0.2	1,590	950	200	1.5	<0.2	1,590	1,110
		250	1	<0.2	1,350	650	250	1	<0.2	1,350	760
		300	0.7	<0.2	1,350	650	300	0.7	<0.2	1,350	760
		350	—	—	—	—	350	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	1	<0.2	1,430	860	~150	1	<0.2	1,430	1,000
		200	1	<0.2	1,430	860	200	1	<0.2	1,430	1,000
		250	0.7	<0.2	1,190	570	250	0.7	<0.2	1,190	670
		300	0.5	<0.2	1,190	360	300	0.5	<0.2	1,190	420
		350	—	—	—	—	350	—	—	—	—
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	1.5	<0.2	4,380	3,940	~150	1.5	<0.2	4,380	4,600
		200	1.5	<0.2	4,380	3,940	200	1.5	<0.2	4,380	4,600
		250	1	<0.2	3,580	2,580	250	1	<0.2	3,580	3,010
		300	0.7	<0.2	3,580	2,150	300	0.7	<0.2	3,580	2,510
		350	—	—	—	—	350	—	—	—	—
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~150	1.5	<0.2	3,580	3,220	~150	1.5	<0.2	3,580	3,760
		200	1.5	<0.2	3,580	3,220	200	1.5	<0.2	3,580	3,760
		250	1	<0.2	2,790	2,010	250	1	<0.2	2,790	2,350
		300	0.7	<0.2	2,790	1,670	300	0.7	<0.2	2,790	1,950
		350	—	—	—	—	350	—	—	—	—
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~150	1.5	<0.2	720	520	~150	1.5	<0.2	720	610
		200	1.5	<0.2	720	520	200	1.5	<0.2	720	610
		250	1	<0.2	560	340	250	1	<0.2	560	400
		300	0.7	<0.2	560	270	300	0.7	<0.2	560	320
		350	—	—	—	—	350	—	—	—	—

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FACE FINISHING

● YPHW-15/-F type insert

Work Materials	Insert Grades	Tool dia. (mm) 50 No. of teeth 7N					Tool dia. (mm) 50/52 No. of teeth 8N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015) (DH102)	~150	2	<0.2	4,140	4,350	~150	2	<0.2	4,140	4,970
		200	2	<0.2	4,140	4,350	200	2	<0.2	4,140	4,970
		250	2	<0.2	4,140	4,350	250	2	<0.2	4,140	4,970
		300	1.5	<0.2	2,860	2,400	300	1.5	<0.2	2,860	2,740
		350	1.5	<0.2	2,860	2,400	350	1.5	<0.2	2,860	2,740
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015) (DH102)	~150	2	<0.2	2,860	3,000	~150	2	<0.2	2,860	3,430
		200	2	<0.2	2,860	3,000	200	2	<0.2	2,860	3,430
		250	2	<0.2	2,860	3,000	250	2	<0.2	2,860	3,430
		300	1.5	<0.2	2,860	2,400	300	1.5	<0.2	2,860	2,740
		350	1.5	<0.2	2,860	2,400	350	1.5	<0.2	2,860	2,740
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	2	<0.2	2,860	3,000	~150	2	<0.2	2,860	3,430
		200	2	<0.2	2,860	3,000	200	2	<0.2	2,860	3,430
		250	2	<0.2	2,860	3,000	250	2	<0.2	2,860	3,430
		300	1.5	<0.2	2,860	2,400	300	1.5	<0.2	2,860	2,740
		350	1.5	<0.2	2,860	2,400	350	1.5	<0.2	2,860	2,740
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~150	2	<0.2	2,550	2,140	~150	2	<0.2	2,550	2,450
		200	2	<0.2	2,550	2,140	200	2	<0.2	2,550	2,450
		250	2	<0.2	2,550	2,140	250	2	<0.2	2,550	2,450
		300	1.5	<0.2	2,230	1,560	300	1.5	<0.2	2,230	1,780
		350	1.5	<0.2	2,230	1,560	350	1.5	<0.2	2,230	1,780
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015 (DH102)	~150	1.5	<0.2	1,270	890	~150	1.5	<0.2	1,270	1,020
		200	1.5	<0.2	1,270	890	200	1.5	<0.2	1,270	1,020
		250	1.5	<0.2	1,270	890	250	1.5	<0.2	1,270	1,020
		300	1.2	<0.2	1,080	600	300	1.2	<0.2	1,080	690
		350	1.2	<0.2	1,080	600	350	1.2	<0.2	1,080	690
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	1.5	<0.2	1,150	810	~150	1.5	<0.2	1,150	930
		200	1.5	<0.2	1,150	810	200	1.5	<0.2	1,150	930
		250	1.5	<0.2	1,150	810	250	1.5	<0.2	1,150	930
		300	1	<0.2	950	530	300	1	<0.2	950	610
		350	1	<0.2	950	530	350	1	<0.2	950	610
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	2	<0.2	3,500	3,680	~150	2	<0.2	3,500	4,210
		200	2	<0.2	3,500	3,680	200	2	<0.2	3,500	4,210
		250	2	<0.2	3,500	3,680	250	2	<0.2	3,500	4,210
		300	1.5	<0.2	2,860	2,400	300	1.5	<0.2	2,860	2,740
		350	1.5	<0.2	2,860	2,400	350	1.5	<0.2	2,860	2,740
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~150	2	<0.2	2,860	3,000	~150	2	<0.2	2,860	3,430
		200	2	<0.2	2,860	3,000	200	2	<0.2	2,860	3,430
		250	2	<0.2	2,860	3,000	250	2	<0.2	2,860	3,430
		300	1.5	<0.2	2,860	2,400	300	1.5	<0.2	2,860	2,740
		350	1.5	<0.2	2,860	2,400	350	1.5	<0.2	2,860	2,740
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~150	2	<0.2	570	480	~150	2	<0.2	570	550
		200	2	<0.2	570	480	200	2	<0.2	570	550
		250	2	<0.2	570	480	250	2	<0.2	570	550
		300	1.5	<0.2	450	320	300	1.5	<0.2	450	370
		350	1.5	<0.2	450	320	350	1.5	<0.2	450	370

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FACE FINISHING

● YPHW-15/-F type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)					
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015) (DH102)	~200	2	<0.2	3,290	3,950					
		250	2	<0.2	3,290	3,950					
		300	2	<0.2	3,290	3,950					
		350	1.5	<0.2	2,270	2,180					
		400	1.5	<0.2	2,270	2,180					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015) (DH102)	~200	2	<0.2	2,270	2,720					
		250	2	<0.2	2,270	2,720					
		300	2	<0.2	2,270	2,720					
		350	1.5	<0.2	2,270	2,180					
		400	1.5	<0.2	2,270	2,180					
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~200	2	<0.2	2,270	2,720					
		250	2	<0.2	2,270	2,720					
		300	2	<0.2	2,270	2,720					
		350	1.5	<0.2	2,270	2,180					
		400	1.5	<0.2	2,270	2,180					
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~200	2	<0.2	2,020	1,940					
		250	2	<0.2	2,020	1,940					
		300	2	<0.2	2,020	1,940					
		350	1.5	<0.2	1,770	1,410					
		400	1.5	<0.2	1,770	1,410					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015 (DH102)	~200	1.5	<0.2	1,010	810					
		250	1.5	<0.2	1,010	810					
		300	1.5	<0.2	1,010	810					
		350	1.2	<0.2	860	550					
		400	1.2	<0.2	860	550					
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~200	1.5	<0.2	910	740					
		250	1.5	<0.2	910	740					
		300	1.5	<0.2	910	740					
		350	1	<0.2	750	480					
		400	1	<0.2	750	480					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~200	2	<0.2	2,780	3,340					
		250	2	<0.2	2,780	3,340					
		300	2	<0.2	2,780	3,340					
		350	1.5	<0.2	2,270	2,180					
		400	1.5	<0.2	2,270	2,180					
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~200	2	<0.2	2,270	2,720					
		250	2	<0.2	2,270	2,720					
		300	2	<0.2	2,270	2,720					
		350	1.5	<0.2	2,270	2,180					
		400	1.5	<0.2	2,270	2,180					
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~200	2	<0.2	450	440					
		250	2	<0.2	450	440					
		300	2	<0.2	450	440					
		350	1.5	<0.2	360	300					
		400	1.5	<0.2	360	300					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/BOTTOM FACE FINISHING

● YPHW-15 type insert

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (DH102)	~150	0.2	20~40	2,100	3,150	~150	0.2	20~38	2,100	3,680
		200	0.2	20~40	2,100	3,150	200	0.2	20~38	2,100	3,680
		250	0.2	20~40	1,570	1,890	250	0.2	20~38	1,570	2,200
		300	0.2	20~22	1,360	1,640	300	0.2	20~22	1,360	1,900
		350	—	—	—	—	350	—	—	—	—
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (DH102)	~150	0.2	20~40	1,890	2,830	~150	0.2	20~38	1,890	3,300
		200	0.2	20~40	1,890	2,830	200	0.2	20~38	1,890	3,300
		250	0.2	20~40	1,410	1,700	250	0.2	20~38	1,410	1,980
		300	0.2	20~22	1,220	1,470	300	0.2	20~22	1,220	1,710
		350	—	—	—	—	350	—	—	—	—
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	DH102	~150	0.2	20~40	1,750	2,100	~150	0.2	20~38	1,750	2,450
		200	0.2	20~40	1,750	2,100	200	0.2	20~38	1,750	2,450
		250	0.2	20~40	1,300	1,400	250	0.2	20~38	1,300	1,650
		300	0.2	20~22	1,150	1,150	300	0.2	20~22	1,150	1,350
		350	—	—	—	—	350	—	—	—	—
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102	~150	0.2	20~40	1,600	1,150	~150	0.2	20~38	1,600	1,350
		200	0.2	20~40	1,600	1,150	200	0.2	20~38	1,600	1,350
		250	0.2	20~40	1,200	720	250	0.2	20~38	1,200	840
		300	0.2	20~22	1,050	630	300	0.2	20~22	1,050	740
		350	—	—	—	—	350	—	—	—	—
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102	~150	0.2	20~40	800	480	~150	0.2	20~38	800	560
		200	0.2	20~40	800	480	200	0.2	20~38	800	560
		250	0.2	20~40	640	380	250	0.2	20~38	640	440
		300	0.2	20~22	400	120	300	0.2	20~22	400	140
		350	—	—	—	—	350	—	—	—	—
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	0.2	20~40	560	240	~150	0.2	20~38	560	280
		200	0.2	20~40	560	240	200	0.2	20~38	560	240
		250	0.2	20~40	400	120	250	0.2	20~38	400	140
		300	0.2	20~22	400	120	300	0.2	20~22	400	140
		350	—	—	—	—	350	–	—	—	—
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	DH102	~150	0.2	20~40	1,590	1,910	~150	0.2	20~38	1,590	2,230
		200	0.2	20~40	1,590	1,910	200	0.2	20~38	1,590	2,230
		250	0.2	20~40	1,190	1,070	250	0.2	20~38	1,190	1,250
		300	0.2	20~22	1,030	620	300	0.2	20~22	1,030	720
		350	—	—	—	—	350	—	—	—	—
Stainless steel SUS304 Below 250HB	DH102	~150	0.2	20~40	1,430	1,290	~150	0.2	20~38	1,430	1,500
		200	0.2	20~40	1,430	1,290	200	0.2	20~38	1,430	1,500
		250	0.2	20~40	1,030	740	250	0.2	20~38	1,030	870
		300	0.2	20~22	800	480	300	0.2	20~22	800	560
		350	—	—	—	—	350	—	—	—	—
Titanium alloy (Ti-6Al-4V)	DH102	~150	0.2	20~40	400	360	~150	0.2	20~38	400	420
		200	0.2	20~40	400	360	200	0.2	20~38	400	420
		250	0.2	20~40	240	140	250	0.2	20~22	240	160
		300	0.2	20~22	240	140	300	0.2	20~22	240	160
		350	—	—	—	—	350	—	—	—	—

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/BOTTOM FACE FINISHING

● YPHW-15 type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		50					50/52				
		No. of teeth 7N					No. of teeth 8N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (DH102)	~150	0.2	25~50	1,700	2,970	~150	0.2	25~48	1,700	3,390
		200	0.2	25~50	1,700	2,970	200	0.2	25~48	1,700	3,390
		250	0.2	25~50	1,700	2,700	250	0.2	25~48	1,700	3,080
		300	0.2	25~50	1,280	1,790	300	0.2	25~48	1,280	2,040
		350	0.2	25~28	1,280	1,790	350	0.2	25~28	1,280	2,040
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (DH102)	~150	0.2	25~50	1,530	2,670	~150	0.2	25~48	1,530	3,050
		200	0.2	25~50	1,530	2,670	200	0.2	25~48	1,530	3,050
		250	0.2	25~50	1,530	2,430	250	0.2	25~48	1,530	2,770
		300	0.2	25~50	1,150	1,600	300	0.2	25~48	1,150	1,830
		350	0.2	25~28	1,150	1,600	350	0.2	25~28	1,150	1,830
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	DH102	~150	0.2	25~50	1,400	1,950	~150	0.2	25~48	1,400	2,200
		200	0.2	25~50	1,400	1,950	200	0.2	25~48	1,400	2,200
		250	0.2	25~50	1,400	1,750	250	0.2	25~48	1,400	2,000
		300	0.2	25~50	1,050	1,250	300	0.2	25~48	1,050	1,400
		350	0.2	25~28	1,050	1,250	350	0.2	25~28	1,050	1,400
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102	~150	0.2	25~50	1,250	1,050	~150	0.2	25~48	1,250	1,200
		200	0.2	25~50	1,250	1,050	200	0.2	25~48	1,250	1,200
		250	0.2	25~50	1,250	880	250	0.2	25~48	1,250	1,000
		300	0.2	25~50	950	660	300	0.2	25~48	950	750
		350	0.2	25~28	950	660	350	0.2	25~28	950	750
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102	~150	0.2	25~50	510	360	~150	0.2	25~48	510	410
		200	0.2	25~50	510	360	200	0.2	25~48	510	410
		250	0.2	25~50	510	340	250	0.2	25~48	510	390
		300	0.2	25~50	380	270	300	0.2	25~48	380	310
		350	0.2	25~28	380	270	350	0.2	25~28	380	310
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	0.2	25~50	380	190	~150	0.2	25~48	380	220
		200	0.2	25~50	380	190	200	0.2	25~48	380	220
		250	0.2	25~50	380	160	250	0.2	25~48	380	180
		300	0.2	25~50	320	130	300	0.2	25~48	320	150
		350	0.2	25~28	320	130	350	0.2	25~28	320	150
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	DH102	~150	0.2	25~50	1,270	1,780	~150	0.2	25~48	1,270	2,030
		200	0.2	25~50	1,270	1,780	200	0.2	25~48	1,270	2,030
		250	0.2	25~50	1,270	1,560	250	0.2	25~48	1,270	1,780
		300	0.2	25~50	950	1,000	300	0.2	25~48	950	1,140
		350	0.2	25~28	950	1,000	350	0.2	25~28	950	1,140
Stainless steel SUS304 Below 250HB	DH102	~150	0.2	25~50	1,150	1,210	~150	0.2	25~48	1,150	1,380
		200	0.2	25~50	1,150	1,210	200	0.2	25~48	1,150	1,380
		250	0.2	25~50	1,150	1,090	250	0.2	25~48	1,150	1,250
		300	0.2	25~50	830	700	300	0.2	25~48	830	800
		350	0.2	25~28	830	700	350	0.2	25~28	830	800
Titanium alloy (Ti-6Al-4V)	DH102	~150	0.2	25~50	320	340	~150	0.2	25~48	320	390
		200	0.2	25~50	320	340	200	0.2	25~48	320	390
		250	0.2	25~50	320	300	250	0.2	25~48	320	340
		300	0.2	25~50	190	160	300	0.2	25~48	190	180
		350	0.2	25~28	190	160	350	0.2	25~28	190	180

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/BOTTOM FACE FINISHING

● YPHW-15 type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)					
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (DH102)	~200	0.2	31~63	1,350	2,700					
		250	0.2	31~63	1,350	2,700					
		300	0.2	31~63	1,350	2,450					
		350	0.2	31~63	1,020	1,630					
		400	0.2	31~35	1,020	1,630					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (DH102)	~200	0.2	31~63	1,210	2,420					
		250	0.2	31~63	1,210	2,420					
		300	0.2	31~63	1,210	2,190					
		350	0.2	31~63	910	1,450					
		400	0.2	31~35	910	1,450					
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	DH102	~200	0.2	31~63	1,110	1,750					
		250	0.2	31~63	1,110	1,750					
		300	0.2	31~63	1,110	1,580					
		350	0.2	31~63	830	1,110					
		400	0.2	31~35	830	1,110					
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102	~200	0.2	31~63	1,000	960					
		250	0.2	31~63	1,000	960					
		300	0.2	31~63	1,000	800					
		350	0.2	31~63	750	590					
		400	0.2	31~35	750	590					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102	~200	0.2	31~63	400	320					
		250	0.2	31~63	400	320					
		300	0.2	31~63	400	300					
		350	0.2	31~63	300	250					
		400	0.2	31~35	300	250					
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~200	0.2	31~63	300	170					
		250	0.2	31~63	300	170					
		300	0.2	31~63	300	140					
		350	0.2	31~63	250	120					
		400	0.2	31~35	250	120					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	DH102	~200	0.2	31~63	1,000	1,600					
		250	0.2	31~63	1,000	1,600					
		300	0.2	31~63	1,000	1,400					
		350	0.2	31~63	750	900					
		400	0.2	31~35	750	900					
Stainless steel SUS304 Below 250HB	DH102	~200	0.2	31~63	910	1,090					
		250	0.2	31~63	910	1,090					
		300	0.2	31~63	910	990					
		350	0.2	31~63	660	640					
		400	0.2	31~35	660	640					
Titanium alloy (Ti-6Al-4V)	DH102	~200	0.2	31~63	250	300					
		250	0.2	31~63	250	300					
		300	0.2	31~63	250	270					
		350	0.2	31~63	150	140					
		400	0.2	31~35	150	140					

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■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/BOTTOM FACE FINISHING AT LOW FEED SPEED

● YPHW-F/-24 type insert

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015	~150	0.2	20~40	1,590	1,430	~150	0.2	20~38	1,590	1,670
		200	0.2	20~40	1,590	1,430	200	0.2	20~38	1,590	1,670
		250	0.2	20~40	1,190	860	250	0.2	20~38	1,190	1,000
		300	0.2	20~22	1,030	620	300	0.2	20~22	1,030	720
		350	—	—	—	—	350	—	—	—	—
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015	~150	0.2	20~40	1,430	1,290	~150	0.2	20~38	1,430	1,500
		200	0.2	20~40	1,430	1,290	200	0.2	20~38	1,430	1,500
		250	0.2	20~40	1,030	740	250	0.2	20~38	1,030	870
		300	0.2	20~22	800	480	300	0.2	20~22	800	560
		350	—	—	—	—	350	—	—	—	—
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015	~150	0.2	20~40	1,270	920	~150	0.2	20~38	1,270	1,070
		200	0.2	20~40	1,270	920	200	0.2	20~38	1,270	1,070
		250	0.2	20~40	950	570	250	0.2	20~38	950	670
		300	0.2	20~22	720	430	300	0.2	20~22	720	500
		350	—	—	—	—	350	—	—	—	—
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015	~150	0.2	20~40	1,030	740	~150	0.2	20~38	1,030	870
		200	0.2	20~40	1,030	740	200	0.2	20~38	1,030	870
		250	0.2	20~40	870	520	250	0.2	20~38	870	610
		300	0.2	20~22	640	380	300	0.2	20~22	640	440
		350	—	—	—	—	350	—	—	—	—
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015	~150	0.2	20~40	800	480	~150	0.2	20~38	800	560
		200	0.2	20~40	800	480	200	0.2	20~38	800	560
		250	0.2	20~40	640	380	250	0.2	20~38	640	440
		300	0.2	20~22	400	120	300	0.2	20~22	400	140
		350	—	—	—	—	350	—	—	—	—
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015	~150	0.2	20~40	1,590	1,910	~150	0.2	20~38	1,590	2,230
		200	0.2	20~40	1,590	1,910	200	0.2	20~38	1,590	2,230
		250	0.2	20~40	1,190	1,070	250	0.2	20~38	1,190	1,250
		300	0.2	20~22	1,030	620	300	0.2	20~22	1,030	720
		350	—	—	—	—	350	—	—	—	—
Stainless steel SUS304 Below 250HB	JC8015	~150	0.2	20~40	1,430	1,290	~150	0.2	20~38	1,430	1,500
		200	0.2	20~40	1,430	1,290	200	0.2	20~38	1,430	1,500
		250	0.2	20~40	1,030	740	250	0.2	20~38	1,030	870
		300	0.2	20~22	800	480	300	0.2	20~22	800	560
		350	—	—	—	—	350	—	—	—	—
Titanium alloy (Ti-6Al-4V)	JC8015	~150	0.2	20~40	400	360	~150	0.2	20~38	400	420
		200	0.2	20~40	400	360	200	0.2	20~38	400	420
		250	0.2	20~40	240	140	250	0.2	20~38	240	160
		300	0.2	20~22	240	140	300	0.2	20~22	240	160
		350	—	—	—	—	350	—	—	—	—

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) Recommend to use YPHW-F type insert for better surface roughness.

QM MAX QXP TYPE

■ RECOMMENDED CUTTING CONDITIONS / BOTTOM FACE FINISHING AT LOW FEED SPEED

● YPHW-F/-24 type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		50					50/52				
		No. of teeth 7N					No. of teeth 8N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015	~150	0.2	25~50	1,270	1,330	~150	0.2	25~48	1,270	1,530
		200	0.2	25~50	1,270	1,330	200	0.2	25~48	1,270	1,530
		250	0.2	25~50	1,270	1,200	250	0.2	25~48	1,270	1,380
		300	0.2	25~50	950	800	300	0.2	25~48	950	910
		350	0.2	25~28	950	800	350	0.2	25~28	950	910
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015	~150	0.2	25~50	1,150	1,210	~150	0.2	25~48	1,150	1,380
		200	0.2	25~50	1,150	1,210	200	0.2	25~48	1,150	1,380
		250	0.2	25~50	1,150	1,090	250	0.2	25~48	1,150	1,250
		300	0.2	25~50	830	700	300	0.2	25~48	830	800
		350	0.2	25~28	830	700	350	0.2	25~28	830	800
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015	~150	0.2	25~50	1,020	860	~150	0.2	25~48	1,020	980
		200	0.2	25~50	1,020	860	200	0.2	25~48	1,020	980
		250	0.2	25~50	1,020	770	250	0.2	25~48	1,020	880
		300	0.2	25~50	760	530	300	0.2	25~48	760	610
		350	0.2	25~28	760	530	350	0.2	25~28	760	610
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015	~150	0.2	25~50	830	700	~150	0.2	25~48	830	800
		200	0.2	25~50	830	700	200	0.2	25~48	830	800
		250	0.2	25~50	830	630	250	0.2	25~48	830	720
		300	0.2	25~50	700	490	300	0.2	25~48	700	560
		350	0.2	25~28	700	490	350	0.2	25~28	700	560
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015	~150	0.2	25~50	510	360	~150	0.2	25~48	510	410
		200	0.2	25~50	510	360	200	0.2	25~48	510	410
		250	0.2	25~50	510	340	250	0.2	25~48	510	390
		300	0.2	25~50	380	270	300	0.2	25~48	380	310
		350	0.2	25~28	380	270	350	0.2	25~28	380	310
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015	~150	0.2	25~50	1,270	1,780	~150	0.2	25~48	1,270	2,030
		200	0.2	25~50	1,270	1,780	200	0.2	25~48	1,270	2,030
		250	0.2	25~50	1,270	1,560	250	0.2	25~48	1,270	1,780
		300	0.2	25~50	950	1,000	300	0.2	25~48	950	1,140
		350	0.2	25~28	950	1,000	350	0.2	25~28	950	1,140
Stainless steel SUS304 Below 250HB	JC8015	~150	0.2	25~50	1,150	1,210	~150	0.2	25~48	1,150	1,380
		200	0.2	25~50	1,150	1,210	200	0.2	25~48	1,150	1,380
		250	0.2	25~50	1,150	1,090	250	0.2	25~48	1,150	1,250
		300	0.2	25~50	830	700	300	0.2	25~48	830	800
		350	0.2	25~28	830	700	350	0.2	25~28	830	800
Titanium alloy (Ti-6Al-4V)	JC8015	~150	0.2	25~50	320	340	~150	0.2	25~48	320	390
		200	0.2	25~50	320	340	200	0.2	25~48	320	390
		250	0.2	25~50	320	300	250	0.2	25~48	320	340
		300	0.2	25~50	190	160	300	0.2	25~48	190	180
		350	0.2	25~28	190	160	350	0.2	25~28	190	180

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) Recommend to use YPHW-F type insert for better surface roughness.

QM MAX

QXP TYPE

■ RECOMMENDED CUTTING CONDITIONS / BOTTOM FACE FINISHING AT LOW FEED SPEED

● YPHW-F/-24 type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)					
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015	~200	0.2	31~63	1,000	1,200					
		250	0.2	31~63	1,000	1,200					
		300	0.2	31~63	1,000	1,080					
		350	0.2	31~63	750	720					
		400	0.2	31~35	750	720					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015	~200	0.2	31~63	910	1,090					
		250	0.2	31~63	910	1,090					
		300	0.2	31~63	910	990					
		350	0.2	31~63	660	640					
		400	0.2	31~35	660	640					
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015	~200	0.2	31~63	800	770					
		250	0.2	31~63	800	770					
		300	0.2	31~63	800	690					
		350	0.2	31~63	600	480					
		400	0.2	31~35	600	480					
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015	~200	0.2	31~63	650	620					
		250	0.2	31~63	650	620					
		300	0.2	31~63	650	560					
		350	0.2	31~63	550	440					
		400	0.2	31~35	550	440					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015	~200	0.2	31~63	400	320					
		250	0.2	31~63	400	320					
		300	0.2	31~63	400	300					
		350	0.2	31~63	300	250					
		400	0.2	31~35	300	250					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015	~200	0.2	31~63	1,000	1,600					
		250	0.2	31~63	1,000	1,600					
		300	0.2	31~63	1,000	1,400					
		350	0.2	31~63	750	900					
		400	0.2	31~35	750	900					
Stainless steel SUS304 Below 250HB	JC8015	~200	0.2	31~63	910	1,090					
		250	0.2	31~63	910	1,090					
		300	0.2	31~63	910	990					
		350	0.2	31~63	660	640					
		400	0.2	31~35	660	640					
Titanium alloy (Ti-6Al-4V)	JC8015	~200	0.2	31~63	250	300					
		250	0.2	31~63	250	300					
		300	0.2	31~63	250	270					
		350	0.2	31~63	150	140					
		400	0.2	31~35	150	140					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) Recommend to use YPHW-F type insert for better surface roughness.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/CONTOURING MILLING

● YPHW-24 type insert

Work Materials	Insert Grades	Tool dia. (mm) 40 No. of teeth 6N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	40 No. of teeth 7N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~100	0.4	<17	1,750	2,620	~100	0.4	<17	1,750	3,060
		150	0.3	<17	1,750	2,620	150	0.3	<17	1,750	3,060
		200	0.2	<17	1,750	2,620	200	0.2	<17	1,750	3,060
		250	0.15	<17	1,750	2,620	250	0.15	<17	1,750	3,060
		300	-	-	-	-	300	-	-	-	-
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015 (DH102)	~100	0.25	<17	1,270	1,900	~100	0.25	<17	1,270	2,220
		150	0.2	<17	1,270	1,900	150	0.2	<17	1,270	2,220
		200	0.15	<17	1,270	1,900	200	0.15	<17	1,270	2,220
		250	0.1	<17	1,270	1,900	250	0.1	<17	1,270	2,220
		300	-	-	-	-	300	-	-	-	-
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~100	0.2	<13	800	960	~100	0.2	<13	800	1,120
		150	0.15	<13	800	960	150	0.15	<13	800	1,120
		200	0.1	<13	800	960	200	0.1	<13	800	1,120
		250	-	-	-	-	250	-	-	-	-
		300	-	-	-	-	300	-	-	-	-

Work Materials	Insert Grades	Tool dia. (mm) 50 No. of teeth 7N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	50/52 No. of teeth 8N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~150	0.4	<21	1,400	2,450	~100	0.4	<21	1,400	2,800
		200	0.3	<21	1,400	2,450	150	0.3	<21	1,400	2,800
		250	0.2	<21	1,400	2,450	200	0.2	<21	1,400	2,800
		300	0.15	<21	1,400	2,450	250	0.15	<21	1,400	2,800
		350	-	-	-	-	300	-	-	-	-
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015 (DH102)	~150	0.25	<21	1,020	1,780	~100	0.25	<21	1,020	2,040
		200	0.2	<21	1,020	1,780	150	0.2	<21	1,020	2,040
		250	0.15	<21	1,020	1,780	200	0.15	<21	1,020	2,040
		300	0.1	<21	1,020	1,780	250	0.1	<21	1,020	2,040
		350	-	-	-	-	300	-	-	-	-
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	0.2	<17	640	900	~100	0.2	<17	640	1,030
		200	0.15	<17	640	900	150	0.15	<17	640	1,030
		250	0.1	<17	640	900	200	0.1	<17	640	1,030
		300	-	-	-	-	250	-	-	-	-
		350	-	-	-	-	300	-	-	-	-

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/CONTOURING MILLING

● YPHW-24 type insert

Work Materials	Insert Grades	Tool dia. (mm)									
		63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)					
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8015 (DH102)	~150	0.4	<26	1,110	2,220					
		200	0.4	<26	1,110	2,220					
		250	0.3	<26	1,110	2,220					
		300	0.2	<26	1,110	2,220					
		350	0.15	<26	1,110	2,220					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8015 (DH102)	~150	0.25	<26	810	1,620					
		200	0.25	<26	810	1,620					
		250	0.2	<26	810	1,620					
		300	0.15	<26	810	1,620					
		350	0.1	<26	810	1,620					
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	0.2	<21	500	800					
		200	0.2	<21	500	800					
		250	0.15	<21	500	800					
		300	0.1	<21	500	800					
		350	—	—	—	—					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FINISHING

● ZPMT＊-PL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015)	~150	≦5.0	<0.20	2,550	4,590	~150	≦5.0	<0.20	2,550	5,350
		200	≦3.0	<0.15	2,040	2,940	200	≦3.0	<0.15	2,040	3,430
		250	≦2.5	<0.10	1,530	1,650	250	≦2.5	<0.10	1,530	1,930
		300	≦2.5	<0.10	1,530	1,650	300	≦2.5	<0.10	1,530	1,930
		350	–	–	–	–	350	–	–	–	–
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015)	~150	≦5.0	<0.20	2,400	3,600	~150	≦5.0	<0.20	2,400	4,200
		200	≦3.0	<0.15	1,920	2,300	200	≦3.0	<0.15	1,920	2,690
		250	≦2.5	<0.10	1,440	1,300	250	≦2.5	<0.10	1,440	1,510
		300	≦2.5	<0.10	1,440	1,300	300	≦2.5	<0.10	1,440	1,510
		350	–	–	–	–	350	–	–	–	–
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	≦5.0	<0.20	2,400	3,600	~150	≦5.0	<0.20	2,400	4,200
		200	≦3.0	<0.15	1,920	2,300	200	≦3.0	<0.15	1,920	2,690
		250	≦2.5	<0.10	1,440	1,300	250	≦2.5	<0.10	1,440	1,510
		300	≦2.5	<0.10	1,440	1,300	300	≦2.5	<0.10	1,440	1,510
		350	–	–	–	–	350	–	–	–	–
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~150	≦4.0	<0.20	2,000	3,000	~150	≦4.0	<0.20	2,000	3,500
		200	≦2.5	<0.15	1,600	1,920	200	≦2.5	<0.15	1,600	2,240
		250	≦2.0	<0.10	1,200	1,080	250	≦2.0	<0.10	1,200	1,260
		300	≦2.0	<0.10	1,200	1,080	300	≦2.0	<0.10	1,200	1,260
		350	–	–	–	–	350	–	–	–	–
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~150	≦3.5	<0.20	1,670	2,000	~150	≦3.5	<0.20	1,670	2,340
		200	≦2.5	<0.15	1,340	1,290	200	≦2.5	<0.15	1,340	1,500
		250	≦1.5	<0.10	1,000	720	250	≦1.5	<0.10	1,000	840
		300	–	–	–	–	300	–	–	–	–
		350	–	–	–	–	350	–	–	–	–
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	≦2.5	<0.15	1,430	1,290	~150	≦2.5	<0.15	1,430	1,500
		200	≦2.0	<0.12	1,140	820	200	≦2.0	<0.12	1,140	960
		250	≦1.0	<0.10	860	460	250	≦1.0	<0.10	860	540
		300	–	–	–	–	300	–	–	–	–
		350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	≦5.0	<0.20	2,230	4,010	~150	≦5.0	<0.20	2,230	4,680
		200	≦3.0	<0.15	1,780	2,560	200	≦3.0	<0.15	1,780	2,990
		250	≦2.5	<0.10	1,340	1,450	250	≦2.5	<0.10	1,340	1,690
		300	≦2.5	<0.10	1,340	1,450	300	≦2.5	<0.10	1,340	1,690
		350	–	–	–	–	350	–	–	–	–
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~150	≦5.0	<0.20	2,400	3,600	~150	≦5.0	<0.20	2,400	4,200
		200	≦3.0	<0.15	1,920	2,300	200	≦3.0	<0.15	1,920	2,690
		250	≦2.5	<0.10	1,440	1,300	250	≦2.5	<0.10	1,440	1,510
		300	≦2.5	<0.10	1,440	1,300	300	≦2.5	<0.10	1,440	1,510
		350	–	–	–	–	350	–	–	–	–
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~150	≦5.0	<0.20	720	1,080	~150	≦5.0	<0.20	720	1,260
		200	≦3.0	<0.15	580	700	200	≦3.0	<0.15	580	810
		250	≦2.5	<0.10	430	390	250	≦2.5	<0.10	430	450
		300	≦2.5	<0.10	430	390	300	≦2.5	<0.10	430	450
		350	–	–	–	–	350	–	–	–	–

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FINISHING

● ZPMT＊-PL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm) 50 No. of teeth 7N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	50/52 No. of teeth 8N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015)	~150	≦5.0	<0.20	2,230	4,680	~150	≦5.0	<0.20	2,230	5,350
		200	≦5.0	<0.20	2,230	4,680	200	≦5.0	<0.20	2,230	5,350
		250	≦3.0	<0.15	1,780	2,990	250	≦3.0	<0.15	1,780	3,420
		300	≦3.0	<0.15	1,780	2,990	300	≦3.0	<0.15	1,780	3,420
		350	≦2.5	<0.10	1,340	1,690	350	≦2.5	<0.10	1,340	1,930
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015)	~150	≦5.0	<0.20	1,910	3,340	~150	≦5.0	<0.20	1,910	3,820
		200	≦5.0	<0.20	1,910	3,340	200	≦5.0	<0.20	1,910	3,820
		250	≦3.0	<0.15	1,530	2,140	250	≦3.0	<0.15	1,530	2,450
		300	≦3.0	<0.15	1,530	2,140	300	≦3.0	<0.15	1,530	2,450
		350	≦2.5	<0.10	1,150	1,210	350	≦2.5	<0.10	1,150	1,380
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	≦5.0	<0.20	1,910	3,340	~150	≦5.0	<0.20	1,910	3,820
		200	≦5.0	<0.20	1,910	3,340	200	≦5.0	<0.20	1,910	3,820
		250	≦3.0	<0.15	1,530	2,140	250	≦3.0	<0.15	1,530	2,450
		300	≦3.0	<0.15	1,530	2,140	300	≦3.0	<0.15	1,530	2,450
		350	≦2.5	<0.10	1,150	1,210	350	≦2.5	<0.10	1,150	1,380
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~150	≦4.0	<0.20	1,600	2,800	~150	≦4.0	<0.20	1,600	3,200
		200	≦4.0	<0.20	1,600	2,800	200	≦4.0	<0.20	1,600	3,200
		250	≦2.5	<0.15	1,280	1,790	250	≦2.5	<0.15	1,280	2,050
		300	≦2.5	<0.15	1,280	1,790	300	≦2.5	<0.15	1,280	2,050
		350	≦2.0	<0.10	960	1,010	350	≦2.0	<0.10	960	1,150
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~150	≦3.0	<0.20	1,340	1,880	~150	≦3.0	<0.20	1,340	2,140
		200	≦3.0	<0.20	1,340	1,880	200	≦3.0	<0.20	1,340	2,140
		250	≦2.5	<0.15	1,070	1,200	250	≦2.5	<0.15	1,070	1,370
		300	≦2.5	<0.15	1,070	1,200	300	≦2.5	<0.15	1,070	1,370
		350	≦1.5	<0.10	800	670	350	≦1.5	<0.10	800	770
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	≦2.5	<0.15	1,150	1,210	~150	≦2.5	<0.15	1,150	1,380
		200	≦2.5	<0.15	1,150	1,210	200	≦2.5	<0.15	1,150	1,380
		250	≦2.0	<0.12	920	770	250	≦2.0	<0.12	920	880
		300	≦2.0	<0.12	920	770	300	≦2.0	<0.12	920	880
		350	≦1.0	<0.10	690	440	350	≦1.0	<0.10	690	500
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	≦5.0	<0.20	1,780	3,740	~150	≦5.0	<0.20	1,780	4,270
		200	≦5.0	<0.20	1,780	3,740	200	≦5.0	<0.20	1,780	4,270
		250	≦3.0	<0.15	1,420	2,390	250	≦3.0	<0.15	1,420	2,730
		300	≦3.0	<0.15	1,420	2,390	300	≦3.0	<0.15	1,420	2,730
		350	≦2.5	<0.10	1,070	1,350	350	≦2.5	<0.10	1,070	1,540
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~150	≦5.0	<0.20	1,910	3,340	~150	≦5.0	<0.20	1,910	3,820
		200	≦5.0	<0.20	1,910	3,340	200	≦5.0	<0.20	1,910	3,820
		250	≦3.0	<0.15	1,530	2,140	250	≦3.0	<0.15	1,530	2,450
		300	≦3.0	<0.15	1,530	2,140	300	≦3.0	<0.15	1,530	2,450
		350	≦2.5	<0.10	1,150	1,210	350	≦2.5	<0.10	1,150	1,380
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~150	≦5.0	<0.20	570	1,000	~150	≦5.0	<0.20	570	1,140
		200	≦5.0	<0.20	570	1,000	200	≦5.0	<0.20	570	1,140
		250	≦3.0	<0.15	460	650	250	≦3.0	<0.15	460	740
		300	≦3.0	<0.15	460	650	300	≦3.0	<0.15	460	740
		350	≦2.5	<0.10	340	360	350	≦2.5	<0.10	340	410

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FINISHING

● ZPMT＊-PL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm)									
		63 / 66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)					
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015)	~200	≦5.0	<0.20	1,620	3,890					
		250	≦5.0	<0.20	1,620	3,890					
		300	≦3.0	<0.15	1,300	2,500					
		350	≦3.0	<0.15	1,300	2,500					
		400	≦2.5	<0.10	970	1,400					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015)	~200	≦5.0	<0.20	1,520	3,040					
		250	≦5.0	<0.20	1,520	3,040					
		300	≦3.0	<0.15	1,220	1,950					
		350	≦3.0	<0.15	1,220	1,950					
		400	≦2.5	<0.10	910	1,090					
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~200	≦5.0	<0.20	1,520	3,040					
		250	≦5.0	<0.20	1,520	3,040					
		300	≦3.0	<0.15	1,220	1,950					
		350	≦3.0	<0.15	1,220	1,950					
		400	≦2.5	<0.10	910	1,090					
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~200	≦4.0	<0.20	1,260	2,520					
		250	≦4.0	<0.20	1,260	2,520					
		300	≦2.5	<0.15	1,010	1,620					
		350	≦2.5	<0.15	1,010	1,620					
		400	≦2.0	<0.10	760	910					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~200	≦3.5	<0.20	1,060	1,700					
		250	≦3.5	<0.20	1,060	1,700					
		300	≦2.5	<0.15	850	1,090					
		350	≦2.5	<0.15	850	1,090					
		400	≦1.5	<0.10	640	610					
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~200	≦2.5	<0.15	910	1,090					
		250	≦2.5	<0.15	910	1,090					
		300	≦2.0	<0.12	730	700					
		350	≦2.0	<0.12	730	700					
		400	≦1.0	<0.10	550	400					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~200	≦5.0	<0.20	1,410	3,380					
		250	≦5.0	<0.20	1,410	3,380					
		300	≦3.0	<0.15	1,130	2,170					
		350	≦3.0	<0.15	1,130	2,170					
		400	≦2.5	<0.10	850	1,220					
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~200	≦5.0	<0.20	1,520	3,040					
		250	≦5.0	<0.20	1,520	3,040					
		300	≦3.0	<0.15	1,220	1,950					
		350	≦3.0	<0.15	1,220	1,950					
		400	≦2.5	<0.10	910	1,090					
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~200	≦5.0	<0.20	450	900					
		250	≦5.0	<0.20	450	900					
		300	≦3.0	<0.15	360	580					
		350	≦3.0	<0.15	360	580					
		400	≦2.5	<0.10	270	320					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/FOR BOTTOM FACE FINISHING

● ZPMT＊-PL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015)	~150	≦0.20	13~38	1,400	1,260	~150	≦0.20	13~38	1,400	1,470
		200	≦0.15	13~38	1,050	760	200	≦0.15	13~38	1,050	880
		250	≦0.10	13~38	1,050	760	250	≦0.10	13~38	1,050	880
		300	≦0.10	13~24	700	420	300	≦0.10	13~24	700	490
		350	–	–	–	–	350	–	–	–	–
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015)	~150	≦0.20	13~38	1,300	1,170	~150	≦0.20	13~38	1,300	1,360
		200	≦0.15	13~38	980	710	200	≦0.15	13~38	980	820
		250	≦0.10	13~38	980	710	250	≦0.10	13~38	980	820
		300	≦0.10	13~24	650	390	300	≦0.10	13~24	650	450
		350	–	–	–	–	350	–	–	–	–
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	≦0.20	13~38	1,300	1,170	~150	≦0.20	13~38	1,300	1,360
		200	≦0.15	13~38	980	710	200	≦0.15	13~38	980	820
		250	≦0.10	13~38	980	710	250	≦0.10	13~38	980	820
		300	≦0.10	13~24	650	390	300	≦0.10	13~24	650	450
		350	–	–	–	–	350	–	–	–	–
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~150	≦0.20	13~38	1,110	1,000	~150	≦0.20	13~38	1,110	1,160
		200	≦0.15	13~38	830	600	200	≦0.15	13~38	830	700
		250	≦0.10	13~38	830	600	250	≦0.10	13~38	830	700
		300	≦0.10	13~24	560	340	300	≦0.10	13~24	560	390
		350	–	–	–	–	350	–	–	–	–
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~150	≦0.20	13~38	800	580	~150	≦0.20	13~38	800	670
		200	≦0.15	13~38	600	360	200	≦0.15	13~38	600	420
		250	≦0.10	13~38	600	360	250	≦0.10	13~38	600	420
		300	≦0.10	13~24	400	190	300	≦0.10	13~24	400	220
		350	–	–	–	–	350	–	–	–	–
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	≦0.15	13~38	560	340	~150	≦0.15	13~38	560	390
		200	≦0.12	13~38	420	200	200	≦0.12	13~38	420	230
		250	≦0.10	13~38	420	200	250	≦0.10	13~38	420	230
		300	≦0.10	13~24	280	100	300	≦0.10	13~24	280	120
		350	–	–	–	–	350	–	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	≦0.20	13~38	1,400	1,510	~150	≦0.20	13~38	1,400	1,760
		200	≦0.15	13~38	1,050	950	200	≦0.15	13~38	1,050	1,100
		250	≦0.10	13~38	1,050	950	250	≦0.10	13~38	1,050	1,100
		300	≦0.10	13~24	700	500	300	≦0.10	13~24	700	590
		350	–	–	–	–	350	–	–	–	–
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~150	≦0.20	13~38	1,300	1,170	~150	≦0.20	13~38	1,300	1,360
		200	≦0.15	13~38	980	710	200	≦0.15	13~38	980	820
		250	≦0.10	13~38	980	710	250	≦0.10	13~38	980	820
		300	≦0.10	13~24	650	390	300	≦0.10	13~24	650	450
		350	–	–	–	–	350	–	–	–	–
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	0,25 Pt	≦0.20	13~38	400	290	~150	≦0.20	13~38	400	340
		200	≦0.15	13~38	300	200	200	≦0.15	13~38	300	230
		250	≦0.10	13~38	300	200	250	≦0.10	13~38	300	230
		300	≦0.10	13~24	200	120	300	≦0.10	13~24	200	140
		350	–	–	–	–	350	–	–	–	–

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/FOR BOTTOM FACE FINISHING

● ZPMT＊-PL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm) 50 No. of teeth 7N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	50/52 No. of teeth 8N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015)	~150	≦0.20	16~48	1,150	1,210	~150	≦0.20	16~48	1,150	1,380
		200	≦0.20	16~48	1,150	1,210	200	≦0.20	16~48	1,150	1,380
		250	≦0.15	16~48	860	720	250	≦0.15	16~48	860	820
		300	≦0.15	16~48	860	720	300	≦0.15	16~48	860	820
		350	≦0.10	16~30	580	410	350	≦0.10	16~30	580	460
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015)	~150	≦0.20	16~48	1,020	1,070	~150	≦0.20	16~48	1,020	1,220
		200	≦0.20	16~48	1,020	1,070	200	≦0.20	16~48	1,020	1,220
		250	≦0.15	16~48	770	650	250	≦0.15	16~48	770	740
		300	≦0.15	16~48	770	650	300	≦0.15	16~48	770	740
		350	≦0.10	16~30	510	360	350	≦0.10	16~30	510	410
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~150	≦0.20	16~48	1,020	1,070	~150	≦0.20	16~48	1,020	1,220
		200	≦0.20	16~48	1,020	1,070	200	≦0.20	16~48	1,020	1,220
		250	≦0.15	16~48	770	650	250	≦0.15	16~48	770	740
		300	≦0.15	16~48	770	650	300	≦0.15	16~48	770	740
		350	≦0.10	16~30	510	360	350	≦0.10	16~30	510	410
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~150	≦0.20	16~48	890	930	~150	≦0.20	16~48	890	1,070
		200	≦0.20	16~48	890	930	200	≦0.20	16~48	890	1,070
		250	≦0.15	16~48	670	560	250	≦0.15	16~48	670	640
		300	≦0.15	16~48	670	560	300	≦0.15	16~48	670	640
		350	≦0.10	16~30	450	320	350	≦0.10	16~30	450	360
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~150	≦0.20	16~48	640	540	~150	≦0.20	16~48	640	610
		200	≦0.20	16~48	640	540	200	≦0.20	16~48	640	610
		250	≦0.15	16~48	480	340	250	≦0.15	16~48	480	380
		300	≦0.15	16~48	480	340	300	≦0.15	16~48	480	380
		350	≦0.10	16~30	320	180	350	≦0.10	16~30	320	200
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~150	≦0.15	16~48	450	320	~150	≦0.15	16~48	450	360
		200	≦0.15	16~48	450	320	200	≦0.15	16~48	450	360
		250	≦0.12	16~48	340	190	250	≦0.12	16~48	340	220
		300	≦0.12	16~48	340	190	300	≦0.12	16~48	340	220
		350	≦0.10	16~30	220	90	350	≦0.10	16~30	220	100
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~150	≦0.20	16~48	1,150	1,450	~150	≦0.20	16~48	1,150	1,660
		200	≦0.20	16~48	1,150	1,450	200	≦0.20	16~48	1,150	1,660
		250	≦0.15	16~48	860	900	250	≦0.15	16~48	860	1,030
		300	≦0.15	16~48	860	900	300	≦0.15	16~48	860	1,030
		350	≦0.10	16~30	580	490	350	≦0.10	16~30	580	560
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~150	≦0.20	16~48	1,020	1,070	~150	≦0.20	16~48	1,020	1,220
		200	≦0.20	16~48	1,020	1,070	200	≦0.20	16~48	1,020	1,220
		250	≦0.15	16~48	770	650	250	≦0.15	16~48	770	740
		300	≦0.15	16~48	770	650	300	≦0.15	16~48	770	740
		350	≦0.10	16~30	510	360	350	≦0.10	16~30	510	410
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~150	≦0.20	16~48	320	270	~150	≦0.20	16~48	320	310
		200	≦0.20	16~48	320	270	200	≦0.20	16~48	320	310
		250	≦0.15	16~48	240	180	250	≦0.15	16~48	240	210
		300	≦0.15	16~48	240	180	300	≦0.15	16~48	240	210
		350	≦0.10	16~30	160	130	350	≦0.10	16~30	160	150

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS/FOR BOTTOM FACE FINISHING

● ZPMT＊-PL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm)									
		63 / 66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)					
Carbon steel S50C, S55C (C50, C55) Below 250HB	CX75 (JC8015)	~200	≦0.20	23~61	910	1,090					
		250	≦0.20	23~61	910	1,090					
		300	≦0.15	23~61	680	650					
		350	≦0.15	23~61	680	650					
		400	≦0.10	23~38	460	370					
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	CX75 (JC8015)	~200	≦0.20	23~61	810	970					
		250	≦0.20	23~61	810	970					
		300	≦0.15	23~61	610	590					
		350	≦0.15	23~61	610	590					
		400	≦0.10	23~38	410	330					
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~200	≦0.20	23~61	810	970					
		250	≦0.20	23~61	810	970					
		300	≦0.15	23~61	610	590					
		350	≦0.15	23~61	610	590					
		400	≦0.10	23~38	410	330					
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~200	≦0.20	23~61	710	850					
		250	≦0.20	23~61	710	850					
		300	≦0.15	23~61	530	510					
		350	≦0.15	23~61	530	510					
		400	≦0.10	23~38	360	290					
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~200	≦0.20	23~61	510	490					
		250	≦0.20	23~61	510	490					
		300	≦0.15	23~61	380	300					
		350	≦0.15	23~61	380	300					
		400	≦0.10	23~38	260	170					
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~200	≦0.15	23~61	350	280					
		250	≦0.15	23~61	350	280					
		300	≦0.12	23~61	260	170					
		350	≦0.12	23~61	260	170					
		400	≦0.10	23~38	180	90					
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~200	≦0.20	23~61	910	1,310					
		250	≦0.20	23~61	910	1,310					
		300	≦0.15	23~61	680	820					
		350	≦0.15	23~61	680	820					
		400	≦0.10	23~38	460	440					
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~200	≦0.20	23~61	810	970					
		250	≦0.20	23~61	810	970					
		300	≦0.15	23~61	610	590					
		350	≦0.15	23~61	610	590					
		400	≦0.10	23~38	410	330					
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~200	≦0.20	23~61	250	240					
		250	≦0.20	23~61	250	240					
		300	≦0.15	23~61	190	170					
		350	≦0.15	23~61	190	170					
		400	≦0.10	23~38	130	110					

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■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ RECOMMENDED CUTTING CONDITIONS

● ZPMT-NL-type inserts (facemill type)

Work Materials	Insert Grades	Tool dia. (mm) 40									
		No. of teeth 6N					No. of teeth 7N				
		ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)
Aluminium alloy 50-110HB	FZ15 FC18	~150	~5.0	~80.0	4,800	4,320	~150	~5.0	~80.0	4,800	5,040
		200	~3.5	~20.0	3,600	2,160	200	~3.5	~20.0	3,600	2,520
		250	~2.0	~10.0	2,400	1,440	250	~2.0	~10.0	2,400	1,680

Work Materials	Insert Grades	Tool dia. (mm) 50					50/52				
		No. of teeth 7N					No. of teeth 8N				
		ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)
Aluminium alloy 50-110HB	FZ15 FC18	~200	~5.0	~100.0	3,820	4,010	~200	~5.0	~100.0	3,820	4,580
		250	~3.5	~25.0	2,870	2,010	250	~3.5	~25.0	2,870	2,300
		300	~2.0	~12.5	1,910	1,340	300	~2.0	~12.5	1,910	1,530

Work Materials	Insert Grades	Tool dia. (mm) 63/66									
		No. of teeth 8N									
		ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)					
Aluminium alloy 50-110HB	FZ15 FC18	~300	~5.0	~120.0	3,050	3,660					
		350	~3.5	~32.0	2,280	1,820					
		400	~2.0	~16.0	1,520	1,220					

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce the depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

QM MAX QXPTYPE

■ Guidelines for selection of the EP** type insert

Work Materials	Carbon steel S50C, S55C (C50, C55) Below 250HB				Die steel SKD61,SKD11 (1.2344,1.2379) Below255HB				Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC				Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC			
Grades / Cat.No.	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102
EPMT100312ZER	☆	☆	☆		☆	☆	☆		☆	☆	☆		☆	☆		
EPMW100312ZER														○		
EPMW100312ZTR	○	○	◎		○	○	◎		○	○	◎		○	◎		
EPHW100316ZTR																○

Work Materials	Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC				Hardened die steel SKD11,SLD,DC11 (1.2344,1.2379) 55-62HRC				Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB				Stainless steel SUS304 Below 250HB			
Grades / Cat.No.	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102
EPMT100312ZER	☆				×	×			○					○	◎	
EPMW100312ZER	○				○				◎					●		
EPMW100312ZTR	●				●				●		○					
EPHW100316ZTR				◎				◎								

Work Materials	Titanium alloy Ti-6Al-4V				Inconel INCO718			
Grades / Cat.No.	JC5118	JC8050	JC7560	DH102	JC5118	JC8050	JC7560	DH102
EPMT100312ZER	○	○	◎		◎	○	○	
EPMW100312ZER		●				●		
EPMW100312ZTR								
EPHW100316ZTR								

- EPMW type: Without chipbreaker
- EPHW type: Without chipbreaker
- EPMT type: With chipbreaker

◎: First Choice, Good Condition ○: Moderate Condition
●: Unfavorable Condition ☆: Light Cutting ×: No good

QM Mill PMEtype

QM Quick & Mini MILL

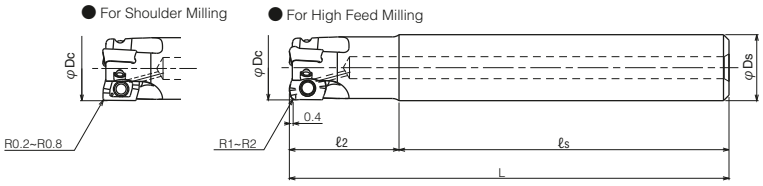
Low cutting force

Adopted unique 3D geometry insert with low cutting force and multi blades.
Even if small insert, QM MILL achieved high speed and high efficient machining.
Possible to use on low power and compact machines such as BT30.

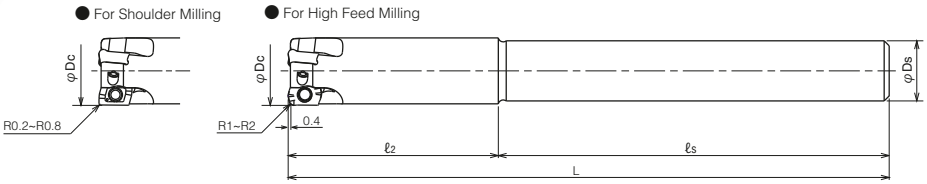
Multi blades

Diameter 10 mm: 2 flutes and diameter 14 mm: 3 flutes

■ **PME type**



■ **PME-LStype**



■ BODY

Type	Cat. No.	Stock	No. of inserts	Coolant hole	Dimensions (mm) φDc	ℓ2	ℓs	L	φDs	Applicable inserts	Parts: Clamp screw	Parts: Wrench
Regular type	**PME2010S10**	●	2	With	**10**	20	60	80	10	EO**0602**Z*R ZOMT0602**ZER	DSW-1840H	A-06
	PME3012S12	●	3		**12**	20	60	80	12			
	PME3014S12	●	3		**14**	20	60	80	12			
Long shank type	**PME2011S10-LS**	●	2	Without	**11**	33	87	120	10			
	PME3013S12-LS	●	3		**13**	39	81	120	12			
	PME3014S12-LS	□	3		**14**	42	78	120	12			

Note) 1. All cutters are supplied without inserts.
2. Please refer page C095-C098 for recommended cutting conditions.

Modular Head Type (Please refer Page B090)

Clamp Screw	Recommended Torque N•m
DSW-1840H	0.4

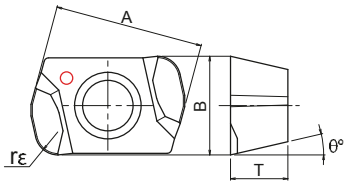
● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

QM Mill PMETYPE

MPM/PME TYPE

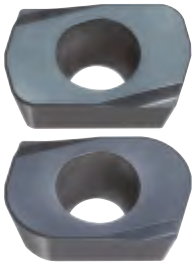
■ INSERTS

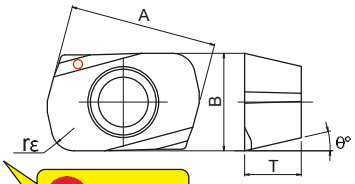
High feed insert



Grade (JC7560)

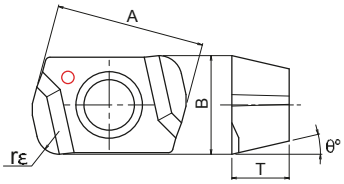
High hardened steel





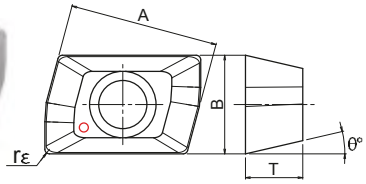
NEW R2 type

High feed insert for unfavourable condition

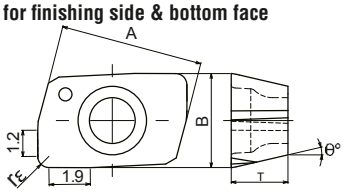


Grade (JC7560)

Shoulder milling insert



NEW **"MIRROR INSERT" for finishing side & bottom face**

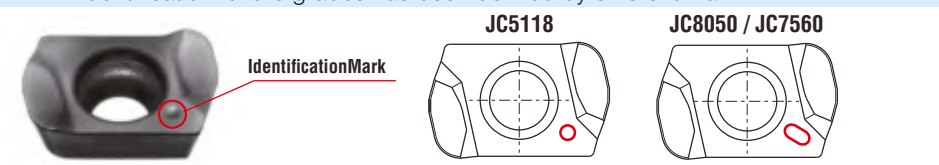


Type	Cat. No.	Tolerance	PVD coated					Dimensions (mm)				
			JC5118	DH102	JC7560	JC8015	JC8050	A	T	B	rε	θ°
High feed insert	EOMT060210ZER	M	●		●		●	6.5	2.5	4.3	1.0	13°
	EOMT060220ZER	M	●				●	6.5	2.5	4.3	2.0	13°
High feed insert for unfavourable condition	EOMW060210ZER	M	●		●		●	6.5	2.5	4.3	1.0	13°
High hardened steel	EOHW060210ZTR	H		●				6.5	2.5	4.3	1.0	13°
	NEW EOHW060220ZTR	H		●				6.5	2.5	4.3	2.0	13°
Shoulder milling insert	ZOMT060202ZER	M	●				●	6.5	2.5	4.3	0.2	13°
	ZOMT060204ZER	M	●				●	6.5	2.5	4.3	0.4	13°
	ZOMT060208ZER	M	●				●	6.5	2.5	4.3	0.8	13°
"Mirror Insert" for finishing side & bottom face	NEW YOHW060203ZER-12	H		●		●		6.5	2.6	4.3	0.3	13°
	NEW YOHW060205ZER-12	H		●		●		6.5	2.6	4.3	0.5	13°
	NEW YOHW060208ZER-12	H		●		●		6.5	2.6	4.3	0.8	13°

10 inserts per case.

Identification of grade for QM MILL insert

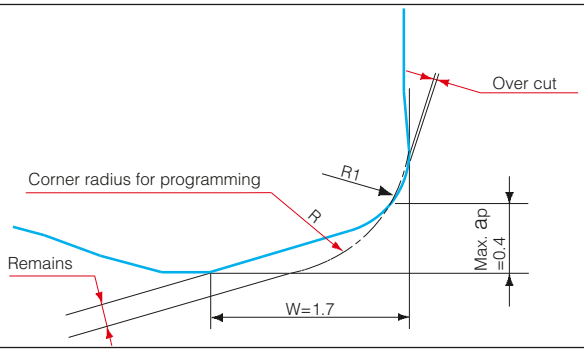
Identification for the grades has been defined by different mark.



● : Standard stock items ☐ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted

QM Mill PMETYPE

■ Definition of corner radius for programming



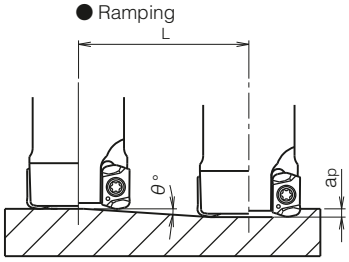
(mm)

Corner radius for programming	Overcut	Remains
R1.0 (Recommended)	0	0.17
R1.5	0.09	0.08
R2.0	0.30	0

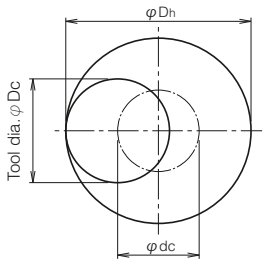
Note) In case of setting corner radius for programming to R2, recommend to use EOMT060220ZER or EOHW060220ZTR.

■ Instructions for profile milling with EO※※ type insert

● Ramping



● Helical interpolation



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circle should not exceed max. depth of cut ap.

● Down cutting is recommended, so tool pass rotation should be counterclockwise.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
● In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
● Long continous chips may come out in case of drilling, confirm the correct cutting parameters.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Max. depth of cut ap (mm)	Ramping		Helical interpolation	
				Max. ramping angle θ°	Total cutting length L (mm) at max.ap	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)
PME2010S10	10	6.6	0.3	2°18′	7.5	15	18
PME2011S10-LS	11	7.6	0.3	1°54′	9	17	20
PME30125S	12	8.5	0.3	1°36′	10.7	19	22
PME3013S-LS	13	9.5	0.3	1°24′	12.3	21	24
PME3014S(-LS)	14	10.5	0.3	1°18′	13.2	23	26

Note) The ramping angle 0.5° or less is recommended (please refer to the above table).

QM Mill PMETYPE

■ RECOMMENDED CUTTING CONDITIONS

● EOMT/W and EOHW type insert

Work Materials	Insert Grades	Tool dia. (mm) 10/11 No. of teeth 2N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	12/13 No. of teeth 3N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	14 No. of teeth 3N ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC7560 (JC8050) (JC5118)	~30	0.3	~6	3,820	4,580	~35	0.3	~8	3,180	5,720	~35	0.3	~10	2,730	6,550
		30~50	0.25	~6	3,440	3,720	35~50	0.25	~8	2,860	4,630	35~50	0.25	~10	2,460	4,720
		50~70	0.15	~5	3,060	2,940	50~70	0.2	~7	2,540	3,660	55~70	0.2	~8	2,180	3,730
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC7560 (JC8050) (JC5118)	~30	0.3	~6	3,500	4,200	~35	0.3	~8	2,920	5,260	~35	0.3	~10	2,500	6,010
		30~50	0.25	~6	3,150	3,400	35~50	0.25	~8	2,630	4,260	35~50	0.25	~10	2,250	4,810
		50~70	0.15	~5	2,800	2,690	50~70	0.2	~7	2,340	3,370	55~70	0.2	~8	2,000	3,420
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC7560 (JC8050) (JC5118)	~30	0.3	~6	3,500	4,200	~35	0.3	~8	2,920	5,260	~35	0.3	~10	2,500	6,010
		30~50	0.25	~6	3,150	3,400	35~50	0.25	~8	2,630	4,260	35~50	0.25	~10	2,250	4,810
		50~70	0.15	~5	2,800	2,690	50~70	0.2	~7	2,340	3,370	55~70	0.2	~8	2,000	3,420
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	JC8050 (JC5118)	~30	0.3	~6	2,860	3,150	~35	0.3	~8	2,390	3,940	~35	0.3	~10	2,050	3,690
		30~50	0.25	~6	2,570	2,540	35~50	0.25	~8	2,150	3,190	35~50	0.25	~10	1,850	2,950
		50~70	0.15	~5	2,290	2,010	50~70	0.2	~7	1,910	2,520	55~70	0.2	~8	1,660	2,360
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	JC8118 EOHWtype	~30	0.2	~6	2,860	2,860	~35	0.2	~7	2,390	3,590	~35	0.2	~9	2,050	3,080
		30~50	0.15	~6	2,570	2,060	35~50	0.15	~7	2,150	2,580	35~50	0.15	~9	1,850	2,220
		50~70	0.1	~5	2,290	1,370	50~70	0.1	~6	1,910	1,720	50~70	0.1	~7	1,660	1,490
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102 EOHWtype	~30	0.15	~6	2,550	1,530	~35	0.15	~7	2,120	1,900	~35	0.15	~9	1,820	1,640
		30~50	0.1	~6	2,300	1,240	35~50	0.1	~7	1,910	1,550	35~50	0.1	~9	1,640	1,330
		50~70	–	–	–	–	50~70	–	–	–	–	50~70	–	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118 (JC7560)	~30	0.3	~6	4,780	5,740	~35	0.3	~8	3,980	7,160	~35	0.3	~10	3,410	8,190
		30~50	0.25	~6	4,300	4,640	35~50	0.25	~8	3,580	5,800	35~50	0.25	~10	3,070	6,550
		50~70	0.15	~5	3,820	3,670	50~70	0.2	~7	3,180	4,580	55~70	0.2	~8	2,760	4,970
Stainless steel SUS304 Below 250HB	JC7560 (JC8050)	~30	0.3	~6	3,820	4,580	~35	0.3	~8	3,180	5,720	~35	0.3	~10	2,730	6,550
		30~50	0.25	~6	3,440	3,720	35~50	0.2	~8	2,860	4,630	35~50	0.2	~10	2,460	5,240
		50~70	0.15	~5	3,060	2,940	50~70	0.2	~7	2,540	3,660	55~70	0.2	~8	2,180	3,920
Titanium alloy (Ti-6Al-4V)	JC7560 (JC5118) (JC8050)	~30	0.3	~6	1,910	1,910	~35	0.3	~8	1,590	2,380	~35	0.3	~10	1,360	2,040
		30~50	0.25	~6	1,720	1,550	35~50	0.2	~8	1,430	1,930	35~50	0.2	~10	1,230	1,630
		50~70	0.15	~5	1,530	1,220	50~70	0.2	~7	1,270	1,520	55~70	0.2	~8	1,090	1,280
Inconel (INCO718)	JC5118 (JC8050) (JC7560)	~30	0.3	~6	950	760	~35	0.3	~8	800	960	~35	0.3	~10	680	820
		30~50	0.25	~6	850	620	35~50	0.2	~8	720	780	35~50	0.2	~10	610	660
		50~70	0.15	~5	760	610	50~70	0.2	~7	640	610	55~70	0.2	~8	550	520

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM Mill PMEtype

■ RECOMMENDED CUTTING CONDITIONS

● ZOMTtype insert

Work Materials	Insert Grades	Tool dia. (mm)														
		10/11					12/13					14				
		No. of teeth 2N					No. of teeth 3N					No. of teeth 3N				
		ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ap×ae (mm²)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC5118 (JC8050)	~30	~4.0	~6.0	5,090	810	~35	~4.0	~8.0	4,240	1,020	~35	~4.0	~8.0	3,640	870
		30~50	~1.2	~1.8	4,580	640	35~50	~1.7	~2.6	3,820	800	35~50	~1.7	~2.6	3,280	700
		50~70	~0.5	~0.8	4,070	490	50~70	~0.6	~1.2	3,390	610	50~70	~0.6	~1.2	2,910	520
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5118 (JC8050)	~30	~4.0	~6.0	4,780	570	~35	~4.0	~8.0	3,980	720	~35	~4.0	~8.0	3,410	620
		30~50	~1.2	~1.8	4,300	430	35~50	~1.7	~2.6	3,580	540	35~50	~1.7	~2.6	3,070	460
		50~70	~0.5	~0.8	3,820	310	50~70	~0.6	~1.2	3,180	380	50~70	~0.6	~1.2	2,730	330
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 (JC5118)	~30	~3.0	~4.0	3,820	460	~35	~3.0	~4.5	3,180	570	~35	~3.0	~4.5	2,730	490
		30~50	~1.2	~1.6	3,440	340	35~50	~1.3	~1.8	2,860	430	35~50	~1.3	~1.8	2,450	370
		50~70	~0.5	~0.8	3,060	240	50~70	~0.6	~1.0	2,540	300	50~70	~0.6	~1.0	2,180	260
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC5118	~30	~4.0	~6.0	4,780	760	~35	~4.0	~8.0	3,980	960	~35	~4.0	~8.0	3,410	820
		30~50	~1.2	~1.8	4,300	600	35~50	~1.7	~2.6	3,580	750	35~50	~1.7	~2.6	3,070	650
		50~70	~0.5	~0.8	3,980	480	50~70	~0.6	~1.2	3,180	570	50~70	~0.6	~1.2	2,720	490
Stainless steel SUS304 Below 250HB	JC8050	~30	~4.0	~6.0	4,780	570	~35	~4.0	~8.0	3,980	720	~35	~4.0	~8.0	3,410	620
		30~50	~1.2	~1.8	4,300	430	35~50	~1.7	~2.6	3,580	540	35~50	~1.7	~2.6	3,070	460
		50~70	~0.5	~0.8	3,820	310	50~70	~0.6	~1.2	3,180	380	50~70	~0.6	~1.2	2,720	320

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM Mill PMETYPE

■ RECOMMENDED CUTTING CONDITIONS

● YOHW-type inserts (side face finishing)

Work Materials	Insert Grades	Tool dia. (mm)														
		10/11					12/13					14				
		No. of teeth 2N					No. of teeth 3N					No. of teeth 3N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015 (DH102)	~30	≦1.2	≦0.10	12.600	3.780	~35	≦1.2	≦0.10	10.600	4.770	~35	≦1.2	≦0.10	9.090	4.090
		30~50	≦0.8	≦0.08	8.820	2.120	35~50	≦0.8	≦0.08	7.420	2.670	35~50	≦0.8	≦0.08	6.360	2.290
		50~70	≦0.6	≦0.08	8.820	1.760	50~70	≦0.6	≦0.08	7.420	2.230	50~70	≦0.6	≦0.08	6.360	1.910
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015 (DH102)	~30	≦1.0	≦0.10	11.400	3.420	~35	≦1.0	≦0.10	9.550	4.300	~35	≦1.0	≦0.10	8.180	3.680
		30~50	≦0.7	≦0.08	7.980	1.920	35~50	≦0.7	≦0.08	6.690	2.400	35~50	≦0.7	≦0.08	5.730	2.060
		50~70	≦0.5	≦0.08	7.980	1.600	50~70	≦0.5	≦0.08	6.690	2.000	50~70	≦0.5	≦0.08	5.730	1.720
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~30	≦1.0	≦0.10	11.400	3.420	~35	≦1.0	≦0.10	9.550	4.300	~35	≦1.0	≦0.10	8.180	3.680
		30~50	≦0.7	≦0.08	7.980	1.920	35~50	≦0.7	≦0.08	6.690	2.400	35~50	≦0.7	≦0.08	5.730	2.060
		50~70	≦0.5	≦0.08	7.980	1.600	50~70	≦0.5	≦0.08	6.690	2.000	50~70	≦0.5	≦0.08	5.730	1.720
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~30	≦1.0	≦0.10	8.880	2.130	~35	≦1.0	≦0.10	7.430	2.670	~35	≦1.0	≦0.10	6.370	2.290
		30~50	≦0.7	≦0.08	6.180	1.240	35~50	≦0.7	≦0.08	5.200	1.560	35~50	≦0.7	≦0.08	4.460	1.340
		50~70	≦0.5	≦0.08	6.180	990	50~70	≦0.5	≦0.08	5.200	1.250	50~70	≦0.5	≦0.08	4.460	1.070
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~30	≦0.8	≦0.10	6.360	1.270	~35	≦0.8	≦0.10	5.300	1.590	~35	≦0.8	≦0.10	4.550	1.370
		30~50	≦0.5	≦0.08	4.440	710	35~50	≦0.5	≦0.08	3.710	890	35~50	≦0.5	≦0.08	3.180	760
		50~70	–	–	–	–	50~70	–	–	–	–	50~70	–	–	–	–
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~30	≦0.5	≦0.10	4.740	950	~35	≦0.5	≦0.10	3.980	1.190	~35	≦0.5	≦0.10	3.410	1.020
		30~50	≦0.3	≦0.08	3.300	530	35~50	≦0.3	≦0.08	2.790	670	35~50	≦0.3	≦0.08	2.390	570
		50~70	–	–	–	–	50~70	–	–	–	–	50~70	–	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~30	≦1.2	≦0.12	12.600	3.780	~35	≦1.2	≦0.12	10.600	4.770	~35	≦1.2	≦0.12	9.090	4.090
		30~50	≦0.8	≦0.10	8.820	2.120	35~50	≦0.8	≦0.10	7.420	2.670	35~50	≦0.8	≦0.10	6.360	2.290
		50~70	≦0.6	≦0.08	8.820	1.760	50~70	≦0.6	≦0.08	7.420	2.230	50~70	≦0.6	≦0.08	6.360	1.910
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~30	≦1.0	≦0.10	11.400	3.420	~35	≦1.0	≦0.10	9.550	4.300	~35	≦1.0	≦0.10	8.180	3.680
		30~50	≦0.7	≦0.08	7.980	1.920	35~50	≦0.7	≦0.08	6.690	2.400	35~50	≦0.7	≦0.08	5.730	2.060
		50~70	≦0.5	≦0.08	7.980	1.600	50~70	≦0.5	≦0.08	6.690	2.000	50~70	≦0.5	≦0.08	5.730	1.720
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~30	≦1.0	≦0.10	2.520	600	~35	≦1.0	≦0.10	2.120	760	~35	≦1.0	≦0.10	1.820	660
		30~50	≦0.7	≦0.08	1.740	350	35~50	≦0.7	≦0.08	1.480	450	35~50	≦0.7	≦0.08	1.270	380
		50~70	≦0.5	≦0.08	1.740	280	50~70	≦0.5	≦0.08	1.480	360	50~70	≦0.5	≦0.08	1.270	300

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

QM Mill PMETYPE

■ RECOMMENDED CUTTING CONDITIONS

● YOHW-type inserts (for bottom face finishing)

Work Materials	Insert Grades	Tool dia. (mm)														
		10/11					12/13					14				
		No. of teeth 2N					No. of teeth 3N					No. of teeth 3N				
		ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015 (DH102)	~30	≦0.12	5~10	7.920	3.170	~35	≦0.12	6~12	6.630	3.980	~35	≦0.12	7~14	5.680	3.410
		30~50	≦0.10	5~10	5.940	1.900	35~50	≦0.10	6~12	4.970	2.380	35~50	≦0.10	7~14	4.260	2.040
		50~70	≦0.06	5~8	5.100	1.430	50~70	≦0.06	6~10	4.300	1.800	50~70	≦0.06	7~11	3.690	1.550
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015 (DH102)	~30	≦0.12	5~10	7.320	2.640	~35	≦0.12	6~12	6.100	3.290	~35	≦0.12	7~14	5.230	2.820
		30~50	≦0.10	5~10	5.460	1.580	35~50	≦0.10	6~12	4.580	1.980	35~50	≦0.10	7~14	3.920	1.690
		50~70	≦0.06	5~8	4.740	1.190	50~70	≦0.06	6~10	3.960	1.500	50~70	≦0.06	7~11	3.400	1.280
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 (DH102)	~30	≦0.12	5~10	7.320	2.640	~35	≦0.12	6~12	6.100	3.290	~35	≦0.12	7~14	5.230	2.820
		30~50	≦0.10	5~10	5.460	1.580	35~50	≦0.10	6~12	4.580	1.980	35~50	≦0.10	7~14	3.920	1.690
		50~70	≦0.06	5~8	4.740	1.190	50~70	≦0.06	6~10	3.960	1.500	50~70	≦0.06	7~11	3.400	1.280
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102 (JC8015)	~30	≦0.12	5~10	6.360	1.530	~35	≦0.12	6~12	5.300	1.910	~35	≦0.12	7~14	4.550	1.640
		30~50	≦0.10	5~10	4.800	920	35~50	≦0.10	6~12	3.980	1.150	35~50	≦0.10	7~14	3.410	980
		50~70	≦0.06	5~8	4.140	700	50~70	≦0.06	6~10	3.450	870	50~70	≦0.06	7~11	2.960	740
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102 (JC8015)	~30	≦0.10	5~10	3.840	770	~35	≦0.10	6~12	3.180	960	~35	≦0.10	7~14	2.730	820
		30~50	≦0.08	5~10	2.880	460	35~50	≦0.08	6~12	2.380	570	35~50	≦0.08	7~14	2.050	490
		50~70	–	–	–	–	50~70	–	–	–	–	50~70	–	–	–	–
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102	~30	≦0.10	5~10	2.220	350	~35	≦0.10	6~12	1.860	450	~35	≦0.10	7~14	1.590	380
		30~50	≦0.08	5~10	1.680	210	35~50	≦0.08	6~12	1.400	270	35~50	≦0.08	7~14	1.190	230
		50~70	–	–	–	–	50~70	–	–	–	–	50~70	–	–	–	–
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 (DH102)	~30	≦0.15	5~10	6.360	1.910	~35	≦0.15	6~12	5.300	2.380	~35	≦0.15	7~14	4.550	2.050
		30~50	≦0.12	5~10	4.800	1.150	35~50	≦0.12	6~12	3.980	1.430	35~50	≦0.12	7~14	3.410	1.230
		50~70	≦0.10	5~8	4.140	810	50~70	≦0.10	6~10	3.450	1.010	50~70	≦0.10	7~11	2.960	860
Stainless steel SUS304 Below 250HB	JC8015 (DH102)	~30	≦0.12	5~10	7.320	2.640	~35	≦0.12	6~12	6.100	3.290	~35	≦0.12	7~14	5.230	2.820
		30~50	≦0.12	5~10	5.460	1.580	35~50	≦0.12	6~12	4.580	1.980	35~50	≦0.12	7~14	3.920	1.690
		50~70	≦0.10	5~8	4.740	1.190	50~70	≦0.10	6~10	3.960	1.500	50~70	≦0.10	7~11	3.400	1.280
Titanium alloy (Ti-6Al-4V)	JC8015 (DH102)	~30	≦0.12	5~10	1.560	370	~35	≦0.12	6~12	1.330	480	~35	≦0.12	7~14	1.140	410
		30~50	≦0.10	5~10	1.200	230	35~50	≦0.10	6~12	1.000	290	35~50	≦0.10	7~14	850	250
		50~70	≦0.06	5~8	1.020	170	50~70	≦0.06	6~10	860	220	50~70	≦0.06	7~11	740	190

ℓ: Overhung length, ap: Axial depth of cut, ae: Radial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed with keeping feed per tooth.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.

Wild Radius **WDR TYPE**

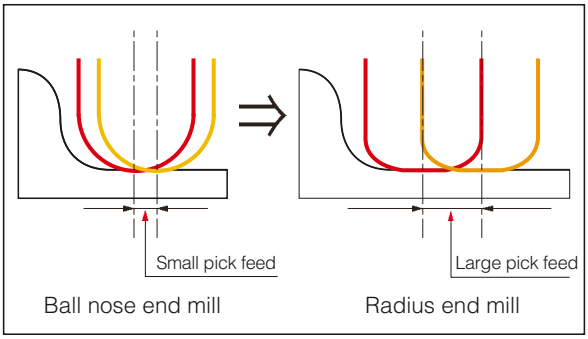
WILD RADIUS

High efficient roughing is possible even if material has uneven removal stock.

Max. depth of cut 18mm

- **Double key on body and insert prevents movement of insert.**

- **Large pick feed achieves higher efficient machining than ball nose end mill.**



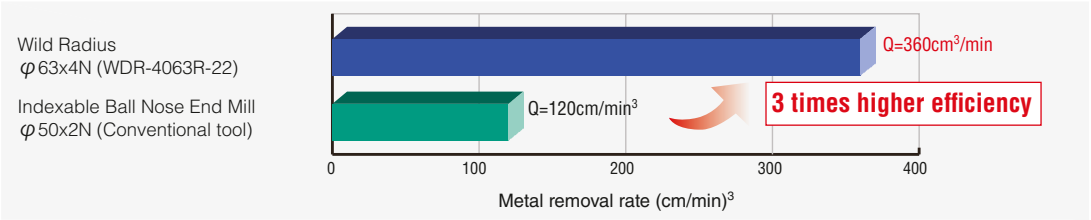
■ CUTTING PERFORMANCE

Metal Removal Rate Comparison

Cutting condition

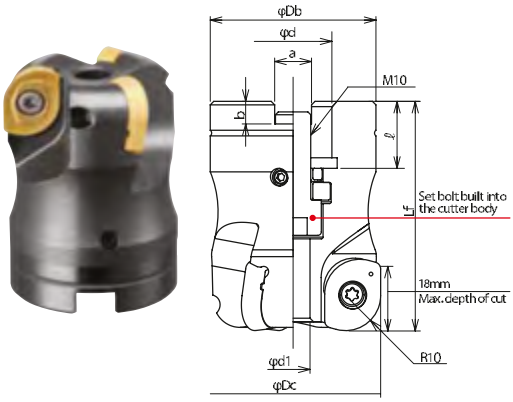
Wild Radius
Mat'l: Cast iron
Vc=150m/min (n=750min^{-1})
Vf=3,000mm/min (fz=1mm/t)
ap=3mm, ae=40mm

Indexable Ball Nose End Mill
Mat'l: Cast iron
Vc=235m/min (n=1,500min^{-1})
Vf=1,200mm/min (fz=0.4mm/t)
ap=10mm, ae=10mm

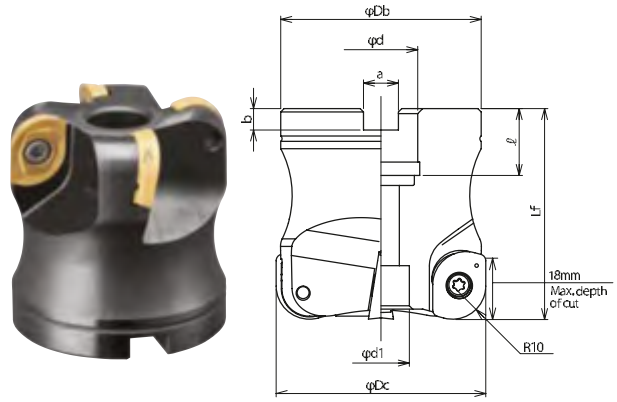


Wild Radius WDRTYPE

● Fig 1. Without coolant hole



● Fig 2. Without coolant hole



■ BODY/FACE MILL TYPE

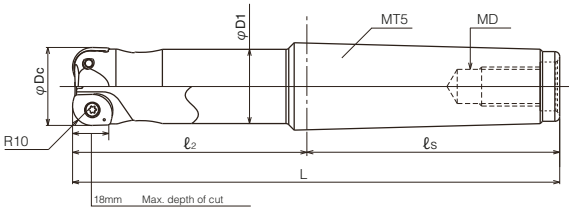
Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Set Bolt	Weight (kg)	Fig.
Metric Bore	**WDR-3050R-22**	●	3	**50**	65	47	22	9.6	10.4	6.3	19	M10x1.5x25*	0.7	1
	WDR-4063R-22	●	4	**63**	63	60	22	17	10.4	6.3	20	M10x1.5x50*	1.1	2
	WDR-4063R-27	●	4	**63**	63	60	27	20	12.4	7	22	M12x1.75x40*	1.1	2
	WDR-5080R-27	□	5	**80**	63	76	27	20	12.4	7	22	M12x1.75x40*	1.7	2
	WDR-6100R-32	□	6	**100**	63	96	32	26	14.4	8	32	M16	2.8	2
	WDR-6125R-40	□	6	**125**	63	100	40	32	16.4	9	32	M20x2.5x45*	4.0	2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C104-C105 for recommended cutting conditions.
3. * mark shows: these cutter bodies are equipped with the set bolt because of the specified bolt size.
Except for these cutter bodies, please use the set bolt equipped with arbor.

Clamp Screw	Recommended Torque N•m
CSW-513H	5.5

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Wild Radius WDRTYPE



■ BODY/END MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm)						Weight (kg)
				φDc	ℓ2	ℓs	L	φD1	MD	
MT shank type	**WDR-2040-120-MT5-M20**	●	2	**40**	120	130	249.5	38	M20X2.5	2.2

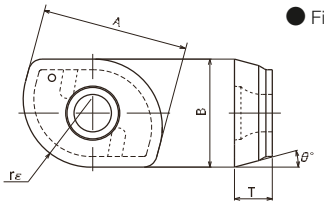
Note) All cutters are supplied without inserts

■ PARTS

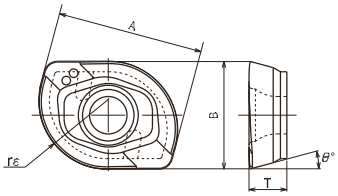
Clamps crew	Wrench
	
CSW-513H	A-20

■ INSERT

● Fig 1. Without chipbreaker



● Fig 2. With chipbreaker



Cat. No.	Tolerance	PVD coated		Dimensions (mm)					Fig.
		JC7560	JC8118	A	T	B	rε	θ°	
YDMW1505100ZTR	**M**	●	●	21.5	5.56	15.875	10	15°	1
YDMT1505100ZER	**M**	●	●	21.5	5.56	15.875	10	15°	2

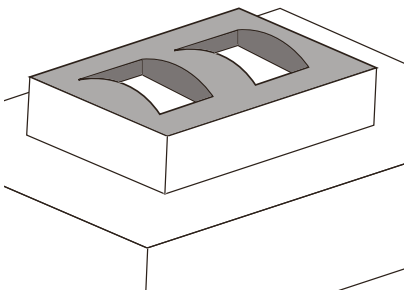
10 inserts per case

Wild Radius WDRTYPE

■ CASE STUDIES

Improved tool life in machining on cast steel

Work size: 1,500x2,000



Work	Part name		Stamping die
	Material		Cast steel
	Hardness		-
Tool	Tool No.		WDR-4063R-22
	Insert No.		YDMT1505100ZER (JC7560)
Cutting conditions	Cutting speed	n	710min^{-1}
		Vc	140m/min
	Feed speed	Vf	2,500mm/min
		fz	0.88mm/t
	ap (mm)		1.5mm
	ae (mm)		20-40mm
	Coolant		Dry
	Machine		Vertical MC

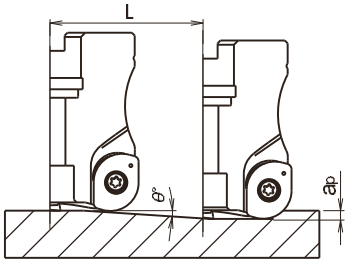
Result

Improved tool life by 2 times compared with competitor A.
Showed normal wear after machining 3 hours.

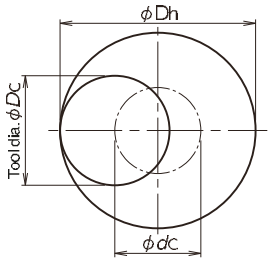
Wild Radius WDRTYPE

■ Instructions for profile milling

● Ramping



● Helical interpolation



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circle should not exceed max. depth of cut ap.

● Down cutting is recommended & tool pass rotation should be counterclockwise.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
● In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
● Long continous chips may come out in case of drilling, confirm the safe cutting conditions.

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Ramping (at ap=3mm)	Helical interpolation		Max. drilling depth Z (mm)
			Max. ramping angle θ°	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)	
WDR-2040	40	20.1	4°24′	56	78	2
WDR-3050	50	30.7	2°48′	76	98	2
WDR-4063	63	43.4	1°48′	102	124	2
WDR-5080	80	60.3	1°12′	136	158	2
WDR-6100	100	80.2	0°54′	176	198	2
WDR-6125	125	104.7	0°36′	226	248	2

Note) For tool dia. φ40-φ63mm, recommended ramping angle is 1° or less.
For tool dia. φ80-φ125mm, recommended ramping angle is 0°30' or less.

Wild Radius WDRTYPE

■ RECOMMENDED CUTTING CONDITIONS

● Face mill & end mill type

Work materials	Grades	Tool dia. (mm)														
		40					50					63				
		No. of teeth 2N					No. of teeth 3N					No. of teeth 4N				
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50,C55) Below 250HB	JC7560 (JC8118)	~150	3	1,200	1,680	6.7	~150	3	960	2,020	10.1	~150	3	910	2,550	16.1
		200	–	–	–	–	200	3	830	1,500	7.5	200	3	760	2,130	13.4
		250	–	–	–	–	250	2.5	640	1,150	4.8	250	3	660	1,590	10.0
		300	–	–	–	–	300	2	580	870	2.9	300	2.5	510	1,220	6.4
		350	–	–	–	–	350	1.5	580	870	2.2	350	2	510	1,020	4.3
		400	–	–	–	–	400	1.5	580	670	1.7	400	2	510	820	3.4
Die steel SKD61,SKD11 (1.2344,1.2379) Below 255HB	JC7560 (JC8118)	~150	3	1,200	1,680	6.7	~150	3	960	2,020	10.1	~150	3	910	2,550	16.1
		200	–	–	–	–	200	3	830	1,500	7.5	200	3	760	2,130	13.4
		250	–	–	–	–	250	2.5	640	1,150	4.8	250	3	660	1,590	10.0
		300	–	–	–	–	300	2	580	870	2.9	300	2.5	510	1,220	6.4
		350	–	–	–	–	350	1.5	580	870	2.2	350	2	510	1,020	4.3
		400	–	–	–	–	400	1.5	580	670	1.7	400	2	510	820	3.4
Mold steel HPM7,PX5,P20 (1.2311,P20) 30-36HRC	JC7560 (JC8118)	~150	3	1,200	1,680	7.6	~150	3	960	2,020	11.4	~150	3	910	2,550	18.1
		200	–	–	–	–	200	3	830	1,500	8.4	200	3	760	2,130	15.1
		250	–	–	–	–	250	2.5	640	1,150	5.4	250	3	660	1,590	11.3
		300	–	–	–	–	300	2	580	870	3.3	300	2.5	510	1,220	7.2
		350	–	–	–	–	350	1.5	580	870	2.4	350	2	510	1,020	4.8
		400	–	–	–	–	400	1.5	580	670	1.9	400	2	510	820	3.9
Mold steel NAK80, HPM1, P21 (1.2311,P21) 38-43HRC	JC8118	~150	2	960	860	4.6	~150	2	760	1,370	9.1	~150	2	610	1,100	9.2
		200	–	–	–	–	200	2	660	1,200	8.0	200	2	510	920	7.7
		250	–	–	–	–	250	1.5	500	900	4.5	250	2	440	800	6.7
		300	–	–	–	–	300	1.5	460	860	4.3	300	1.5	360	650	4.1
		350	–	–	–	–	350	1	460	860	2.9	350	1.2	360	650	3.3
		400	–	–	–	–	400	0.5	460	660	1.1	400	1	360	550	2.3
Hardened die steel SKD61 DAC DHA (1.2344, 1.2379) 42-52HRC	JC8118	~150	1.5	640	320	1.6	~150	1.5	510	380	2.4	~150	1.5	400	400	3.2
		200	–	–	–	–	200	1.5	430	320	2.1	200	1.5	330	330	2.7
		250	–	–	–	–	250	1	370	280	1.2	250	1.5	290	290	2.3
		300	–		–	–	300	1	260	200	0.9	300	1	200	200	1.1
		350	–	–	–	–	350	0.5	260	200	0.4	350	0.8	200	200	0.9
		400	–	–	–	–	400	0.3	260	190	0.2	400	0.5	200	200	0.5
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	JC8118 (JC7560)	~150	3	1,200	1,920	5.8	~150	3	960	2,300	8.6	~150	3	910	2,910	13.7
		200	–	–	–	–	200	3	830	1,750	6.6	200	3	760	2,280	10.8
		250	–	–	–	–	250	2.5	640	1,250	3.9	250	3	660	1,720	8.1
		300	–	–	–	–	300	2	580	1,050	2.6	300	2.5	510	1,220	4.8
		350	–	–	–	–	350	1.5	580	1,050	2.0	350	2	510	1,220	3.8
		400	–	–	–	–	400	1.5	580	870	1.6	400	2	510	1,020	3.2
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	JC8118	~150	3	1,200	1,920	5.8	~150	3	960	2,300	8.6	~150	3	910	2,910	13.7
		200	–	–	–	–	200	3	830	1,750	6.6	200	3	760	2,280	10.8
		250	–	–	–	–	250	2.5	640	1,250	3.9	250	3	660	1,720	8.1
		300	–	–	–	–	300	2	580	1,050	2.6	300	2.5	510	1,220	4.8
		350	–	–	–	–	350	1.5	580	1,050	2.0	350	2	510	1,220	3.8
		400	–	–	–	–	400	1.5	580	870	1.6	400	2	510	1,020	3.2
Stainless steel SUS304 Below 250HB	JC7560	~150	2	960	860	3.4	~150	2	760	1,370	6.9	~150	2	610	1,100	6.9
		200	–	–	–	–	200	2	660	1,200	6.0	200	2	510	920	5.8
		250	–	–	–	–	250	1.5	500	900	3.4	250	2	440	800	5.0
		300	–	–	–	–	300	1.5	460	860	3.2	300	1.5	360	650	3.1
		350	–	–	–	–	350	1	460	860	2.2	350	1.5	360	650	3.1
		400	–	–	–	–	400	0.5	460	660	0.8	400	1	360	550	1.7

ℓ: Overhung length, ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

Wild Radius WDRTYPE

■ RECOMMENDED CUTTING CONDITIONS

● Face mill & end mill type

Work materials	Grades	Tool dia. (mm)														
		80					100					125				
		No. of teeth 5N					No. of teeth 6N					No. of teeth 6N				
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50,C55) Below 250HB	JC7560 (JC8118)	~150	3	720	2,520	20.2	~150	3	580	2,440	24.4	~150	3	460	1,930	24.1
		200	3	600	2,100	16.8	200	3	480	2,020	20.2	200	3	460	1,930	24.1
		250	3	520	1,560	12.5	250	3	480	1,730	17.3	250	3	380	1,480	18.5
		300	3	400	1,200	9.6	300	3	420	1,510	15.1	300	3	380	1,370	17.1
		350	2.5	400	1,000	6.7	350	3	320	960	9.6	350	3	380	1,250	15.6
		400	2	360	900	4.8	400	2.5	320	960	8.0	400	3	330	990	12.4
Die steel SKD61,SKD11 (1.2344,1.2379) Below 255HB	JC7560 (JC8118)	~150	3	720	2,520	20.2	~150	3	580	2,440	24.4	~150	3	460	1,930	24.1
		200	3	600	2,100	16.8	200	3	480	2,020	20.2	200	3	460	1,930	24.1
		250	3	520	1,560	12.5	250	3	480	1,730	17.3	250	3	380	1,480	18.5
		300	3	400	1,200	9.6	300	3	420	1,510	15.1	300	3	380	1,370	17.1
		350	2.5	400	1,000	6.7	350	3	320	960	9.6	350	3	380	1,250	15.6
		400	2	360	900	4.8	400	2.5	320	960	8.0	400	3	330	990	12.4
Mold steel HPM7,PX5,P20 (1.2311,P20) 30-36HRC	JC7560 (JC8118)	~150	3	720	2,520	22.7	~150	3	580	2,440	27.5	~150	3	460	1,930	27.1
		200	3	600	2,100	18.9	200	3	480	2,020	22.7	200	3	460	1,930	27.1
		250	3	520	1,560	14.0	250	3	480	1,730	19.5	250	3	380	1,480	20.8
		300	3	400	1,200	10.8	300	3	420	1,510	17.0	300	3	380	1,370	19.3
		350	2.5	400	1,000	7.5	350	3	320	960	10.8	350	3	380	1,250	17.6
		400	2	360	900	5.4	400	2.5	320	960	9.0	400	3	330	990	13.9
Mold steel NAK80, HPM1,P21 (1.2311,P21) 38-43HRC	JC8118	~150	2	480	1,080	11.5	~150	2	380	1,020	13.6	~150	2	310	840	14.0
		200	2	400	900	9.6	200	2	320	860	11.5	200	2	260	700	11.7
		250	2	350	790	8.4	250	2	280	750	10.0	250	2	220	600	10.0
		300	2	290	650	6.9	300	2	230	620	8.3	300	2	160	430	7.2
		350	1.5	290	650	5.2	350	1.5	230	620	6.2	350	1.5	160	430	5.4
		400	1	290	540	2.9	400	1.5	230	510	5.1	400	1.5	160	420	5.3
Hardened die steel SKD61 DAC DHA (1.2344, 1.2379) 42-52HRC	JC8118	~150	1.5	320	400	4.1	~150	1.5	260	390	5.0	~150	1.5	210	310	5.0
		200	1.5	270	340	3.5	200	1.5	220	330	4.2	200	1.5	170	260	4.2
		250	1.5	230	290	3.0	250	1.5	190	280	3.6	250	1.5	150	220	3.5
		300	1.5	160	200	2.1	300	1.5	160	240	3.1	300	1.5	130	200	3.2
		350	1	160	200	1.4	350	1	160	240	2.1	350	1	130	200	2.1
		400	0.5	160	200	0.7	400	1	160	200	1.7	400	1	130	180	1.9
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	JC8118 (JC7560)	~150	3	720	2,880	17.3	~150	3	580	2,780	20.9	~150	3	460	2,210	20.7
		200	3	600	2,250	13.5	200	3	480	2,160	16.2	200	3	460	2,210	20.7
		250	3	520	1,820	10.9	250	3	480	1,870	14.0	250	3	380	1,600	15.0
		300	3	400	1,300	7.8	300	3	420	1,640	12.3	300	3	380	1,500	14.1
		350	2.5	400	1,200	6.0	350	3	320	1,060	8.0	350	3	380	1,370	12.8
		400	2	360	990	4.0	400	2.5	320	1,060	6.6	400	3	330	1,090	10.2
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	JC8118	~150	3	720	2,880	17.3	~150	3	580	2,780	20.9	~150	3	460	2,210	20.7
		200	3	600	2,250	13.5	200	3	480	2,160	16.2	200	3	460	2,210	20.7
		250	3	520	1,820	10.9	250	3	480	1,870	14.0	250	3	380	1,600	15.0
		300	3	400	1,300	7.8	300	3	420	1,640	12.3	300	3	380	1,500	14.1
		350	2.5	400	1,200	6.0	350	3	320	1,060	8.0	350	3	380	1,370	12.8
		400	2	360	990	4.0	400	2.5	320	1,060	6.6	400	3	330	1,090	10.2
Stainless steel SUS304 Below 250HB	JC7560	~150	2	480	1,080	8.6	~150	2	380	1,020	10.2	~150	2	310	840	10.5
		200	2	400	900	7.2	200	2	320	860	8.6	200	2	260	700	8.8
		250	2	350	790	6.3	250	2	280	750	7.5	250	2	220	600	7.5
		300	2	290	650	5.2	300	2	230	620	6.2	300	2	160	430	5.4
		350	1.5	290	650	3.9	350	2	230	620	6.2	350	2	160	430	5.4
		400	1	290	540	2.2	400	1.5	230	510	3.8	400	2	160	420	5.3

ℓ: Overhung length, ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of chatter occurring, recommend to reduce depth of cut ap or Feed speed.
3) If machine does not have enough power, recommend to reduce the depth of cut ap or Spindle speed and Feed speed.
4) Use air blow.

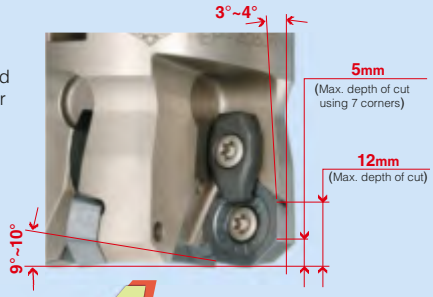
Hepta Mill HEPTYPE

Features of HEPTA MILL

1 High metal removal

Cutting forces are reduced due to outer edge and inner edge has side and face clearance, so high feed machining can be achieved in case of higher depth of cut.

- Material to be cut S50C (C50): fz=1mm/t in case of ap=3mm, fz=0.6mm/t in case of ap=5mm.
- Material to be cut FC300 (GG300): fz=1mm/t in case of ap=5mm.
- Material to be cut SKD61 (1.2344), 45HRC: fz=0.6mm/t in case of ap=2.5mm.



2 G-Body

Combination of rigid G-Body and high stability to the insert in the insert pocket gives stable machining without chatter in case of roughing.

3 Stronger heptagon insert

Improved insert strength 40% compared with conventional insert by increasing size and thickness of insert.

4 7 times indexability

Heptagoninsert gives maximum 7 times indexability when ap=5mm or less.

5 Double clamp system

Adopted double clamp system tightens the insert strongly.

Please refer page C009 for "Insert set up installation point of double clamping mechanism type

6 Insert grades JC5040 JC8015 JC8050 JC7560

"JC5040" is suitable for general steel.
"JC8015" is suitable for cast iron, stainless steel and hardened steel.
Tough grade "JC8050" against chipping for unfavorable conditions.
"JC7560" improved heat-fracture and impact strength for rough milling.

7 Insert corner identification

Insert has corner identification No. on the top face.

NEW HEPTA MILL

HEP type HEPTA MILL with Heptagon insert

Hepta Mill HEP TYPE

■ CUTTING PERFORMANCE

Chip volume comparison

HEPTA MILL: HEP-4063R-08

Cutting condition

Mat'l: S50C (C50), 201HB
Tool dia.: φ63mm
n=800min^{-1}

ap=3mm
ae=40mm
Q=384cm^3/min
Power load: 66%

High feed cutter

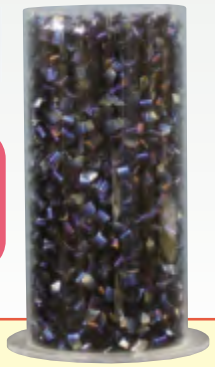
Cutting condition

Mat'l: S50C (C50), 201HB
Tool dia.: φ63mm
n=800min^{-1}

ap=1.5mm
ae=40mm
Q=384cm^3/min
Power load: 66%

Chip volume comparison (same weight 3kg/min)

LESS STORAGE SPACE REQUIRED



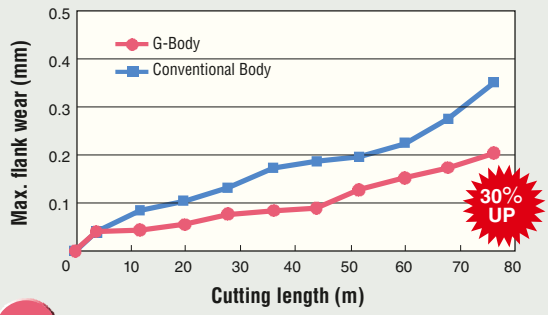
Reduced chip volume by 20%

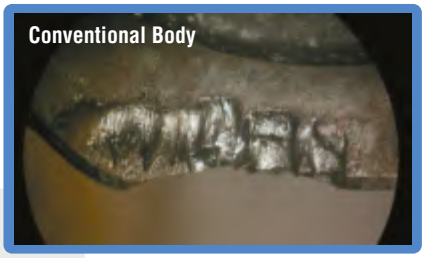
Tool life comparison G-body VS Conventional body

Cutting condition

Mat'l: S53C
Tool dia: φ63mm
(HEP-4063R-08)
n=800min^{-1}
Vc=158m/min
Vf=800mm/min

fz=1mm/t
ap=3mm
ae=40mm
Dry, Down cut
Insert grade: JC5040





G-body gives body strength and improved tool life by 1.3 times compared with conventional body.

Hepta Mill HEP TYPE

G-Body Through Coolant Hole (except dia. φ200)

Fig. 1

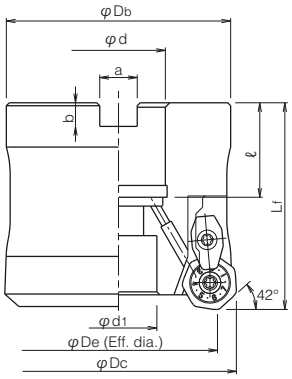


Fig. 2 (Without coolant hole)

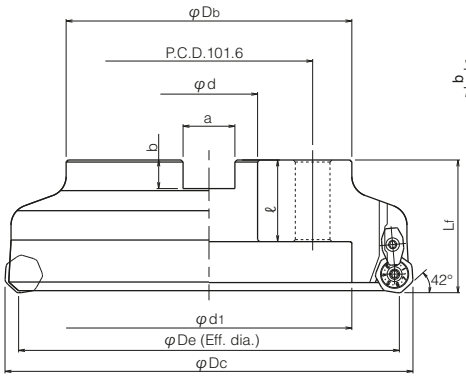
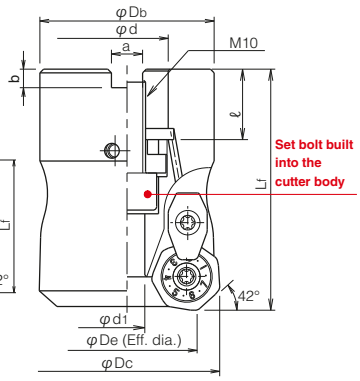


Fig. 3



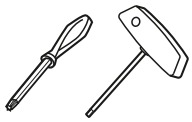
■ BODY/FACE MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	φDe (Eff. dia.)	Lf	φDb	φd	φd1	a	b	ℓ	Head cap screw (JIS Standard)	weight (kg)	Fig.
Metric Bore	HEP-3050R-08-22	●	3	50	36.7	65	47	22	9.6	10.4	6.3	19	※M10×1.5×25	0.9	3
	HEP-4063R-08-22	●	4	63	49.5	50	60	22	17	10.4	6.3	20	M10	1.1	1
	HEP-4063R-08-27	●	4	63	49.5	50	60	27	20	12.4	7	22	※M12×1.75×30	1.1	1
	HEP-5080R-08-27	●	5	80	66.6	55	76	27	20	12.4	7	22	※M12×1.75×40	1.9	1
	HEP-6100R-08-32	●	6	100	86.6	70	96	32	26	14.4	8	32	※M16×2.0×45	3.6	1
	HEP-7125R-08-40	●	7	125	111.6	70	100	40	32	16.4	9	35	※M20×2.5×45	5.5	1
	HEP-8160R-08-40	●	8	160	146.6	70	100	40	32	16.4	9	35	※M20×2.5×45	8.4	1
	HEP-9200R-08-60	●	9	200	186.6	65	140	60	140	25.4	14.3	40	M16	10.2	2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C112-C119 for recommended cutting conditions.
3. ※ Mark shows: these cutter bodies are equipped with the set bolt because of the specified bolt size. Except for these cutter bodies, please use the set bolt equipped with arbor.
4. In case of using double clamping mechanism type, please refer page C009.

Hepta Mill HEPTYPE

■ PARTS

Clamp screw	Clamp set	Wrench
 Recommended Torque 6.0 N•m		
DSW-4512H	DCM-17	Facemill type : A-20 Endmill type : A-20SD

■ HEXAGON WRENCH SIZE FOR SET BOLT

Thread	 Hexagon wrench size (mm)
M10	8
M12	10
M16	14
M20	17
M24	19

Note) All cutters are supplied without hexagon wrench.

Hepta Mill HEPTYPE

■ INSERTS

Fig. 1 Without Chipbreaker

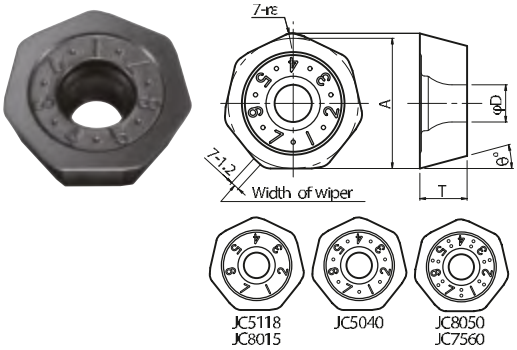


Fig. 2 Without Chipbreaker

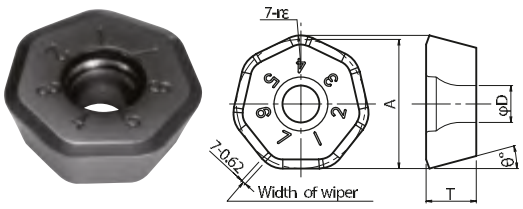


Fig. 3 With Chipbreaker

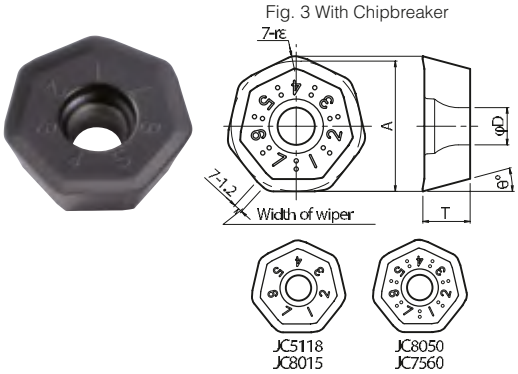
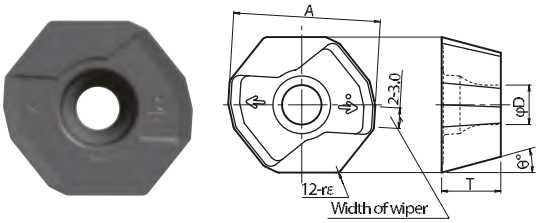


Fig. 4 Wiper Insert



Cat. No.	Tole-rance	Dimensions (mm)					PVD coated						Fig.
		A	T	φD	r ε	θ°	JC8015	JC5040	JC5118	JC8118	JC8050	JC7560	
XDMW080620ZTR	M	17.5	6.35	5	2	15	●	○	○		●	●	1
XDMW080635ZTR-S	M	17.5	6.35	5	3.5	15	●						2
XDMT080620ZER	M	17.5	6.35	5	2	15	●		○		●	●	3
XDMT080708ZER (Wiper Insert)	M	18.6	7.5	5	0.8	15	●						4
XDMT080620ZER-ML	M	17.3	6.5	5	2	15				●		●	3

10 inserts per case

■ How to use of corner change

Recommend to rotate the insert counter-clockwise for corner change.

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Hepta Mill HEPTYPE

■ Attention for using wiper insert

● In case of feed per rev. f >1.2mm/rev and required surface roughness Rz ≒ 12.5 μm, we recommend to use wiper insert.

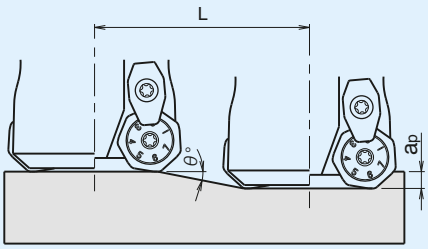
f (mm/rev)	No. of wiper inserts to install
1.2 < f (mm/rev) ≦ 3	1
3 < f (mm/rev) ≦ 6	2
6 < f (mm/rev) ≦ 9	3
9 < f (mm/rev) ≦ 12	4

● Please put wiper inserts to become unequal pitch.
● Even if wiper insert is used, the same cutting condition (page C088-C095) is applied.

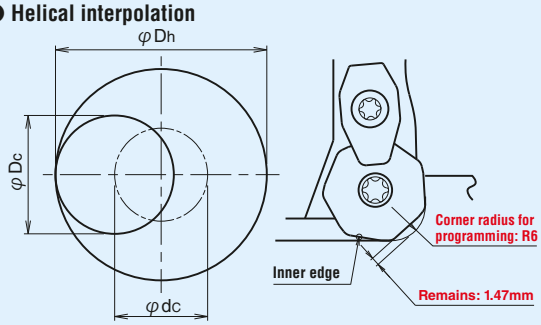
"⇩" mark is shown to the front

■ Instructions for profiling milling with "HEPTA MILL"

● **Ramping**



● **Helical interpolation**



● **Calculation of tool pass dia.**

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● **Depth of cut per one circuit should not exceed max. depth of cut ap.**
● **Down cutting is recommended, so tool pass rotation should be counter-clockwise.**

Cat. No.	Tool dia. φDc (mm)	Effective cutting dia. (mm)	Ramping (at maximum depth of cut ap=5mm)				Helical interpolation	
			Ramping angle to the inner edge θ°	Total cutting length with inner edge L (mm)	Max. ramping angle θ°	Total cutting length L (mm)	Min. bore dia. Dh min (mm)	Max. bore dia. Dh max (mm)
HEP-3050	50	36.7	1°50′	156	9°	31	74	96
HEP-*063	63	49.5	1°25′	202	7°	40	100	122
HEP-*080	80	66.6	1°	286	5°	57	134	156
HEP-*100	100	86.6	0°45′	382	3°30′	81	174	196
HEP-*125	125	111.6	0°35′	491	2°30′	114	224	246
HEP-*160	160	146.6	0°25′	687	2°	143	294	316
HEP-*200	200	186.6	0°20′	860	1°30′	190	374	396

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS General Use

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 50 No. of teeth 3N a_p (mm)	n (min⁻¹)	V_f (mm/min)	P_c (kW)	63 No. of teeth 4N a_p (mm)	n (min⁻¹)	V_f (mm/min)	P_c (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	4	900	2,200	15.7	4	700	2,300	20.6
			150	3.5	800	1,700	10.6	3.5	650	1,800	14.1
			200	3	700	1,300	7	3	600	1,500	10.1
			250	2.5	700	1,050	4.7	2.5	600	1,200	6.7
			300	2	700	1,050	3.7	2	600	1,200	5.4
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMT080620ZER(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC5118) (JC5040)	100	3	900	1,900	10.2	3	700	2,000	13.6
			150	2.5	800	1,400	6.3	2.5	650	1,600	9.1
			200	2.5	700	1,050	4.7	2.5	600	1,200	6.8
			250	2	700	850	3.1	2	600	1,000	4.5
			300	2	700	850	3.1	2	600	1,000	4.5
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER (XDMT080620ZER)	JC5118 (JC8015)	100	3	650	1,400	8.1	3	500	1,400	10.2
			150	2.5	600	1,100	5.3	2.5	450	1,100	6.7
			200	2.5	500	750	3.6	2.5	400	700	4.2
			250	2	500	600	2.3	2	400	600	2.9
			300	2	500	600	2.3	2	400	600	2.9
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	3	900	1,900	10.2	3	700	2,000	13.6
			150	2.5	800	1,400	6.3	2.5	650	1,600	9.1
			200	2.5	700	1,050	4.7	2.5	600	1,200	6.8
			250	2	700	850	3.1	2	600	1,000	4.5
			300	2	700	850	3.1	2	600	1,000	4.5
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	450	550	3.8	2.5	450	700	6.1
			150	2	400	450	2.5	2	400	600	4.2
			200	2	350	320	1.8	2	300	350	2.5
			250	1.5	350	320	1.3	1.5	300	350	1.8
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMW080635ZTR-S)	JC8015 (JC8015)	100	5	900	2,700	17.2	5	700	2,800	22.5
			150	4	800	2,400	12.2	4	600	2,400	15.4
			200	3.5	700	1,800	8	3.5	550	2,000	11.2
			250	3	700	1,600	6.1	3	550	1,600	7.7
			300	2.5	700	1,600	5.1	2.5	550	1,600	6.4
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMW080620ZTR) (XDMW080635ZTR-S)	JC5118 (JC8015) (JC8015)	100	4	750	1,800	13.5	4	600	2,000	18.9
			150	3	680	1,350	7.6	3	550	1,450	10.3
			200	2.5	600	1,000	4.7	2.5	500	1,150	6.8
			250	2	600	900	3.4	2	500	900	4.3
			300	1.5	600	900	2.5	1.5	500	900	3.2
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	800	1,200	9.2	4	650	1,200	11.6
			150	3.5	700	1,000	6.7	3.5	600	1,000	8.5
			200	3	600	700	4	3	500	800	5.8
			250	2.5	600	550	2.6	2.5	500	600	3.6
			300	2	600	550	2.1	2	500	600	2.9

a_p: Depth of cut, n: Spindle speed, V_f: Feed speed, P_c: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS General Use

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 80 No. of teeth 5N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	100 No. of teeth 6N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	4	550	2,200	25.1	4	450	2,200	31.3
			150	4	500	1,800	20.5	4	400	1,700	24.2
			200	3.5	450	1,400	14	3.5	350	1,300	16.2
			250	3	450	1,100	9.4	3	350	1,100	11.8
			300	2.5	450	1,100	7.8	2.5	350	1,100	9.8
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMT080620ZER(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC5118) (JC5040)	100	3	550	2,000	17.3	3	450	1,900	20.5
			150	3	500	1,500	12.9	3	400	1,500	16.2
			200	2.5	450	1,100	7.9	2.5	350	1,100	9.9
			250	2.5	450	900	6.5	2.5	350	850	7.6
			300	2	450	900	5.2	2	350	850	6.1
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER (XDMT080620ZER)	JC5118 (JC8015)	100	3	400	1,300	12	3	350	1,500	17.3
			150	3	350	1,050	9.7	3	300	1,200	13.8
			200	2.5	300	800	6.2	2.5	250	800	7.7
			250	2.5	300	600	4.6	2.5	250	600	5.8
			300	2	300	600	3.7	2	250	600	4.6
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	3	550	2,000	17.3	3	450	1,900	20.5
			150	3	500	1,500	12.9	3	400	1,500	16.2
			200	2.5	450	1,100	7.9	2.5	350	1,100	9.9
			250	2.5	450	900	6.5	2.5	350	850	7.6
			300	2	450	900	5.2	2	350	850	6.1
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	350	700	7.8	2.5	250	600	8.3
			150	2.5	300	600	6.7	2.5	200	500	6.9
			200	2	250	400	3.6	2	160	400	4.4
			250	2	250	350	3.1	2	160	350	3.9
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMW080635ZTR-S)	JC8015 (JC8015)	100	5	550	2,750	28	5	450	2,700	34.4
			150	5	500	2,400	24.5	5	400	2,400	30.6
			200	4	450	1,800	14.7	4	350	2,000	20.4
			250	3.5	450	1,600	11.4	3.5	350	1,600	14.3
			300	3	450	1,600	9.8	3	350	1,600	12.2
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMW080620ZTR) (XDMW080635ZTR-S)	JC5118 (JC8015) (JC8015)	100	4	450	1,750	21	4	380	1,800	27.1
			150	4	400	1,350	16.2	4	350	1,350	20.3
			200	3	380	1,000	9	3	300	1,150	13
			250	2.5	380	900	6.8	2.5	300	900	8.5
			300	2	380	900	5.4	2	300	900	6.8
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	500	1,200	14.7	4	400	1,100	16.9
			150	4	450	900	11.1	4	350	1,000	15.4
			200	3.5	400	800	8.6	3.5	300	700	9.4
			250	3	400	600	5.5	3	300	600	6.9
			300	2.5	400	600	4.6	2.5	300	550	5.3

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS General Use

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 125 No. of teeth 7N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	160 No. of teeth 8N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	4	350	2,000	35.6	4	300	1,900	43.3
			150	4	320	1,600	28.5	4	260	1,500	34.2
			200	4	300	1,300	23.1	4	220	1,100	25.1
			250	3.5	300	1,100	17.1	3.5	220	900	18
			300	3	300	1,100	14.7	3	220	900	15.4
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMT080620ZER(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC5118) (JC5040)	100	3	350	1,700	22.9	3	300	1,700	29.3
			150	3	320	1,350	18.2	3	260	1,250	21.6
			200	3	300	1,050	14.2	3	220	900	15.5
			250	2.5	300	1,000	11.2	2.5	220	700	10.1
			300	2.5	300	1,000	11.2	2.5	220	700	10.1
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER (XDMT080620ZER)	JC5118 (JC8015)	100	3	300	1,500	21.6	3	250	1,400	25.8
			150	3	250	1,100	15.8	3	200	1,000	18.4
			200	3	200	750	10.8	3	150	600	11.1
			250	2.5	200	600	7.2	2.5	150	500	7.7
			300	2.5	200	600	7.2	2.5	150	500	7.7
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	3	350	1,700	22.9	3	300	1,700	29.3
			150	3	320	1,350	18.2	3	260	1,250	21.6
			200	3	300	1,050	14.2	3	220	900	15.5
			250	2.5	300	1,000	11.2	2.5	220	700	10.1
			300	2.5	300	1,000	11.2	2.5	220	700	10.1
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	200	550	9.5	2.5	170	550	12.2
			150	2.5	150	400	6.9	2.5	150	500	11.1
			200	2.5	125	260	4.5	2.5	120	300	6.7
			250	2	125	260	3.6	2	120	280	5
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMW080635ZTR-S)	JC8015 (JC8015)	100	5	350	2,450	39	5	280	2,250	45.9
			150	5	320	2,200	35	5	260	2,100	42.8
			200	5	280	1,800	28.7	5	220	1,700	34.7
			250	4	280	1,400	17.8	4	220	1,400	22.8
			300	3.5	280	1,400	15.6	3.5	220	1,400	20
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMW080620ZTR) (XDMW080635ZTR-S)	JC5118 (JC8015) (JC8015)	100	4	300	1,700	31.9	4	250	1,500	36.1
			150	4	270	1,250	23.5	4	220	1,200	28.9
			200	3	250	1,000	14.1	3	180	950	17.1
			250	3	250	800	11.3	3	180	800	14.4
			300	2.5	250	800	9.4	2.5	180	800	12
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	300	1,000	19.2	4	240	900	22.1
			150	4	250	800	15.4	4	200	750	18.4
			200	4	220	650	12.5	4	180	600	14.7
			250	3.5	220	550	9.2	3.5	180	500	10.8
			300	3	220	500	7.2	3	180	450	8.3

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS General Use

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 200 No.of teeth 9N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	4	220	1,600	45.6
			150	4	200	1,300	37
			200	4	180	1,000	28.5
			250	3.5	180	800	20
			300	3	180	800	17.1
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMT080620ZER(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC5118) (JC5040)	100	3	220	1,400	30.2
			150	3	200	1,100	23.7
			200	3	180	800	17.3
			250	2.5	180	650	11.7
			300	2.5	180	650	11.7
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER (XDMT080620ZER)	JC5118 (JC8015)	100	3	200	1,100	25.3
			150	3	170	1,000	23
			200	3	130	600	13.8
			250	2.5	130	500	9.6
			300	2.5	130	500	9.6
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMT080620ZER(-ML) (XDMW080620ZTR)	JC7560 (JC5040)	100	3	220	1,400	30.2
			150	3	200	1,100	23.7
			200	3	180	800	17.3
			250	2.5	180	650	11.7
			300	2.5	180	650	11.7
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	140	500	13.9
			150	2.5	120	450	12.5
			200	2.5	100	280	7.8
			250	2	100	250	5.6
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMW080635ZTR-S)	JC8015 (JC8015)	100	5	220	2,000	51
			150	5	200	1,800	45.9
			200	5	180	1,400	35.7
			250	4	180	1,300	26.5
			300	3.5	180	1,300	23.2
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMW080620ZTR) (XDMW080635ZTR-S)	JC5118 (JC8015) (JC8015)	100	4	180	1,350	40.6
			150	4	170	1,000	30.1
			200	3	150	800	18
			250	3	150	700	15.8
			300	2.5	150	700	13.2
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	200	800	24.6
			150	4	160	650	20
			200	4	140	550	16.9
			250	3.5	140	450	12.1
			300	3	140	400	9.2

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS Interrupted Cutting

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 50 No.of teeth 3N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	63 No. of teeth 4N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	4	750	1,800	12.8	4	600	1,950	17.5
			150	3.5	680	1,450	9	3.5	550	1,500	11.8
			200	3	600	1,100	5.9	3	500	1,300	8.8
			250	2.5	600	900	4	2.5	500	1,000	5.6
			300	2	600	900	3.2	2	500	1,000	4.5
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	750	1,600	8.6	3	600	1,700	11.6
			150	2.5	680	1,200	5.4	2.5	550	1,350	7.6
			200	2.5	600	900	4.1	2.5	500	1,000	5.7
			250	2	600	720	2.6	2	500	850	3.9
			300	2	600	720	2.6	2	500	850	3.9
Mold steel NAK80,HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER	JC5118	100	3	550	1,100	6.3	3	450	1,250	9.1
			150	2.5	500	900	4.3	2.5	400	1,000	6.1
			200	2.5	400	600	2.9	2.5	350	700	4.2
			250	2	400	500	1.9	2	350	600	2.9
			300	2	400	500	1.9	2	350	600	2.9
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	750	1,600	8.6	3	600	1,700	11.6
			150	2.5	680	1,200	5.4	2.5	550	1,350	7.6
			200	2.5	600	900	4.1	2.5	500	1,000	5.7
			250	2	600	720	2.6	2	500	850	3.9
			300	2	600	720	2.6	2	500	850	3.9
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	450	450	3.1	2.5	450	550	4.8
			150	2	400	350	1.9	2	400	500	3.5
			200	2	350	250	1.4	2	300	300	2.1
			250	1.5	350	250	1	1.5	300	300	1.6
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	5	750	2,250	14.3	5	600	2,400	19.3
			150	4	680	2,000	10.2	4	550	2,200	14.2
			200	3.5	600	1,500	6.8	3.5	500	1,700	9.5
			250	3	600	1,350	5.2	3	500	1,350	6.5
			300	2.5	600	1,350	4.3	2.5	500	1,350	5.4
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	4	650	1,400	10.5	4	550	1,500	14.2
			150	3	600	1,100	6.2	3	500	1,200	8.5
			200	2.5	500	750	3.5	2.5	400	800	4.8
			250	2	500	600	2.3	2	400	650	3.1
			300	1.5	500	600	1.7	1.5	400	650	2.3
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	650	1,000	7.7	4	500	1,000	9.7
			150	3.5	550	800	5.4	3.5	450	800	6.8
			200	3	500	550	3.2	3	400	650	4.7
			250	2.5	500	450	2.2	2.5	400	500	3
			300	2	500	450	1.7	2	400	500	2.4

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS Interrupted Cutting

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 80 No. of teeth 5N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	100 No. of teeth 6N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	4	450	1,800	20.5	4	380	1,800	25.6
			150	4	400	1,500	17.1	4	350	1,400	19.9
			200	3.5	380	1,200	12	3.5	300	1,100	13.7
			250	3	380	900	7.7	3	300	900	9.6
			300	2.5	380	900	6.4	2.5	300	900	8
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	450	1,700	14.7	3	380	1,600	17.3
			150	3	400	1,250	10.8	3	350	1,250	13.5
			200	2.5	380	900	6.5	2.5	300	900	8.9
			250	2.5	380	750	5.4	2.5	300	700	6.3
			300	2	380	750	4.3	2	300	700	5
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER	JC5118	100	3	350	1,150	10.6	3	300	1,200	13.8
			150	3	300	900	8.3	3	250	900	10.4
			200	2.5	250	700	5.4	2.5	200	550	5.3
			250	2.5	250	500	3.8	2.5	200	450	4.3
			300	2	250	500	3.1	2	200	450	3.5
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	450	1,700	14.7	3	380	1,600	17.3
			150	3	400	1,250	10.8	3	350	1,250	13.5
			200	2.5	380	900	6.5	2.5	300	900	8.9
			250	2.5	380	750	5.4	2.5	300	700	6.3
			300	2	380	750	4.3	2	300	700	5
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	350	550	6.1	2.5	250	500	6.9
			150	2.5	300	500	5.6	2.5	200	400	5.6
			200	2	250	320	2.8	2	160	320	3.6
			250	2	250	280	2.5	2	160	280	3.1
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	5	450	2,250	22.9	5	380	2,250	28.7
			150	5	400	1,900	19.3	5	350	2,000	26
			200	4	380	1,500	12.2	4	300	1,700	17.3
			250	3.5	380	1,350	9.7	3.5	300	1,400	12.2
			300	3	380	1,350	8.3	3	300	1,350	10.4
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	4	400	1,350	16.2	4	330	1,200	18
			150	4	350	1,100	13.2	4	300	900	13.5
			200	3	300	800	7.2	3	250	750	8.5
			250	2.5	300	650	4.9	2.5	250	600	5.6
			300	2	300	650	3.9	2	250	600	4.5
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	400	1,000	12.3	4	300	900	13.8
			150	4	350	700	8.6	4	300	800	12.3
			200	3.5	300	650	7	3.5	250	600	8.1
			250	3	300	600	5.5	3	250	500	5.8
			300	2.5	300	600	4.6	2.5	250	450	4.3

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEP TYPE

■ RECOMMENDED CUTTING CONDITIONS Interrupted Cutting

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 125 No. of teeth 7N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)	160 No. of teeth 8N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	4	300	1,700	30.3	4	250	1,600	36.5
			150	4	270	1,400	24.9	4	220	1,200	27.4
			200	4	250	1,100	19.6	4	180	900	20.5
			250	3.5	250	900	14	3.5	180	750	15
			300	3	250	900	12	3	180	750	12.8
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	300	1,400	18.9	3	250	1,400	24.2
			150	3	270	1,100	14.8	3	220	1,000	17.3
			200	3	250	900	12.1	3	180	750	12.9
			250	2.5	250	850	9.5	2.5	180	600	8.6
			300	2.5	250	850	9.5	2.5	180	600	8.6
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER	JC5118	100	3	250	1,150	16.6	3	200	1,100	20.2
			150	3	200	800	11.5	3	150	800	14.7
			200	3	150	550	7.9	3	120	550	10.1
			250	2.5	150	500	6	2.5	120	450	6.9
			300	2.5	150	500	6	2.5	120	450	6.9
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	300	1,400	18.9	3	250	1,400	24.2
			150	3	270	1,100	14.8	3	220	1,000	17.3
			200	3	250	900	12.1	3	180	750	12.9
			250	2.5	250	850	9.5	2.5	180	600	8.6
			300	2.5	250	850	9.5	2.5	180	600	8.6
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	200	450	7.8	2.5	170	450	10
			150	2.5	150	320	5.6	2.5	150	400	8.9
			200	2.5	125	200	3.5	2.5	120	250	5.6
			250	2	125	200	2.8	2	120	220	3.9
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	5	300	2,100	33.5	5	250	2,000	40.8
			150	5	270	1,850	29.8	5	220	1,750	35.7
			200	5	250	1,500	24.4	5	180	1,450	29.5
			250	4	250	1,200	15.1	4	180	1,200	19.4
			300	3.5	250	1,200	13.3	3.5	180	1,200	17
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	4	250	1,100	20.7	4	200	1,000	24.1
			150	4	230	850	16	4	170	800	19.2
			200	3	200	700	9.9	3	150	600	10.8
			250	3	200	550	7.8	3	150	500	9
			300	2.5	200	550	6.5	2.5	150	500	7.5
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	250	800	15.4	4	200	700	17.2
			150	4	200	650	12.5	4	160	600	14.7
			200	4	180	500	9.6	4	150	500	12.3
			250	3.5	180	450	7.6	3.5	150	400	8.6
			300	3	180	400	5.8	3	150	350	6.5

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Hepta Mill HEPTYPE

■ RECOMMENDED CUTTING CONDITIONS Interrupted Cutting

Work Materials	Inserts	Insert Grades	Overhung length ℓ (mm)	Tool dia. (mm) 200 No. of teeth 9N ap (mm)	n (min⁻¹)	Vf (mm/min)	Pc (kW)
Carbon steel S50C, S55C (C50, C55) Below 250HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	4	180	1,300	37
			150	4	170	1,100	31.3
			200	4	150	850	24.2
			250	3.5	150	700	17.5
			300	3	150	700	15
Mold steel HPM7, PX5, KPM30 (1.2311, P20) 30-36HRC	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	180	1,200	25.9
			150	3	170	900	19.4
			200	3	150	700	15.1
			250	3.5	150	550	9.9
			300	2.5	150	550	9.9
Mold steel NAK80, HPM1 (1.2311, P21) 38-43HRC	XDMT080620ZER	JC5118	100	3	170	1,000	23
			150	3	150	800	18.4
			200	3	100	500	11.5
			250	2.5	100	400	7.7
			300	2.5	100	400	7.7
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XDMW080620ZTR(-ML) (XDMT080620ZER) (XDMW080620ZTR)	JC7560 (JC8050) (JC8050)	100	3	180	1,200	25.9
			150	3	170	900	19.4
			200	3	150	700	15.1
			250	2.5	150	550	9.9
			300	2.5	150	550	9.9
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	XDMW080620ZTR (XDMW080620ZTR)	JC5118 (JC8015)	100	2.5	140	400	11.1
			150	2.5	120	350	9.7
			200	2.5	100	220	6.1
			250	2	100	200	4.4
Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	5	180	1,600	40.8
			150	5	170	1,500	39
			200	5	150	1,200	30.3
			250	4	150	1,100	22.5
			300	3.5	150	1,100	19.7
Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	XDMW080620ZTR (XDMT080620ZER) (XDMW080635ZTR-S)	JC5118 (JC8050) (JC8015)	100	4	160	900	27.1
			150	4	140	700	21
			200	3	120	500	11.3
			250	3	120	400	9
			300	2.5	120	400	7.5
Stainless steel SUS304 Below 250HB	XDMT080620ZER(-ML) (XDMT080620ZER)	JC7560 (JC8050)	100	4	160	650	20
			150	4	130	500	15.4
			200	4	110	450	13.8
			250	3.5	110	350	9.4
			300	3	110	300	6.9

ap: Depth of cut, n: Spindle speed, Vf: Feed speed, Pc: Net power consumption

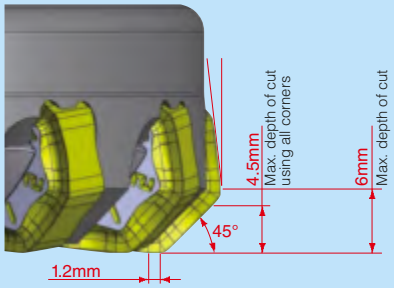
■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity. (Above parameter is for BT50 arbor)
2) In case chatter occurrs, recommend to reduce depth of cut or spindle speed and feed speed.
3) Use air blow to flush the chips out.
4) We recommend to use XDMW080635ZTR-S JC8015 (negative geometry inserts) for material having sand inclusions and uneven removal stocks.

Nega Hepta NHPTYPE

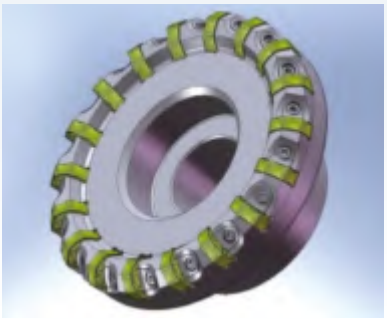
FEATURES

Economical cutter with multi corner insert



- Lower cutting forces by 3D positive geometry chip breaker even though double side negative insert.
- Pocket milling is possible due to outer cutting edge has side clearance.

Wide range of cutter body

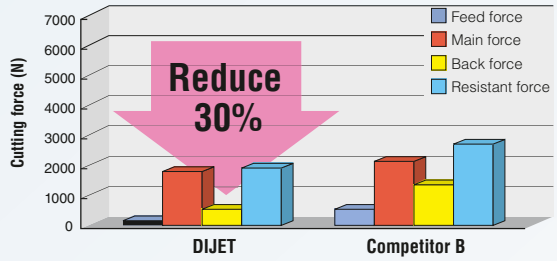


- Regular type for lower power consumption.
- Ultra fine pitch type for high efficient machining.
- From dia. 63mm to 250mm

Nega Hepta NHPTYPE

■ CUTTING PERFORMANCE

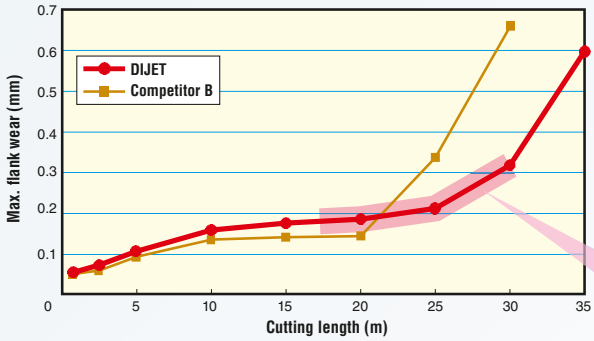
Cutting Force Comparison



φ125, 18 inserts

Material: FC300
Cutting conditions:
Vc=200m/min
fz=0.5mm/t
ap=3mm
ae=80mm
Overhung length: ℓ=138mm
Downcut, Dry

Tool Life Comparison



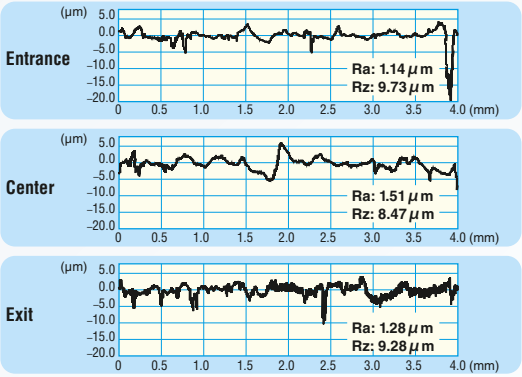
Material: FC300 (Interrupted cutting)
Cutting conditions: Vc=300m/min, n=764min^{-1},
fz=0.3mm/t, ap=3mm,ae=100mm
Overhung length: ℓ=138mm, Dry

DIJET: 30m

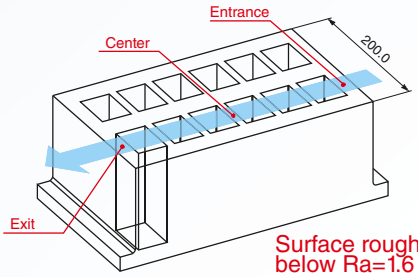
Competitor B: 30m

Inserts got wornout gradually

Surface Roughness



Material: FC300 (Interrupted cutting)
Cutting conditions: Vc=300m/min, n=764min^{-1},
fz=0.3mm/t, ap=3mm,
ae=100mm
Overhung length: ℓ=138mm, Dry



Surface roughness:
below Ra=1.6μm!

Nega Hepta NHP TYPE

Fig. 1

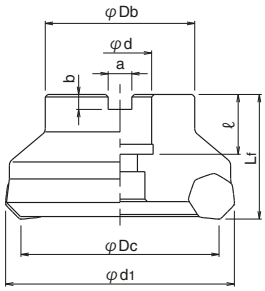
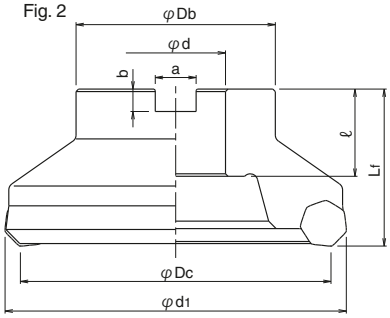


Fig. 2



■ BODY / ULTRA FINE PITCH TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm)								Weight (kg)	Fig.
				φDc	Lf	φDb	φd	φd1	a	b	ℓ		
Metric Bore	**NHP-14100R-08-32**	□	14	**100**	50	70	32	112.4	14.4	8	32	2.1	2
	NHP-18125R-08-40	□	18	**125**	63	80	40	137.4	16.4	9	35	3.7	2
	NHP-22160R-08-40	□	22	**160**	63	100	40	172.4	16.4	9	29	5.2	4
	NHP-28200R-08-60	□	28	**200**	63	140	60	212.4	25.4	14.3	40	7.6	3
	NHP-36250R-08-60	□	36	**250**	63	160	60	262.4	25.4	14.3	40	12.9	3

Note) 1. All cutters are supplied without inserts.
2. Refer page C126 for recommended cutting conditions.

Nega Hepta NHPTYPE

Fig. 3

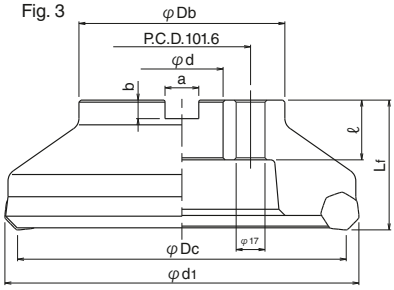
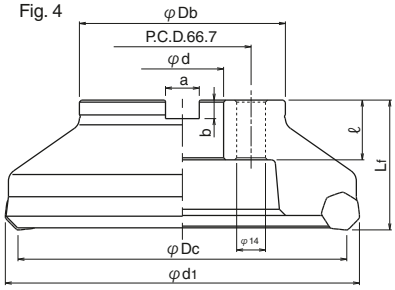


Fig. 4



■ BODY/REGULAR TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm)								Weight (kg)	Fig.
				φDc	Lf	φDb	φd	φd1	a	b	ℓ		
Metric Bore	**NHP-5063R-08-22**	●	5	**63**	50	60	22	75.4	10.4	6.3	20	1.2	1
	NHP-6080R-08-27	●	6	**80**	50	60	27	92.4	12.4	7	22	1.6	1
	NHP-8100R-08-32	●	8	**100**	50	70	32	112.4	14.4	8	32	2.0	2
	NHP-8125R-08-40	●	8	**125**	63	80	40	137.4	16.4	9	35	3.2	2
	NHP-10160R-08-40	●	10	**160**	63	100	40	172.4	16.4	9	29	5.2	4

Note) 1. All cutters are supplied without inserts.
2. Refer page C126 for recommended cutting conditions

■ PARTS

Wedge Screw	Wedge	Wrench
 Recommended Torque 6.0 N·m		
LS-110	70710	A-15T

Nega Hepta NHPTYPE

■ INSERT

Fig. 1

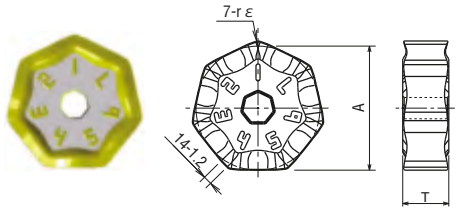


Fig. 2 (Low cutting force)

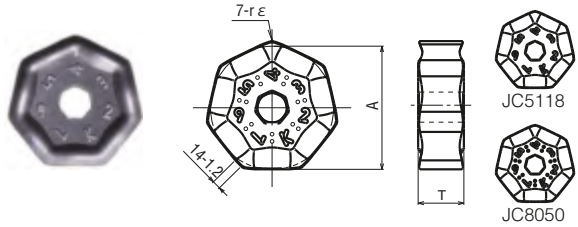


Fig. 3 (Wiper insert)

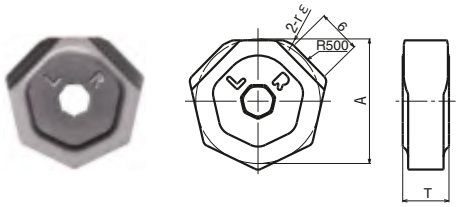
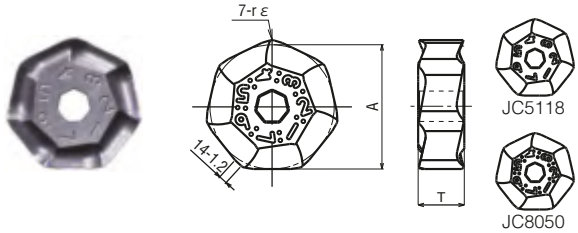


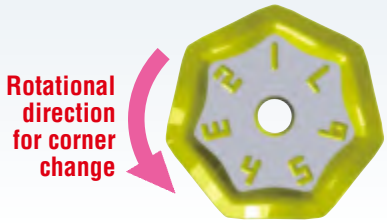
Fig. 4



■ BODY

Cat. No.	Tole-rance	Dimensions (mm)			PVD coated			CVD coated	Fig.
		A	T	r ε	JC5118	JC8003	JC8050	JC608X	
XNMU080610AEN	M	17.5	6.5	1				●	1
XNMU080610AEN-KL					●		●		2
XNMU080610AER-PM					●		●		4
XNHU0806AEN-W	H					●			3

■ HOW TO USE OF CORNER CHANGE



Recommend to rotate the insert counter-clockwise for corner change

■ ATTENTION TO USING WIPER INSERT

- In case of feed per rev. f >1.2mm/rev and required surface roughness Rz≒12.5μm, we recommend to use wiper insert.
- Feed per tooth fz < 6mm/rev is recommended.
- Please put insert as “R” mark is shown to the front.

Nega Hepta NHPTYPE

★ Instructions for mounting inserts

1 Clean
Clean the insert pocket including insert seat carefully

2 Mounting insert
Press insert to inside seat ① and slide down ward ② (Refer Fig. 1)

3 Tightening wedge screw
Tightening wedge screw ③ and confirm there is no gap between insert and insert seat. (Refer Fig. 2)
※ Recommended tightening torque: 6N·m

4 Confirmation
Confirm the insert edge is parallel to insert pocket edge. (Refer Fig. 3)

Fig.1 Fig.2 Fig.3

■ POWER CONSUMPTION

Tool dia. φDc (mm)	Ultra fine pitch type		Regular type	
	No. of Insert	Power Consumption	No. of Insert	Power Consumption
	z (tooth)	**Pc** (kW)	**z** (tooth)	**Pc** (kW)
63			5	6.8
80			6	8.1
100	14	18.9	8	10.8
125	18	24.3	8	10.8
160	22	29.7	10	13.5
200	28	37.8		
250	36	48.6		

Power consumption Pc was calculated as Q/Pc'=34 (cm^3/kW) from test data at below cutting condition.

Work Material: FC250
ap=3 (mm) fz=0.3 (mm/t)
ae=0.8Dc (mm) Vc=200 (m/min)

Power consumption calculating formula:
Pc (kW)= (ae×ap×Vf)/ {1000 × (Q/Pc')}

Note) The parameters calculated are based on cutting test of cast iron. Actual Pc (kW) is changed according to work shape and cutting conditions.

Nega Hepta NHPTYPE

■ RECOMMENDED CUTTING CONDITIONS

Cat. No.	Insert	Depth of cut ap (mm)	Cutting speed Vc (m/min)	Feed per tooth fz (mm)	Insert Grades
Grey cast iron FC300 (GG30) Below 300HB	XNMU080610AEN XNMU080610AEN-KL	Below 3.0	200 (150-250)	0.3 (0.1-1.0)	Vc≧200: JC608X (XNMU080610AEN) ※Vc≦200: JC5118 (XNMU080610AEN-KL)
		3-6		0.3 (0.1-0.5)	
Nodular cast iron FCD400 (GGG40) Below 300HB	XNMU080610AEN XNMU080610AEN-KL	Below 3.0	150 (120-180)	0.2 (0.1-0.8)	Vc≧150: JC608X (XNMU080610AEN) ※Vc≦150: JC5118 (XNMU080610AEN-KL)
		3-6		0.2 (0.1-0.4)	
Low carbon steel SS400, S10C (17100, C10) Below 180HB	XNMU080610AEN-KL	Below 2.5	180 (140-220)	0.3 (0.1-0.5)	JC5118 (JC8050) (For interrupted cutting)
	XNMU080610AER-PM	2.0-3.5			
Carbon steel S50C, S55C (C50, C55) Below 250HB	XNMU080610AEN-KL	Below 2.5	160 (120-200)	0.3 (0.1-0.5)	JC5118 (JC8050) (For interrupted cutting)
	XNMU080610AER-PM	2.0-3.5			
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	XNMU080610AEN-KL	Below 2.5	140 (100-180)	0.3 (0.1-0.5)	JC5118 (JC8050) (For interrupted cutting)
	XNMU080610AER-PM	2.0-3.5			
Mold steel NAK80, HPM1, P21 (1.2311, P21) 30-43HRC	XNMU080610AEN-KL	Below 2.5	80 (60-100)	0.15 (0.1-0.3)	JC5118 (JC8050) (For interrupted cutting)
Stainless steel SUS304 Below 250HB	XNMU080610AEN-KL	Below 2.5	130 (100-160)	0.2 (0.1-0.4)	JC8050
	XNMU080610AER-PM	2.0-3.0			

※ For low power machine

■ NOTE

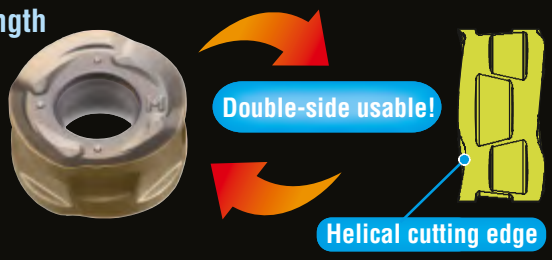
The cutting parameters to be adjusted according to the machine rigidity or work rigidity.

TDM EXTREME EXTDM TYPE

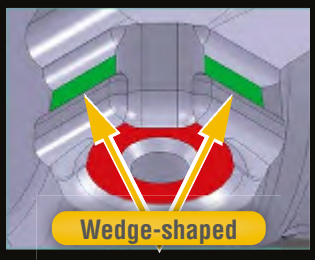
Feature of product

"EXTREME DIEMATE" EXTDM / MTX type with edge sharpness and strength.

- Achieved edge sharpness and strength by unique helical cutting edge. Adopted radius insert suitable for turbine blade machining.
- Economical double-side insert (8 corners).



- Unique insert rotation preventing structure: Due to wedge-shaped binding face of insert prevents movement of inserts. Able to stable machining.



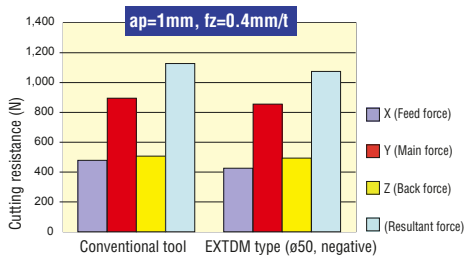
- Insert are arranged in an irregular pitch (except for 3 tooth type). Prevents chattering & vibration.

Cutting performance

Cutting force of EXTDM is almost the same as the conventional positive cutter.

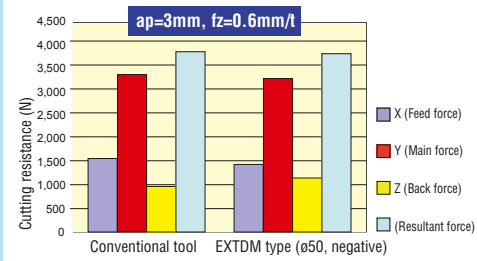
● Cutting force comparison

Material: S50C C50
Cutting conditions: Vc=120/min, fz=1.0mm/t, ap=0,6mm, ae=15mm
Down cut, Air blow, Tool No.: EXTDM-5050R-12-22 (ø50),
Insert No.: RNMU1205MOE-MM (JC7560P)



● Cutting force comparison

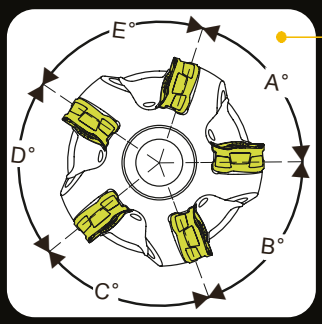
Material: S50C C50
Cutting conditions: Vc=120/min, fz=1.0mm/t, ap=0,6mm, ae=15mm
Dow cut, Air blow, Tool No.: EXTDM-5050R-12-22 (ø50),
Insert No.: RNMU1205MOE-MM (JC7560P)



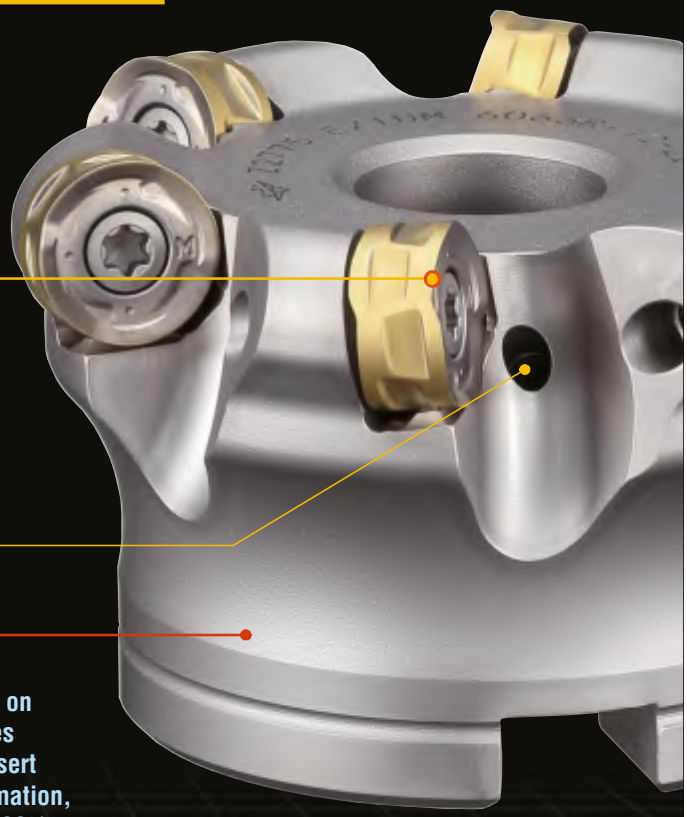
TDM EXTREME

EXTDMTYPE

Indexable radius cutter for hard-to-cut material.



Irregular pitch prevents chattering & vibration (except for 3 tooth type).



Achieved edge sharpness & strength by helical cutting edge

Through coolant hole: surely coolant supply to cutting edge

G-Body

Adopted GN surface-hardening treatment on thermal resistant high strength steel gives high hardness over 65HRC and secure insert pocket and holder against thermal deformation, improved body durability and tool life by 30% or more. Make it difficult to be damaged even under severe cutting conditions. Also rust-proof and anti-welding effect is much improved.

Cutting performance

Tool life comparison

Material: SUS420J2 Stainless steel (Martensitic)

Cutting conditions:
Vc=260m/min,
n=1,650min^{-1},
Vf=495mm/min,
fz=0.3mm/t,
ae=30mm,
ap=0.5–2.5mm

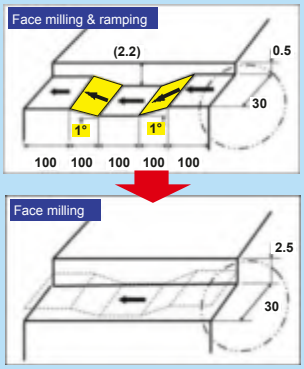
Down cut

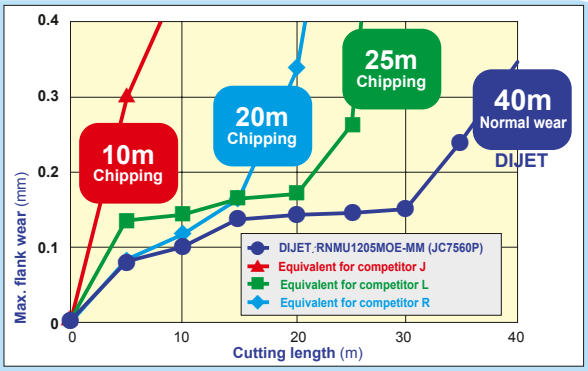
Air blow

Test by 1 insert

Tool No.:
EXTDM-5050R-12-22 (ø50)

Insert No.:
RNMU1205MOE-MM (JC7560P)

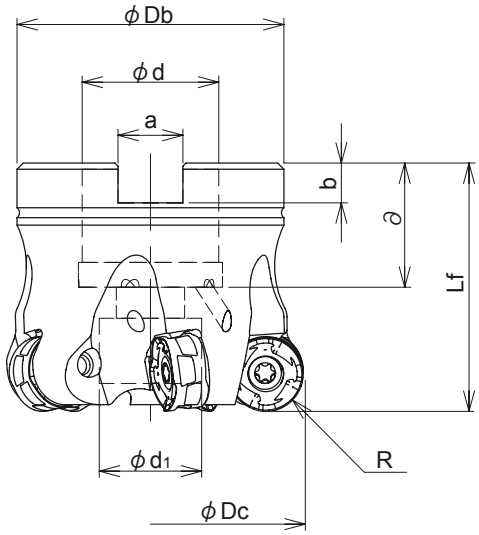




TDM EXTREME EXTDMTYPE

G-Body Through Coolant Hole

■ FACE MILL TYPE



Type	Cat. No.	Stock	No. of tooth	Dimensions (mm)									Weight (kg)
				φDc	R	Lf	φDb	φd	φd1	a	b	ℓ	
Metric Bore	**EXTDM-5050R-12-22**	●	5	**50**	6	40	43	22	16.5	10.4	6.3	20	0.29
	EXTDM-5052R-12-22	●	5	**52**	6	40	43	22	16.5	10.4	6.3	20	0.30
	EXTDM-6063R-12-22	●	6	**63**	6	40	48	22	16.5	10.4	6.3	20	0.43
	EXTDM-6063R-12-27	●	6	**63**	6	50	58	27	20	12.4	7	22	0.56
	EXTDM-6066R-12-27	●	6	**66**	6	50	60	27	20	12.4	7	22	0.64

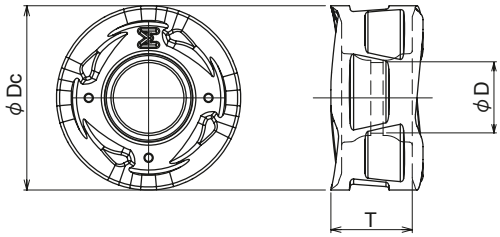
Note) All cutters are supplied without inserts.

Modular Head Type Please refer Page B132

Wrench	Clamp Screw	Recommended Torque (N·m)
A-15T	**TSW-410H**	3.5

TDM EXTREME EXTDMTYPE

■ INSERT

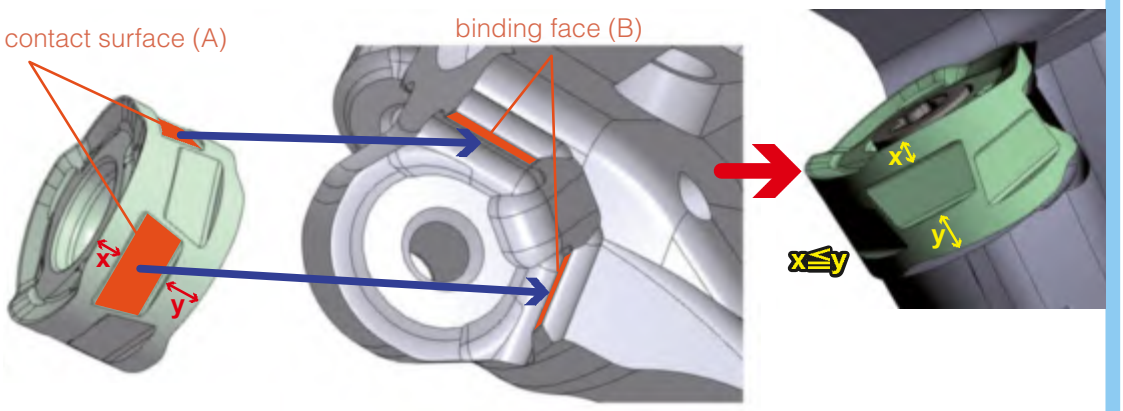


■ BODY

Cat. No.	Tolerance	Total of corners (double-side)	Dimensions (mm)			PVD coated
			φDc	T	φD	NEW JC7560P
RNMU1205MOE-MM	M	8	12	5.3	4.6	●

10 inserts per case.

■ ATTENTION TO MOUNTING INSERT



Put insert so that contact surface of insert (A) can come into contact with wedge-shaped binding face (B).

TDM EXTREME EXTDMTYPE

■ RECOMMENDED CUTTING CONDITIONS

Work Materials	Grades	Cutting speed Vc (m/min)	Breaker	Depth of cut		Feed per tooth	Tool dia. φDc (mm)			
							50/52×5N		63/66×6N	
				ap range (mm)	ap (mm)	fz (mm/t)	n (min⁻¹)	Vf (mm/min)	n (min⁻¹)	Vf (mm/min)
Stainless steel (Martensitic) 13Cr (SUS403, 410, 420, 430)	JC7560P	170-220-270	MM	0.5 – 3.0 Recommended up to 2.5mm	0.5	0.55	1,347 (Vc=220) (φ52)	3,704	1,060 (Vc=220) (φ66)	3,498
					1.0	0.40		2,694		2,544
					1.5	0.35		2,357		2,226
					2.0	0.30		2,021		1,908
					2.5	0.27		1,818		1,717
					(3.0)	0.25		1,683		1,590
Stainless steel (Austenitic) (SUS304, 316, 317)	JC7560P	120-160-200	MM	0.5 – 3.0 Recommended up to 2.5mm	0.5	0.55	979 (Vc=160) (φ52)	2,692	771 (Vc=160) (φ66)	2,544
					1.0	0.40		1,958		1,850
					1.5	0.35		1,713		1,619
					2.0	0.30		1,469		1,388
					2.5	0.27		1,322		1,249
					(3.0)	0.25		1,224		1,157

ℓ: Overhung length, ap: Depth of cut, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed, fz: Feed per tooth

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of lengthening overhung length, cuttting speed and feed speed to be reduced according to the right table.
3) Use air blow.

MM breaker insert has helical cutting edge, so recommend to use at ap=3mm or less.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc Or under 3Dc	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%

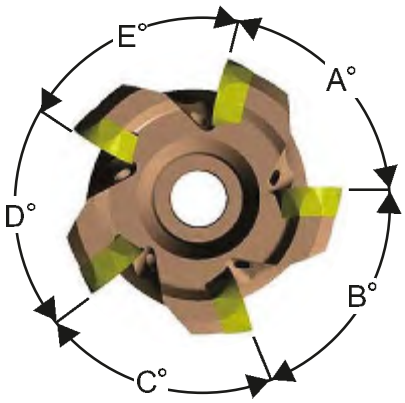
■ Max. ramping angle

Tool dia. (mm)	Max. ramping angle
32	0.7°
40	0.8°
50	1°
52	1°
63	0.8°
66	0.8°

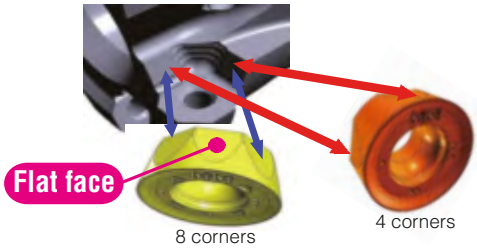
Blade Chipper TDMTYPE

Aerospace Tooling

High speed and high performance at machining stainless steel turbin blade



Unequal pitch design prevents chatter and vibration.



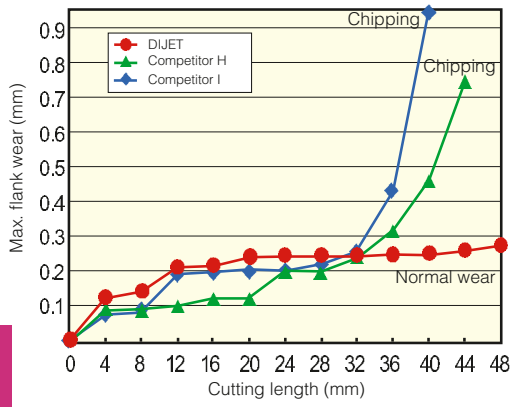
Flat face insert locking seat prevents insert movement

■ CUTTING PERFORMANCE

Tool life comparison

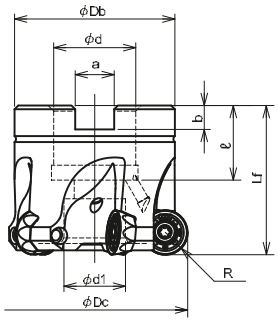
Cutting condition

Insert: RPMT1204MOE-MM8 JC7560
Mat'l: Stainless steel (SUS420J2)
Tool dia.: φ52mm
Vc=260m/min (n=1,952min^{-1}), fz=0.4mm/t
ap=2mm, ae=0~32mm, Dry
*Machined by 1 teeth



TDM type: 48m, normal wear
Competitor: 40m, chipping

Blade Chipper TDMTYPE



■ BODY

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm)									Weight (kg)
				φDc	R	Lf	φDb	φd	φd1	a	b	ℓ	
Metric Bore	**TDM-5050R-12-22**	●	5	**50**	6	40	43	22	16.5	10.4	6.3	20	0.28
	TDM-5052R-12-22	●	5	**52**	6	40	43	22	16.5	10.4	6.3	20	0.35

Note) All cutters are supplied without inserts.

■ INSERT

Fig. 1

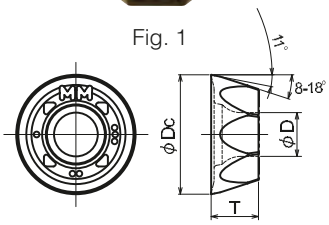


Fig. 2

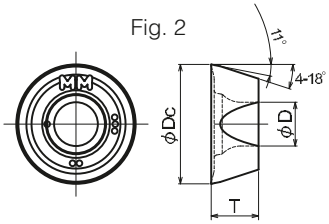
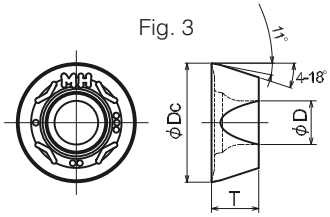


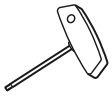
Fig. 3



Type	No. of Corner	Cat. No.	Tolerance	PVD coated	Dimensions (mm)			Fig.
				JC7560 P	φDc	T	φD	
Regular	8	**RPMT1204MOE-MM8**	M	●	12	4.762	4.4	1
Regular	4	**RPMT1204MOE-MM4**	M	●	12	4.762	4.4	2
Strong	4	**RPMT1204MOE-MH4**	M	●	12	4.762	4.4	3

10 inserts per case

■ PARTS

Clamp screw	Wrench
	
DSW-410H	A-15T

Clamp Screw	Recommended Torque (N·m)
DSW-410H	3.6

Blade Chipper TDMTYPE

Aerospace Tooling

Face Milling | Copy Milling | Pocket Milling

Series expansion, small diameter type for Blade-Chipper TDM / MTD type.

Feature of product

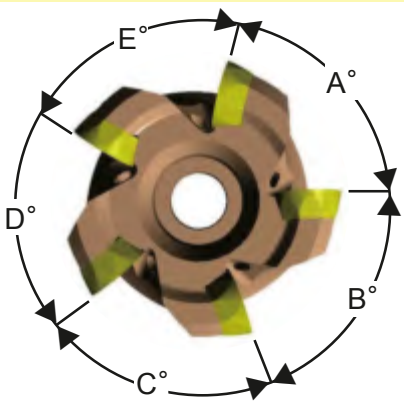
1. Has extensive lineup of small diameter type **for machining small to medium-sized turbine blade.**

2. Insert are arranged in **an irregular pitch** (except for 3 tooth type). Prevents chattering & vibration.

3. Available now **medium or heavy type inserts**.

4. Adoptied **new PVD coated grade "JC7560P"** improved heat-fracture resistance & impact strength.

■ Specification of TDM / MTD type



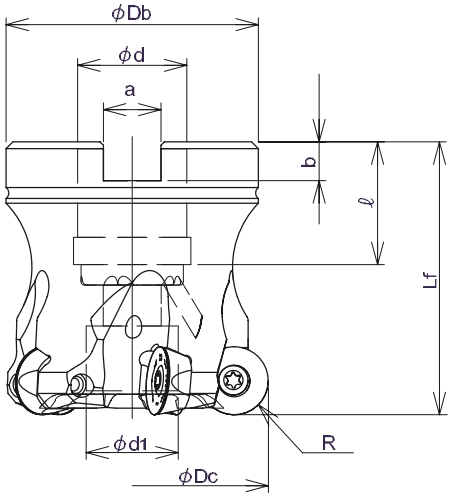
Irregular pitch prevents chattering & vibration (except for 3 tooth type).

■ Insert shape of TDM / MTD small diameter type

Application	Medium	Heavy
Breaker	MM4	MH4
Appearance		
Breaker angle	15°	10°
No. of corners	4	4

Blade Chipper TDMTYPE

■ FACE MILL TYPE Through Coolant Hole



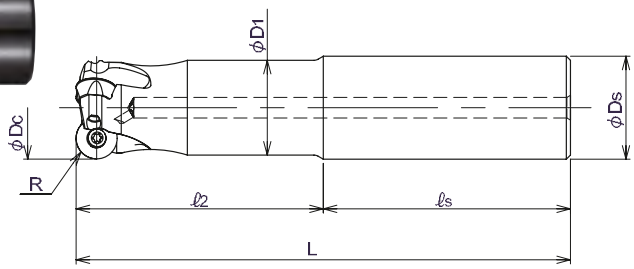
Wrench	Clamp Screw	Recommended Torque (N·m)
A-10	DSW-307H	1.8

Type	Cat. No.	Stock	No. of tooth	Dimensions (mm) φDc	R	Lf	φDb	φd	φd1	a	b	ℓ	Weight (kg)
Metric Bore	TDM-5040R-10-16	●	5	40	5	40	37	16	13.5	8.4	5.6	18	0.19
	TDM-5042R-10-16	●	5	42	5	40	38	16	13.5	8.4	5.6	18	0.20

Note) All cutters are supplied without inserts.

Modular Head Type Please refer Page B127

■ END MILL TYPE Through Coolant Hole



Clamp Screw	Recommended Torque (N·m)
DSW-307H	1.8

Cat. No.	Stock	No. of inserts	Dimensions (mm) φDc	R	ℓ2	ℓs	L	φD1	φDs	Applicable inserts	Parts: Clamp screw	Parts: Wrench
TDM-3025-60-S25	●	3	25	5	60	60	120	23	25	RPMT10T3MOE-MM4	 DSW-307H	 A-10
TDM-4032-70-S32	●	4	32	5	70	60	130	29	32			

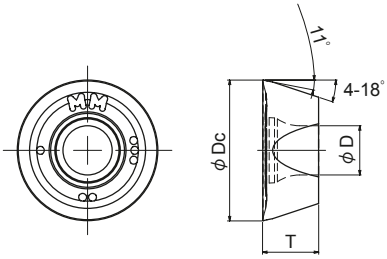
Note) All cutters are supplied without inserts.

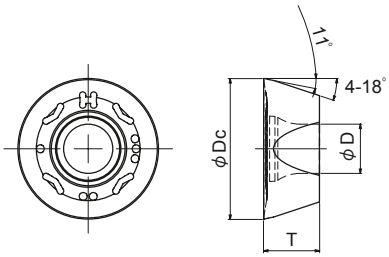
Blade Chipper TDMTYPE

■ INSERT

Fig.1 RPMT10T3MOE-MM4

Fig.2 RPMT10T3MOE-MH4





Type	Corner	Cat. No.	Tolerance	PVD coated	Dimensions (mm)			Fig.
				NEW JC7560P	φDc	T	φD	
Medium	4	**RPMT10T3MOE-MM4**	**M**	●	10	3.97	3.5	1
Heavy	4	**RPMT10T3MOE-MH4**	**M**	●	10	3.97	3.5	2

10 inserts per case

Blade Chipper TDMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● TDM type (End mill type)

Work Materials	Grades	Cutting speed Vc (m/min)	Breaker	Depth of cut		Feed per tooth	Tool dia. φDc (mm) 25×3N		32×4N	
				ap range (mm)	ap (mm)	fz (mm/t)	n (min⁻¹)	Vf (mm/min)	n (min⁻¹)	Vf (mm/min)
Stainless steel (Martensitic) 13Cr (SUS403, 410, 420, 430)	JC7560P	180-230-280	MM4 MH4	0.5 – 2.5	0.5	0.33	2,928 (Vc=230)	2,899	2,288 (Vc=230)	3,020
					1.0	0.22		1,932		2,013
					1.5	0.19		1,669		1,739
					2.0	0.18		1,581		1,647
Stainless steel (Austenitic) 17Cr (SUS304, 316, 317)	JC7560P	120-170-220	MM4 MH4	0.5 – 2.5	0.5	0.33	2,165 (Vc=170)	2,143	1,691 (Vc=170)	2,232
					1.0	0.22		1,429		1,488
					1.5	0.19		1,234		1,285
					2.0	0.18		1,169		1,218

ℓ: Overhung length, ap: Depth of cut, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed, fz: Feed per tooth

● TDM type (Face mill type)

Work Materials	Grades	Cutting speed Vc (m/min)	Breaker	Depth of cut		Feed per tooth	Tool dia. φDc (mm) 50		52	
				ap range (mm)	ap (mm)	fz (mm/t)	n (min⁻¹)	Vf (mm/min)	n (min⁻¹)	Vf (mm/min)
Stainless steel (Martensitic) 13Cr (SUS403, 410, 420, 430)	JC7560	190-240-290	MM8	0.5 – 1.5 (Max 3mm in case of 4 corners use)	0.5	0.55	1,528 (Vc=240)	4,202	1,469 (Vc=240)	4,040
					1.0	0.40		3,056		2,938
			MM4 (MH4)	0.5 – 3	2.0	0.30		2,292		2,204
					3.0	0.25		1,910		1,836
Stainless steel (Austenitic) 17Cr (SUS304, 316, 317)	JC7560	130-180-230	MM8	0.5 – 1.5 (Max 3mm in case of 4 corners use)	0.5	0.55	1,146 (Vc=180)	3,152	1,102 (Vc=180)	3,031
					1.0	0.40		2,292		2,204
			MM4 (MH4)	0.5 – 3	2.0	0.30		1,719		1,653
					3.0	0.25		1,433		1,37

ℓ: Overhung length, ap: Depth of cut, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed, fz: Feed per tooth

■ NOTE

1) The figure to be adjusted according to the machine rigidity or work rigidity.
2) In case of lengthening overhung length, cuttting speed and feed speed to be reduced according to the right table.
3) Should use breaker type properly according to the work shapes or conditions of chipping. Normally, recommend to use MM-breaker.
4) Use air blow.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc Or under 3Dc	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%

Blade Chipper TDMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● TDM type (Face mill type)

Work Materials	Grades	Cutting speed Vc (m/min)	Breaker	Depth of cut		Feed per tooth	Tool dia. φDc (mm)			
							40×5N		42×5N	
				ap range (mm)	ap (mm)	fz (mm/t)	n (min⁻¹)	Vf (mm/min)	n (min⁻¹)	Vf (mm/min)
Stainless steel (Martensitic) 13Cr (SUS403, 410, 420, 430)	JC7560P	190-240-290	MM4 MH4	0.5 – 2.5	0.5	0.35	1,910 (Vc=240)	3,343	1,819 (Vc=240)	3,083
					1.0	0.25		2,388		2,274
					1.5	0.21		2,006		1,910
					2.0	0.20		1,910		1,819
					2.5	0.18		1,719		1,637
Stainless steel (Austenitic) 17Cr (SUS304, 316, 317)	JC7560P	130-180-230	MM4 MH4	0.5 – 2.5	0.5	0.35	1,432 (Vc=180)	2,506	1,364 (Vc=180)	2,387
					1.0	0.25		1,790		1,705
					1.5	0.21		1,504		1,432
					2.0	0.20		1,432		1,364
					2.5	0.18		1,289		1,228

ℓ: Overhung length, ap: Depth of cut, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed, fz: Feed per tooth

MM4: Medium type / 4 corners
MH4: Heavy type / 4 corners

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case of more overhung length, cutting speed and feed speed to be reduced according to the right table.
3) Use air blow to flush the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%

Super Diemaster HDMTYPE

High efficient machining tool with edge sharpness and strength.

Increased insert strength

68% stronger than conventional Diemaster (DDM) ISO insert. In addition to conventional insert grades, Tough grade "JC8050" for unfavourable conditions and "JC5118" for general use are available.

Double clamp system

Adopted double clamp system for more rigidity.

Adopted positive axial rake

- R3.5 & R5 inserts→A.R.; +6°
- R6 & R8 inserts→A.R.; +8°

⇒Reduced cutting forces by 21% than conventional Diemaster.

Variation

Modular Head is available with combination of carbide shank.
(Please refer page B023-B024 for modular type)

G-Body

Special surface hardening treatment on thermal heat resistant high speed steel gives high hardness over 65HRC and secure insert pocket and holder against thermal deformation. This G-body is anti-vibration and highly tough. This results increased tool life by 30% or more compared with general cutter body. It is difficult to get damage even under severe cutting conditions. Also rust-proof and anti-welding effect are much improved.

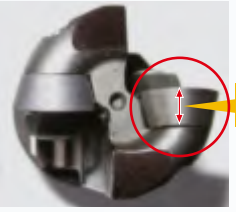
Insert strength comparison

	R3.5	R5	R6	R8
ISO Standard Insert	2.38	3.18	3.97	4.762
Super Diemaster	2.7	4.1	4.8	6

68% Stronger than ISO Standard Insert

■ Insert comparison

Super Diemaster



Insert thickness: 4.1

Body:
SDH-2250-R10-M12
Insert:
RDMW1004MOT

ISO Standard Insert

Insert thickness: 3.18

Body:
MDH-2250-M12
Insert:
RDHX1003MOT

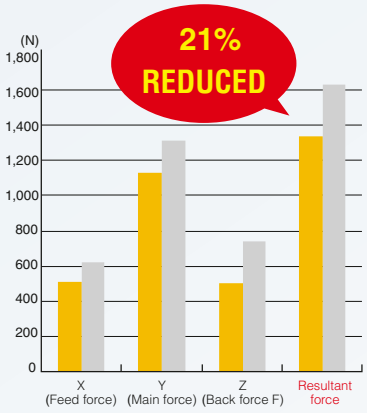
Super Diemaster HDMTYPE

■ CUTTING PERFORMANCE

Cutting force comparison

① General machining for hardened die steel

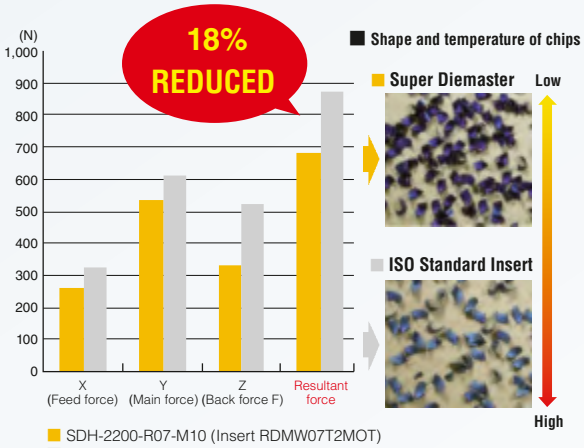
Tool dia.: 20mm, Mat'l: SKD61 (1.2344) 45HRC
Vc=91m/min, fz =0.2mm/t, ap=0.7mm,
ae=10mm by down cut
Modular Head + MSN Carbide Shank



■ SDH-2200-R07-M10 (Insert RDMW07T2MOT)
■ MDH-4200-M10 (ISO Standard Insert RDHX0702MOT)

② General machining for die steel

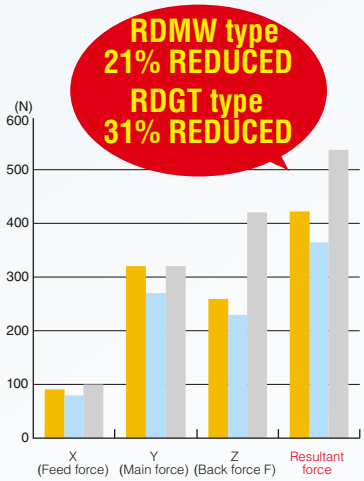
Tool dia.: 20mm, Mat'l: SKD11 (1.2379) HS30
Vc=179m/min, fz =0.34mm/t,ap=1.2mm,
ae=10mm by down cut
Modular Head + MSN Carbide Shank



■ SDH-2200-R07-M10 (Insert RDMW07T2MOT)
■ MDH-4200-M10 (ISO Standard Insert RDHX0702MOT)

③ High feed machining for hardened die steel

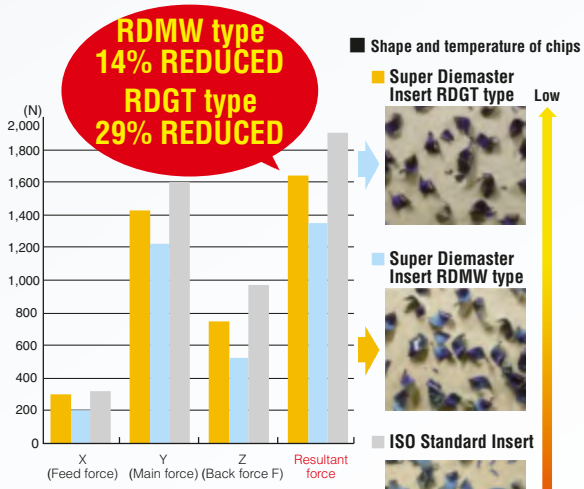
Tool dia.: 40mm, Mat'l: SKD61 (1.2344) 45HRC
Vc=201m/min, fz=0.4mm/t, ap=0.2mm,
ae=10mm by down cut
Modular Head + MSN Carbide Shank



■ SDH-2400-R12-M16
(Without Chipbreaker RDMW1204MOT)
■ SDH-2400-R12-M16
(With Chipbreaker RDGT1204MOE)
■ MDH-4400-M10
(ISO Standard Without Chipbreaker RDHX1203MOT)

④ General machining for die steel

Tool dia.: 40mm, Mat'l: SKD11 (1.2379) HS30
Vc=179m/min, fz =0.34mm/t, ap=1.2mm,
ae=10mm by down cut
Modular Head + MSN Carbide Shank



■ SDH-2400-R12-M16
(Without Chipbreaker RDMW1204MOT)
■ SDH-2400-R12-M16
(With Chipbreaker RDGT1204MOE)
■ MDH-4400-M10
(ISO Standard Without Chipbreaker RDHX1203MOT)

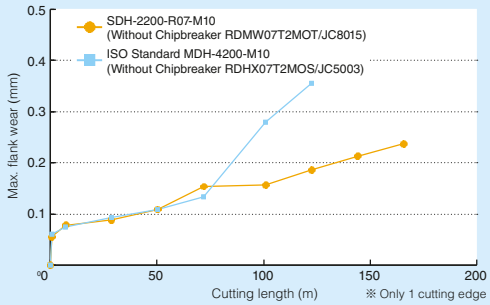
Super Diemaster HDMTYPE

■ CUTTING PERFORMANCE

Tool life comparison

① High feed machining for hardened die steel

Tool dia: 20mm, Mat'l: SKD61 (1.2344), 43HRC, Overhung length: 70mm, Vc=250m/min, fz=0.2mm/t,
ap=0.2mm, ae=10mm (Air blow, Down cutting)
Modular Head + MSN Carbide Shank: MSN-M10-40-S20C

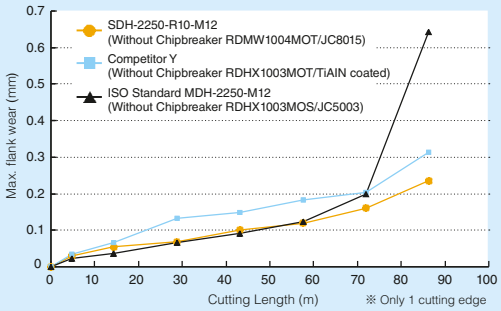


■ Condition of damaged inserts

	After 72m	After 122.4m	After 165.6m
Super Diemaster RDMW07T2MOT (JC8015) VB MAX (mm)	 0.154		 0.237
ISO Standard RDHX07T2MOS (JC5003) VB MAX (mm)	 0.134	 0.356	

② High feed machining for hardened die steel

Tool dia: 25mm, Mat'l: SKD11 (1.2379), 43HRC, Overhung length: 70mm, Vc=250m/min, fz=0.3mm/t,
ap=0.2mm, ae=15.5mm (Air blow, Down cutting)
Modular Head + MSN Carbide Shank: MSN-M12-55-S25C

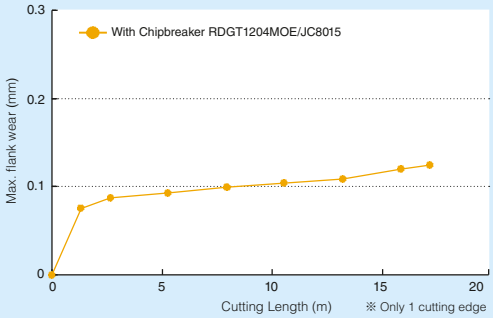


■ Condition of damaged inserts

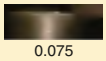
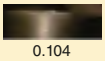
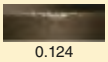
	After 72m	After 86.2m
Super Diemaster RDMW1004MOT (JC8015) VB MAX (mm)	 0.159	 0.235
Competitor Y RDHX1003MOT (TiAlN coated) VB MAX (mm)	 0.203	 0.313
ISO Standard RDHX1003MOS (JC5003) VB MAX (mm)	 0.199	 0.643

③ Ti-alloy age hardened

Tool dia: 32mm, Mat'l: Ti6Al4V, 42HRC, Overhung length: 118mm, Vc=60m/min, fz=0.3mm/t,
ap=0.5mm, ae=12mm (Wet cutting, Down cutting)
Modular Head: SDH-2320-R12-M16 + MSN Carbide Shank: MSN-M16-157S-S32C

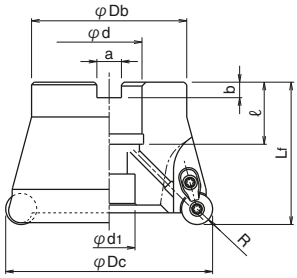


■ Condition of damaged inserts

	After 1.32m	After 10.56m	After 17.16m
Super Diemaster RDGT1204MOE (JC8015) VB MAX (mm)	 0.075	 0.104	 0.124

Super Diemaster HDM TYPE

G-Body Through Coolant Hole



■ BODY/FACEMILL・STANDARD TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	R	Lf	φDb	φd	φd1	a	b	ℓ	Head cap screw (JIS Standard)	weight (kg)	Inserts
Metric Bore	HDM-3050-12R-22	●	3	**50**	6	50	47	22	16.5	10.4	6.3	20	M10	0.5	RD○○1204MO○
	HDM-3050-16R-22	●	3	**50**	8	55	47	22	16.5	10.4	6.3	20	M10	0.5	RD○○1606MO○
	HDM-4063-12R-22	●	4	**63**	6	50	60	22	16.5	10.4	6.3	20	M10	0.7	RD○○1204MO○
	HDM-4063-16R-22	●	4	**63**	8	50	60	22	16.5	10.4	6.3	20	M10	0.7	RD○○1606MO○

Note) 1. All cutters are supplied without inserts.
2. Please refer page C147-C153 for recommended cutting conditions.
3. Mark shows: these cutter bodies are equipped with the set bolt because of the specified bolt size. Except for these cutter bodies, please use the set bolt equipped with arbor.
4. In case of using double clamping mechanism type, please refer page C009.

Modular Head Type Please refer Page B111

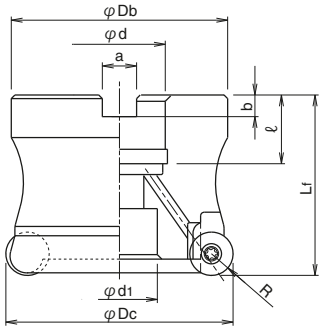
■ HEXAGON WRENCH FOR SET BOLT

Thread	Hexagon Wrench Size (mm)
M10	8
M12	10
M16	14
M20	17
M24	19

Note) All cutters are supplied without Hexagon Wrench

Super Diemaster HDM TYPE

G-Body Through Coolant Hole



■ BODY / FACEMILL・FINE PITCH TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	R	Lf	φDb	φd	φd1	a	b	ℓ	Head cap screw (JIS Standard)	weight (kg)	Inserts
Metric Bore	HDM-4050-16R-22	●	4	50	8	55	47	22	16.5	10.4	6.3	20	M10	0.4	RD○○1606MO○
	HDM-5050-12R-22	●	5	50	6	50	47	22	16.5	10.4	6.3	20	M10	0.4	RD○○1204MO○
	HDM-4052-16R-22	●	4	52	8	55	40	22	16.5	10.4	6.3	20	M10	0.5	RD○○1606MO○
	HDM-5052-12R-22	●	5	52	6	50	40	22	16.5	10.4	6.3	20	M10	0.5	RD○○1204MO○
	HDM-5063-16R-27	●	5	63	8	50	60	27	20	12.4	7	22	M12	0.7	RD○○1606MO○
	HDM-6063-12R-27	●	6	63	6	50	60	27	20	12.4	7	22	M12	0.8	RD○○1204MO○
	HDM-5066-16R-27	●	5	66	8	50	60	27	20	12.4	7	22	M12	0.7	RD○○1606MO○
	HDM-6066-12R-27	●	6	66	6	50	60	27	20	12.4	7	22	M12	0.7	RD○○1204MO○
	HDM-6080-16R-27	●	6	80	8	55	76	27	20	12.4	7	22	M12	1.3	RD○○1606MO○
	HDM-7080-12R-27	●	7	80	6	55	76	27	20	12.4	7	22	M12	1.4	RD○○1204MO○

Note) 1. All cutters are supplied without inserts.
2. Please refer page C147-C153, for recommended cutting conditions.

Modular Head Type Please refer Page B111

■ HEXAGON WRENCH FOR SET BOLT

Thread	Hexagon Wrench Size (mm)
M10	8
M12	10
M16	14
M20	17
M24	19

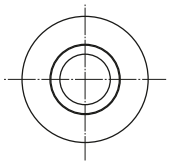
Note) All cutters are supplied without Hexagon Wrench

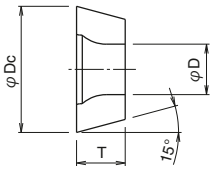
Super Diemaster HDMTYPE

■ INSERTS

Standard Type

Without Chipbreaker
Chamfer -MOT
General Cutting





10 Inserts per case

Cat. No.	Tolerance	PVD coated			Dimensions (mm)		
		DH103	JC8015	JC5040	φDc	T	φD
RDMW1204MOT	M	●	●	●	12	4.8	4.4
RDMW1606MOT	M	●	●	●	16	6	5

Low Cutting Force

With Chipbreaker
Chamfer -MOT
R-honed -MOE
Stainless Steel

With Chipbreaker
R-honed -MOE
Titanium・Inconel

Fig. 1

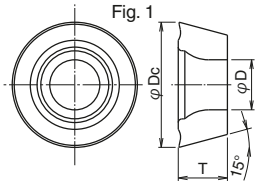
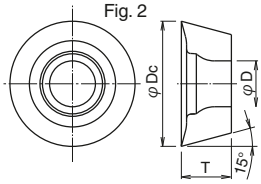


Fig. 2

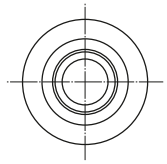


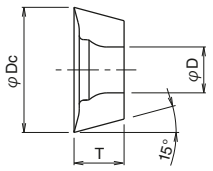
10 Inserts per case

Cat. No.	Tolerance	PVD coated				Dimensions (mm)			Fig.
		JC5118	JC8015	JC8050	JC8118	φDc	T	φD	
RDGT1204MOE	G		●	●		12	4.8	4.4	1
RDGT1204MOT	G		●	●					
RDGT1606MOE	G		●	●		16	6	5	1
RDGT1606MOT	G		●	●					
RDMT1204MOE	M	○	○	●	◎	12	4.8	4.4	1
RDMT1204MOE-ML	M			●					2
RDMT1204MOT	M	○	○	●	◎				1
RDMT1606MOE	M	○	○	●	◎	16	6	5	1
RDMT1606MOT	M	○	○	●	◎				

Low Cutting Force

With Chipbreaker
Sharp edge
Aluminium



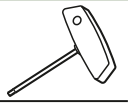


10 Inserts per case

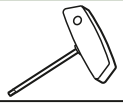
Cat. No.	Tolerance	Uncoated	Dimensions (mm)		
		FZ05	φDc	T	φD
RDGT1204MOF-AL	G	●	12	4.8	4.4
RDGT1606MOF-AL	G	●	16	6	5

Note) In case of chip clogging remove the clamp set. (DCM-18, DCM-17) (Only in the case of Aluminium Machining)

■ PARTS / FACE MILL・STANDARD TYPE

Inserts	Clamp Screw	Clamp Set	Wrench
			
RD○○1204MO○	DSW-410H	DCM-18	A-15T
RD○○1606MO○	DSW-4512H	DCM-17	A-20 (~φ125) A-20L (φ160)

■ PARTS / FACE MILL・FINE PITCH TYPE

Inserts	Clamp Screw	Wrench
		
RD○○1204MO○	DSW-410H	A-15T
RD○○1606MO○	DSW-4512H	A-20

Clamp Screw	Recommended Torque (N・m)
DSW-410H	3.6
DSW-4512H	6.0

◎ : Soon to be stocked ● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Super Diemaster HDMTYPE

■ Grade selection guide

ISO	P					M					K				N				S				H		
	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	N01	N10	N20	N30	S01	S10	S20	S30	H01	H10	H20
Application Range		JC5118	JC5040	JC5118			JC5118	JC8015	JC5118	JC8050		JC8015				FZ05				JC5118	JC8015	JC8050	DH103	JC5118	JC8015

■ Guidelines for selection of milling Inserts

Work Materials	Cast iron Cast steel	Carbon steel Die steel			Mold steel		High hardened steel	Titanium alloy Inconel		Stainless steel		Aluminium alloy
Grades / Cat. No.	JC8015 JC5118	JC5040	JC5118	JC8050	JC8015 JC5118	JC8050	DH103 (Over50HRC) JC8015 JC5118	JC8015 JC5118	JC8050	JC8015 JC5118	JC8050	FZ05
RDMW1204MOT	◎	◎			◎		◎	○		○		
RD○T1204MOT	☆		☆		○					◎		
RD○T1204MOE				●		●		◎	●		●	
RDMT1204MOE-ML									◎		◎	
RDMW1606MOT	◎	◎			◎		◎	○		○		
RD○T1606MOT	☆		☆		○					◎		
RD○T1606MOE				●		●		◎	●		●	
RDGT○○○○MOF-AL												◎

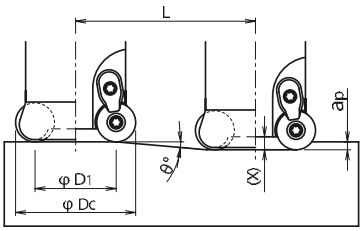
•RDMW type: without chipbreaker •RD○T type: with chipbreaker

◎ : First choice, Good condition ○ : Moderate condition ● : Unfavorable condition ☆ : Light cutting

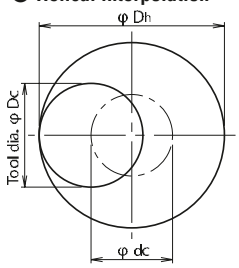
Super Diemaster HDMTYPE

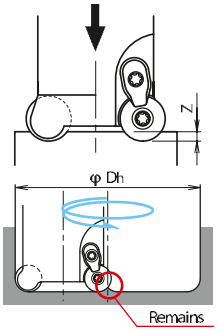
■ Instructions for profile milling

● Ramping



● Helical interpolation





● Calculation of tool pass dia. $\varphi dc = \varphi Dh - \varphi Dc$

Tool pass dia. Bore dia. Tool dia.

● Depth of cut per one circle should not exceed max. depth of cut ap.
● Down cutting is recommended, so tool pass rotation should be counter-clockwise.
● Do not continue ramping after drilling.
● In case of helical interpolation, remove the core by traverse milling.

● In case of ramping and helical interpolation, apply 70% or less feed speed from standard cutting condition table.
● In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
● Long continous chips may come out in case of drilling, confirm the safe cutting conditions.

Tool dia. φDc (mm)	Insert dia. (mm)	Effective cutting dia. φD1 (mm)	Min. bore dia. φDh min. (mm)	Max. bore dia. φDh max. (mm)	Max. ramping angle θ°	Max. depth of cut ap (mm)	Total cutting length L (mm) at Max. ap	Max. drilling depth Z (mm)	Depth of holder face X (mm)
50	12 R6	38	80	98	5°15′	6.0	65.2	3.5	4.5
50	16 R8	34	75	98	7°25′	8.0	61.4	4.0	5.0
52	12 R6	40	84	102	4°55′	6.0	69.7	3.5	4.5
52	16 R8	36	79	102	6°55′	8.0	65.9	4.0	5.0
63	12 R6	51	106	124	3°45′	6.0	91.5	3.5	4.5
63	16 R8	47	101	124	5°00′	8.0	91.4	4.0	5.0
66	12 R6	54	112	130	3°30′	6.0	98.1	3.5	4.5
66	16 R8	50	107	130	4°40′	8.0	98.0	4.0	5.0
80	12 R6	68	140	158	2°45′	6.0	124.9	3.5	4.5
80	16 R8	64	135	158	3°30′	8.0	130.7	4.0	5.0

Super Diemaster HDM TYPE

■ RECOMMENDED CUTTING CONDITIONS

● FACE MILL • STANDARD TYPE

Work Materials	Insert Grades	Tool dia. (mm) (Insert type)											
		50 (R6)				50 (R8)				63 (R6)			
		No. of teeth 3N (Double Clamp)				No. of teeth 3N (Double Clamp)				No. of teeth 4N (Double Clamp)			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8050 JC5040 JC5118	150	3	1,250	1,090	150	4	1,260	1,100	150	3	980	1,140
		200	2.5	1,250	1,160	200	3	1,260	1,210	200	2.7	980	1,300
		250	2	880	870	250	2	880	980	250	2.2	690	910
		300	1.2	880	1,130	300	1.5	880	1,160	300	1.6	690	1,100
		350	0.7	750	950	350	1	760	1,000	350	1	590	1,010
		400	–	–	–	400	–	–	–	400	0.5	540	1,190
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 JC5118 JC8015 For over 40HRC	150	2.5	1,200	1,190	150	3.5	1,210	1,010	150	2.5	940	1,160
		200	2	1,200	1,220	200	3	1,210	1,100	200	2.2	940	1,240
		250	1.1	840	1,130	250	2.5	850	940	250	1.6	660	970
		300	0.9	840	1,260	300	2	850	970	300	1.1	660	1,180
		350	0.5	720	1,180	350	1	730	1,110	350	0.7	560	1,120
		400	–	–	–	400	–	–	–	400	0.5	520	1,140
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5040 JC5118	150	3	1,180	1,030	150	4	1,200	1,040	150	3	930	1,080
		200	2.5	1,180	1,130	200	3	1,200	1,180	200	2.7	930	1,120
		250	2	830	840	250	2	840	960	250	2.2	650	850
		300	1.2	830	1,000	300	1.5	840	1,100	300	1.6	650	1,040
		350	0.7	700	950	350	1	720	950	350	1	560	870
		400	–	–	–	400	–	–	–	400	0.5	510	1,100
Stainless steel SUS304 Below 250HB	JC8050 JC8015 JC5118	150	3	990	860	150	4	1,000	870	150	3	780	900
		200	2.5	990	890	200	3	1,000	990	200	2.7	780	930
		250	2	690	700	250	2	700	780	250	2.2	550	730
		300	1.2	690	860	300	1.5	700	920	300	1.6	550	830
		350	0.7	590	820	350	1	600	790	350	1	470	690
		400	–	–	–	400	–	–	–	400	0.5	430	940
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015 Without Chipbreaker (DH103) (For over 50HRC)	100	1.5	810	560	100	2	860	590	100	1.5	650	580
		150	1.2	810	610	150	1.8	860	620	150	1.2	650	650
		200	1	570	410	200	1.6	600	470	200	1	450	490
		250	0.8	570	510	250	1.2	600	520	250	0.8	450	520
		300	0.4	490	440	300	0.8	520	465	300	0.6	390	590
		350	–	–	–	350	–	–	–	350	0.3	360	620
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	JC8015 JC5118	150	3	1,120	1,170	150	4	1,130	1,190	150	3	880	1,370
		200	2.5	1,120	1,110	200	3	1,130	1,290	200	2.7	880	1,440
		250	2	780	960	250	2	790	1,060	250	2.2	620	1,120
		300	1.2	780	1,170	300	1.5	790	1,300	300	1.6	620	1,240
		350	0.7	670	920	350	1	680	900	350	1	530	1,160
		400	–	–	–	400	–	–	–	400	0.5	480	1,220
Titanium alloy 35-43HRC	JC8050 JC8015 JC5118	150	1	420	270	150	1.5	440	330	150	1	330	260
		200	0.8	420	315	200	1.2	440	265	200	0.9	330	290
		250	0.6	290	260	250	1	310	205	250	0.7	230	240
		300	0.4	290	305	300	0.8	310	230	300	0.5	230	295
		350	0.2	250	375	350	0.4	260	255	350	0.3	200	340
		400	–	–	–	400	–	–	–	400	0.2	180	360
Inconel 35-43HRC	JC8015 JC5118 JC8050	150	1	210	135	150	1.5	220	145	150	1	165	130
		200	0.8	210	155	200	1.2	220	165	200	0.9	165	160
		250	0.6	150	135	250	1	150	115	250	0.7	120	130
		300	0.4	150	160	300	0.8	150	130	300	0.5	120	150
		350	0.2	130	195	350	0.4	130	155	350	0.3	100	165
		400	–	–	–	400	–	–	–	400	0.2	90	180
Aluminium alloy A5052, A7075 50-110HB	FZ05	150	4.5	4,450	5,200	150	6	4,450	5,200	150	4.5	3,500	5,500
		200	4	4,450	5,400	200	5	4,450	5,400	200	4	3,500	5,700
		250	3.5	3,800	4,900	250	4	3,800	4,900	250	3.5	3,050	5,200
		300	2.5	3,200	5,000	300	3	3,200	5,000	300	2.5	2,500	5,200
		350	1.5	3,100	4,200	350	2	3,100	4,200	350	1.5	2,400	4,300
		400	1	2,550	3,000	400	1	2,550	3,000	400	1	2,000	3,200

ℓ: Overhung length, ap: Axial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.

Super Diemaster HDMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● FACE MILL • STANDARD TYPE

Work Materials	Insert Grades	Tool dia. (mm) (Insert type)											
		63 (R8)											
		No. of teeth 4N (Double Clamp)											
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)								
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8050 JC5040 JC5118	150	4	990	1,110								
		200	3	990	1,290								
		250	2	690	1,200								
		300	1.5	690	1,210								
		350	1	590	1,040								
		400	0.5	540	1,360								
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 JC5118 JC8015 For over 40HRC	150	3.5	950	1,140								
		200	3	950	1,250								
		250	2.5	670	980								
		300	2	670	1,020								
		350	1	570	1,000								
		400	0.5	520	1,330								
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5040 JC5118	150	4	940	1,090								
		200	3	940	1,240								
		250	2	660	970								
		300	1.5	660	1,160								
		350	1	560	980								
		400	0.5	520	1,330								
Stainless steel SUS304 Below 250HB	JC8050 JC8015 JC5118	150	4	790	920								
		200	3	790	1,040								
		250	2	550	850								
		300	1.5	550	960								
		350	1	470	800								
		400	0.5	430	1,100								
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015 Without Chipbreaker (DH103) (For over 50HRC)	100	2	660	600								
		150	1.8	660	610								
		200	1.6	460	460								
		250	1.2	460	500								
		300	0.8	400	530								
		350	0.4	370	470								
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	JC8015 JC5118	150	4	890	1,240								
		200	3	890	1,350								
		250	2	620	1,140								
		300	1.5	620	1,310								
		350	1	530	1,180								
		400	0.5	490	1,250								
Titanium alloy 35-43HRC	JC8050 JC8015 JC5118	150	1.5	340	300								
		200	1.3	340	325								
		250	1.1	240	240								
		300	0.9	240	250								
		350	0.6	200	290								
		400	0.3	190	300								
Inconel 35-43HRC	JC8015 JC5118 JC8050	150	1.5	170	170								
		200	1.3	170	155								
		250	1.1	120	120								
		300	0.9	120	130								
		350	0.6	100	140								
		400	0.3	95	180								
Aluminium alloy A5052, A7075 50-110HB	FZ05	150	6	3,500	5,500								
		200	5	3,500	5,700								
		250	4	3,050	5,200								
		300	3	2,500	5,200								
		350	2	2,400	4,300								
		400	1	2,000	3,200								

ℓ: Overhung length, ap: Axial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of Titanium alloy or Inconel, recommend wet cutting

Super Diemaster HDMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● FACE MILL • FINE PITCH TYPE

Work Materials	Insert Grades	Tool dia. (mm) (Insert type)											
		50/52 (R6)				50/52 (R8)				63/66 (R6)			
		No. of teeth 5N				No. of teeth 4N				No. of teeth 6N			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8050 JC5040 JC5118	150	2	1,290	2,250	150	3	1,300	1,700	150	2	1,010	2,000
		200	1.7	1,290	1,920	200	2.5	1,300	1,820	200	1.8	1,010	1,800
		250	1.5	900	1,620	250	2	910	1,350	250	1.6	710	1,530
		300	1	900	2,020	300	1.2	910	1,800	300	1.2	710	1,910
		350	0.5	780	2,150	350	0.7	780	1,870	350	0.8	610	1,830
		400	–	–	–	400	–	–	–	400	0.4	560	1,850
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 JC5118 JC8015 For over 40HRC	150	1.7	1,230	2,200	150	2.5	1,250	1,750	150	1.7	960	2,060
		200	1.5	1,230	2,150	200	2	1,250	1,850	200	1.6	960	2,130
		250	1.2	860	1,720	250	1.1	880	1,760	250	1.4	670	1,610
		300	0.8	860	1,720	300	0.9	880	1,760	300	1	670	1,810
		350	0.4	730	1,800	350	0.5	750	1,800	350	0.6	570	2,200
		400	–	–	–	400	–	–	–	400	0.4	550	2,150
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5040 JC5118	150	1.7	1,230	2,200	150	2.5	1,260	1,750	150	1.7	960	2,060
		200	1.5	1,230	2,150	200	2	1,260	1,850	200	1.6	960	2,130
		250	1.2	860	1,720	250	1.1	880	1,760	250	1.4	670	1,610
		300	0.8	860	1,720	300	0.9	880	1,760	300	1	670	1,850
		350	0.4	730	1,800	350	0.5	750	1,850	350	0.6	570	2,200
		400	–	–	–	400	–	–	–	400	0.4	550	2,150
Stainless steel SUS304 Below 250HB	JC8050 JC8015 JC5118	150	2	1,020	1,780	150	3	1,030	1,350	150	2	800	1,670
		200	1.7	1,020	1,520	200	2.5	1,030	1,440	200	1.8	800	1,770
		250	1.5	710	1,240	250	2	720	1,060	250	1.6	560	1,180
		300	1	710	1,420	300	1.2	720	1,420	300	1.2	560	1,340
		350	0.5	610	1,530	350	0.7	620	1,490	350	0.8	480	1,380
		400	–	–	–	400	–	–	–	400	0.4	440	1,580
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015 Without Chipbreaker (DH103) (For over 50HRC)	100	1.2	850	1,060	100	1.5	880	880	100	1.2	650	970
		150	1	850	1,100	150	1.2	880	950	150	1.1	650	1,010
		200	0.8	560	980	200	1	620	740	200	0.9	460	970
		250	0.5	560	1,260	250	0.8	620	870	250	0.6	460	1,250
		300	0.3	510	1,270	300	0.4	530	850	300	0.4	390	1,170
		350	–	–	–	350	–	–	–	350	0.2	360	1,300
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	JC8015 JC5118	150	2	1,150	2,350	150	3	1,170	1,820	150	2	900	2,260
		200	1.7	1,150	2,580	200	2.5	1,170	2,000	200	1.8	900	2,420
		250	1.5	800	1,840	250	2	820	1,470	250	1.6	630	1,700
		300	1	800	2,300	300	1.2	820	1,800	300	1.2	630	1,920
		350	0.5	690	2,410	350	0.7	700	1,680	350	0.8	540	1,610
		400	–	–	–	400	–	–	–	400	0.4	500	1,730
Titanium alloy 35-43HRC	JC8050 JC8015 JC5118	150	1	420	420	150	1.5	440	440	150	1	330	400
		200	0.8	420	630	200	1.2	440	410	200	0.9	330	460
		250	0.6	290	460	250	1	310	310	250	0.7	230	370
		300	0.4	290	580	300	0.8	310	370	300	0.5	230	460
		350	0.2	250	630	350	0.4	260	420	350	0.3	200	540
		400	–	–	–	400	–	–	–	400	0.2	180	560
Inconel 35-43HRC	JC8015 JC5118 JC8050	150	1	210	210	150	1.5	220	220	150	1	165	200
		200	0.8	210	320	200	1.2	220	210	200	0.9	165	230
		250	0.6	150	230	250	1	150	160	250	0.7	120	190
		300	0.4	150	290	300	0.8	150	190	300	0.5	120	230
		350	0.2	130	320	350	0.4	130	210	350	0.3	100	270
		400	–	–	–	400	–	–	–	400	0.2	90	280
Aluminium alloy A5052, A7075 50-110HB	FZ05	150	4	4,300	8,400	150	5.5	4,300	6,700	150	4	3,350	7,800
		200	3.5	4,300	8,800	200	4.5	4,300	7,000	200	3.5	3,350	8,200
		250	3	3,650	7,800	250	3.5	3,650	6,300	250	3	2,900	7,400
		300	2	3,050	8,900	300	2.5	3,050	6,300	300	2	2,400	7,500
		350	1	2,950	6,600	350	1.5	2,950	5,300	350	1	2,300	7,200
		400	0.7	2,450	4,300	400	1	2,450	3,400	400	0.7	2,150	5,200

ℓ: Overhung length, ap: Axial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

Please refer page C118-C119

Super Diemaster HDMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● FACE MILL • FINE PITCH TYPE

Work Materials	Insert Grades	Tool dia. (mm) (Insert type)											
		63/66 (R8)				80 (R6)				80 (R8)			
		No. of teeth 5N				No. of teeth 7N				No. of teeth 6N			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8050 JC5040 JC5118	150	3	1,020	1,660	150	2	790	1,830	150	3	790	1,540
		200	2.7	1,020	1,530	200	1.8	790	1,640	200	2.7	790	1,320
		250	2.2	720	1,330	250	1.6	550	1,380	250	2.2	550	1,220
		300	1.6	720	1,450	300	1.2	550	1,730	300	1.6	550	1,330
		350	1	620	1,550	350	0.8	470	1,650	350	1	470	1,410
		400	0.5	560	1,800	400	0.4	430	1,660	400	0.5	430	1,660
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8050 JC5118 JC8015 For over 40HRC	150	2.5	970	1,690	150	1.7	740	1,850	150	2.5	750	1,570
		200	2.2	970	1,790	200	1.6	740	1,920	200	2.2	750	1,660
		250	1.6	680	1,460	250	1.4	520	1,460	250	1.6	530	1,370
		300	1.1	680	1,800	300	1	520	1,640	300	1.1	530	1,680
		350	0.7	580	1,590	350	0.6	440	1,980	350	0.7	450	1,480
		400	0.5	560	1,680	400	0.4	410	1,870	400	0.5	410	1,480
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC5040 JC5118	150	2.5	970	1,690	150	1.7	740	1,850	150	2.5	750	1,570
		200	2.2	970	1,790	200	1.6	740	1,920	200	2.2	750	1,660
		250	1.6	680	1,460	250	1.4	520	1,460	250	1.6	530	1,370
		300	1.1	680	1,800	300	1	520	1,680	300	1.1	530	1,680
		350	0.7	580	1,590	350	0.6	440	1,980	350	0.7	450	1,480
		400	0.5	560	1,680	400	0.4	410	1,870	400	0.5	410	1,480
Stainless steel SUS304 Below 250HB	JC8050 JC8015 JC5118	150	3	810	1,320	150	2	620	1,510	150	3	620	1,210
		200	2.7	810	1,330	200	1.8	620	1,600	200	2.7	620	1,220
		250	2.2	570	1,050	250	1.6	430	1,060	250	2.2	430	950
		300	1.6	570	1,220	300	1.2	430	1,200	300	1.6	430	1,100
		350	1	490	1,230	350	0.8	370	1,240	350	1	370	1,110
		400	0.5	450	1,420	400	0.4	340	1,420	400	0.5	340	1,290
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC5118 JC8015 Without Chipbreaker (DH103) (For over 50HRC)	100	1.5	670	840	100	1.2	500	870	100	1.5	500	750
		150	1.2	670	900	150	1.1	500	910	150	1.2	500	810
		200	1	460	760	200	0.9	350	860	200	1	350	690
		250	0.8	460	920	250	0.6	350	1,110	250	0.8	350	840
		300	0.6	400	900	300	0.4	300	1,050	300	0.6	300	810
		350	0.3	360	900	350	0.2	270	1,140	350	0.3	270	810
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	JC8015 JC5118	150	3	910	1,540	150	2	700	2,050	150	3	710	1,440
		200	2.7	910	1,860	200	1.8	700	2,200	200	2.7	710	1,740
		250	2.2	640	1,440	250	1.6	490	1,540	250	2.2	500	1,350
		300	1.6	640	1,700	300	1.2	490	1,740	300	1.6	500	1,590
		350	1	550	1,510	350	0.8	420	1,460	350	1	430	1,420
		400	0.5	510	1,630	400	0.4	380	1,530	400	0.5	390	1,500
Titanium alloy 35-43HRC	JC8050 JC8015 JC5118	150	1.5	340	430	150	1	250	350	150	1.5	250	380
		200	1.3	340	470	200	0.9	250	410	200	1.3	250	420
		250	1.1	240	390	250	0.7	170	320	250	1.1	180	350
		300	0.9	240	400	300	0.5	170	400	300	0.9	180	360
		350	0.6	200	350	350	0.3	150	470	350	0.6	150	320
		400	0.3	180	490	400	0.2	140	510	400	0.3	140	460
Inconel 35-43HRC	JC8015 JC5118 JC8050	150	1.5	170	220	150	1	120	170	150	1.5	125	190
		200	1.3	170	240	200	0.9	120	200	200	1.3	125	210
		250	1.1	120	200	250	0.7	80	150	250	1.1	90	180
		300	0.9	120	200	300	0.5	80	180	300	0.9	90	180
		350	0.6	100	180	350	0.3	70	220	350	0.6	75	160
		400	0.3	90	250	400	0.2	65	240	400	0.3	70	230
Aluminium alloy A5052, A7075 50-110HB	FZ05	150	5.5	3,350	6,500	150	4	2,800	7,600	150	5.5	2,800	6,500
		200	4.5	3,350	6,800	200	3.5	2,800	8,000	200	4.5	2,800	6,900
		250	3.5	2,900	6,200	250	3	2,400	7,200	250	3.5	2,400	6,200
		300	2.5	2,400	6,200	300	2	2,000	7,300	300	2.5	2,000	6,200
		350	1.5	2,300	5,200	350	1	1,900	6,000	350	1.5	1,900	5,100
		400	1	2,150	4,300	400	0.7	1,600	4,500	400	1	1,600	3,800

ℓ: Overhung length, ap: Axial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

Please refer page C118-C119

Super Diemaster HDMTYPE

■ RECOMMENDED CUTTING CONDITIONS / HIGH SPEED MACHINING

● FACE MILL • FINE PITCH TYPE

Work Materials	Insert Grades	Tool dia. (mm) (Insert type)											
		50/52 (R6)				50/52 (R8)				63/66 (R6)			
		No. of teeth 5N				No. of teeth 4N				No. of teeth 6N			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015 Without chipbreaker	150	1.4	1,590	3,180	150	1.9	1,640	2,400	150	1.4	1,240	2,980
		200	1.2	1,590	3,180	200	1.7	1,640	2,400	200	1.2	1,240	2,980
		250	1	1,110	2,220	250	1.3	1,150	1,680	250	1	870	2,090
		300	0.6	1,030	2,830	300	1	1,070	1,710	300	0.6	800	2,200
		350	0.3	950	2,610	350	0.4	980	2,350	350	0.3	740	2,040
		400	–	–	–	400	–	–	–	400	–	–	–
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC		150	1.4	1,520	3,040	150	1.9	1,570	2,300	150	1.4	1,190	2,850
		200	1.2	1,520	3,040	200	1.7	1,570	2,300	200	1.2	1,190	2,850
		250	1	1,060	2,120	250	1.3	1,100	1,600	250	1	830	1,990
		300	0.6	990	2,720	300	1	1,020	1,630	300	0.6	770	2,220
		350	0.3	910	2,500	350	0.4	940	2,250	350	0.3	710	1,950
		400	–	–	–	400	–	–	–	400	–	–	–
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB		150	1.4	1,520	3,040	150	1.9	1,570	2,300	150	1.4	1,190	2,850
		200	1.2	1,520	3,040	200	1.7	1,570	2,300	200	1.2	1,190	2,850
		250	1	1,060	2,120	250	1.3	1,100	1,600	250	1	830	1,990
		300	0.6	990	2,720	300	1	1,020	1,630	300	0.6	770	2,120
		350	0.3	910	2,500	350	0.4	940	2,250	350	0.3	710	1,950
		400	–	–	–	400	–	–	–	400	–	–	–
Stainless steel SUS304 Below 250HB	JC8015 Without chipbreaker	150	1.4	1,320	2,640	150	1.9	1,360	2,000	150	1.4	1,030	2,470
		200	1.2	1,320	2,640	200	1.7	1,360	2,000	200	1.2	1,030	2,470
		250	1	920	1,840	250	1.3	950	1,390	250	1	720	1,730
		300	0.6	860	2,360	300	1	880	1,400	300	0.6	670	1,840
		350	0.3	790	2,170	350	0.4	820	1,970	350	0.3	620	1,700
		400	–	–	–	400	–	–	–	400	–	–	–
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	DH103	100	1	1,070	1,870	100	1.2	1,100	1,540	100	1	830	1,710
		150	0.8	1,070	1,870	150	1	1,100	1,540	150	0.8	830	1,710
		200	0.6	750	3,740	200	0.8	770	1,120	200	0.6	580	1,390
		250	0.3	700	2,100	250	0.5	710	1,700	250	0.3	540	1,620
		300	0.2	640	2,170	300	0.3	660	1,650	300	0.2	500	1,980
		350	–	–	–	350	–	–	–	350	–	–	–
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	DH103	150	1.4	1,450	3,980	150	1.9	1,600	3,000	150	1.4	1,130	3,660
		200	1.2	1,450	3,980	200	1.7	1,500	3,000	200	1.2	1,130	3,660
		250	1	1,010	2,020	250	1.3	1,050	1,500	250	1	790	1,900
		300	0.6	940	3,520	300	1	970	2,700	300	0.6	730	2,400
		350	0.3	870	3,260	350	0.4	900	2,880	350	0.3	680	2,150
		400	–	–	–	400	–	–	–	400	–	–	–
Aluminium alloy A5052, A7075 50-110HB	FZ05	150	1.6	5,500	15,000	150	2.1	5,500	12,000	150	1.6	4,300	14,000
		200	1.4	5,500	15,000	200	1.9	5,500	12,000	200	1.4	4,300	14,000
		250	1.2	4,900	17,000	250	1.5	4,900	13,600	250	1.2	3,850	16,000
		300	0.8	4,300	15,000	300	1.2	4,300	12,000	300	0.8	3,350	14,000
		350	0.6	4,000	14,000	350	0.6	4,000	11,200	350	0.6	3,150	13,000
		400	0.4	3,650	13,000	400	0.4	3,650	10,400	400	0.4	2,900	13,000

ℓ: Overhung length, ap: Axial depth of cut, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed spee
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.

Super Diemaster HDMTYPE

■ RECOMMENDED CUTTING CONDITIONS/HIGH SPEED MACHINING

● FACE MILL • FINE PITCH TYPE

Work Materials	Insert Grades	Tool dia. (mm) (Insert type)											
		63/66 (R8)				80 (R6)				80 (R8)			
		No. of teeth 5N				No. of teeth 7N				No. of teeth 6N			
		ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015 Without chipbreaker	150	1.9	1,270	2,350	150	1.4	970	2,720	150	1.9	980	2,180
		200	1.7	1,270	2,350	200	1.2	970	2,720	200	1.7	980	2,180
		250	1.3	890	1,650	250	1	680	1,900	250	1.3	690	1,530
		300	1	830	1,600	300	0.6	630	2,030	300	1	640	1,490
		350	0.4	760	2,280	350	0.3	580	1,870	350	0.4	590	2,120
		400	–	–	–	400	–	–	–	400	–	–	–
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC		150	1.9	1,220	2,250	150	1.4	920	2,580	150	1.9	940	2,090
		200	1.7	1,220	2,250	200	1.2	920	2,580	200	1.7	940	2,090
		250	1.3	850	1,570	250	1	640	1,790	250	1.3	660	1,470
		300	1	790	1,580	300	0.6	600	1,930	300	1	610	1,460
		350	0.4	730	2,200	350	0.3	550	1,770	350	0.4	560	2,030
		400	–	–	–	400	–	–	–	400	–	–	–
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB		150	1.9	1,220	2,250	150	1.4	920	2,580	150	1.9	940	2,090
		200	1.7	1,220	2,250	200	1.2	920	2,580	200	1.7	940	2,090
		250	1.3	850	1,570	250	1	640	1,790	250	1.3	660	1,470
		300	1	790	1,580	300	0.6	600	1,930	300	1	610	1,460
		350	0.4	730	2,200	350	0.3	550	1,770	350	0.4	560	2,030
		400	–	–	–	400	–	–	–	400	–	–	–
Stainless steel SUS304 Below 250HB	JC8015 Without chipbreaker	150	1.9	1,050	1,940	150	1.4	800	2,240	150	1.9	810	1,800
		200	1.7	1,050	1,940	200	1.2	800	2,240	200	1.7	810	1,800
		250	1.3	730	1,440	250	1	560	1,570	250	1.3	570	1,370
		300	1	680	1,360	300	0.6	520	1,680	300	1	530	1,270
		350	0.4	630	1,890	350	0.3	480	1,550	350	0.4	490	1,760
		400	–	–	–	400	–	–	–	400	–	–	–
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	DH103	100	1.2	840	1,470	100	1	640	1,540	100	1.2	660	1,390
		150	1	840	1,470	150	0.8	640	1,540	150	1	660	1,390
		200	0.8	590	1,090	200	0.6	450	1,260	200	0.8	460	1,020
		250	0.5	550	1,320	250	0.3	420	1,470	250	0.5	430	1,240
		300	0.3	510	1,270	300	0.2	380	1,750	300	0.3	400	1,200
		350	–	–	–	350	–	–	–	350	–	–	–
Grey & Nodular cast iron FC, FCD (GG,GGG) Below 300HB	DH103	150	1.9	1,160	2,900	150	1.4	880	3,320	150	1.9	900	2,700
		200	1.7	1,160	2,900	200	1.2	880	3,320	200	1.7	900	2,700
		250	1.3	810	1,930	250	1	620	1,740	250	1.3	630	1,800
		300	1	750	2,600	300	0.6	570	2,180	300	1	590	2,480
		350	0.4	700	2,800	350	0.3	530	1,950	350	0.4	540	2,590
		400	–	–	–	400	–	–	–	400	–	–	–
Aluminium alloy A5052, A7075 50-110HB	FZ05	150	2.1	4,300	11,800	150	1.6	3,600	13,800	150	2.1	3,600	11,900
		200	1.9	4,300	11,800	200	1.4	3,600	13,800	200	1.9	3,600	11,900
		250	1.5	3,850	13,500	250	1.2	3,200	15,600	250	1.5	3,200	13,400
		300	1.2	3,350	11,700	300	0.8	2,800	13,700	300	1.2	2,800	11,750
		350	0.6	3,150	11,000	350	0.6	2,600	12,700	350	0.6	2,600	11,000
		400	0.4	2,900	11,000	400	0.4	2,400	12,600	400	0.4	2,400	10,800

ℓ: Overhung length, ap: Axial depth of cut, n: Spindle speed, Vf: Feed speed

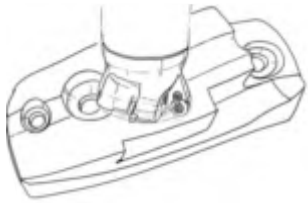
■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed spee
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.

Super Diemaster HDM TYPE

■ CASE STUDIES

1. Forged carbon steel.



Result

Tool life is 7 times longer than competitor's tool.
SUPER DIEMASTER: 30 pieces
Competitor's tool: 4 pieces
It also reduces machining time by 25%

Work	Part name	Parts
	Material	SF700
	Hardness	290~325HB
Tool	Tool No.	HDM-3050-16R
	Insert No.	RDMW1606MOT (JC8015)
Cutting conditions	Cutting Speed	800 (min^{-1}), 125 (m/min)
	Feed Speed	200 (mm/min), 0.25 (mm/rev)
	Depth of cut	0.2 (mm)
	Width of cut	20~30 (mm)
	Coolant	Oil
	Machine	Vertical MC

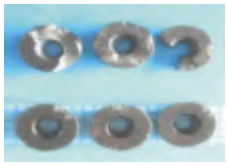
2. Semi-finishing of stainless steel.

Result

Even after machining 100 blades, inserts have less wear and less vibrations than the competitor's.

Work	Part name	Turbine Blades
	Material	Stainless steel (SUS420)
	Hardness	280HB
Tool	Tool No.	SDH-2200-R07-M10
	Insert No.	RDMW07T2MOT (JC8015)
Cutting conditions	Cutting Speed	3,200 (min^{-1}), 200 (m/min)
	Feed Speed	1,920 (mm/min), 0.3 (mm/rev)
	Depth of cut	0.3 (mm)
	Width of cut	0.5 (mm)
	Coolant	Wet
	Machine	Vertical MC

3. Cutting of welded part.



ISO Standard Insert thickness 4.76mm

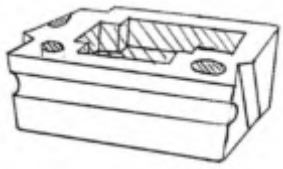
Super Diemaster Insert thickness 6.0mm

Result

ISO standard insert was getting chip-off on welded area but HDM insert could cut without chatter and chip-off.
Tool life was improved 1.5 times.

Work	Part name	Cam
	Material	SKD11+Welding 62
	Hardness	HRC
Tool	Tool No.	HDM-3050-16R
	Insert No.	RDMW1606MOT (JC8015)
Cutting conditions	Cutting Speed	1,000 (min^{-1}), 157 (m/min)
	Feed Speed	500 (mm/min), 0.5 (mm/rev)
	Depth of cut	1 (mm)
	Width of cut	27 (mm)
	Coolant	Dry
	Machine	Vertical MC 22 KW

4. Cutting of die casting mold.



Result

It is observed that HDM Cutter cycle time is reduced by 20% and tool life is improved by 1.3 times compared with competitors. Feed speed is improved from 1,100mm/min to 1,400mm/min.

Work	Part name	Die Casting Mold
	Material	SKT4
	Hardness	36~42HRC
Tool	Tool No.	HDM-4080-12R
	Insert No.	RDMW1204MOT (JC8015)
Cutting conditions	Cutting Speed	450 (min^{-1}), 115 (m/min)
	Feed Speed	1,400 (mm/min), 3 (mm/rev)
	Depth of cut	1.5~2.0 (mm)
	Width of cut	50 (mm)
	Coolant	Dry
	Machine	Vertical MC

Swing Ball SWBTYPE

Applicable range is from soft material to welded and hard material. For high efficiency and longer tool life.

1. Smooth and calm cutting and low cutting force at higher feed rate.

Cutting force is reduced by 25% compared with conventional type. This is achieved by using a positive style insert with chipbreaker groove and edge notches. Double insert desgin gives smooth cutting action and excellent cutting.

2. Plunge cutting is possible because of better crack resistance on nose cutting nose portion.

Providing sub chip pocket at spiral nose cutting edge ejects chips smoothly and improves crack-resistance (except for Semi-finishing insert -H type)

3. Reliable insert location and improved security for heavy operations.

By providing key on the back face of insert and cutter body, insert movement is prevented. Impact of cutting load is secured.

4. G-Body

Special surface harding treatment on thermal resistant high strength steel gives high hardness over 65HRC and secure insert pocket and holder against thermal deformation. Improved body durabilty and tool life by 30% or more. Make it difficult to be damaged even under severe cutting conditions. Also rust-proof and anti-welding effect is much improved.

Insert Series Expansion

Available now 3 type inserts suitable for various uses:

① Low Cutting Force ② Welded & Hardened Material ③ Semi-Finishing

① Inserts for low cutting forces (-N type)

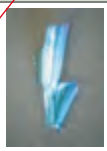
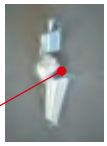
1. **15% reduced cutting force compared with regular type. More smooth and calm cutting is possible.**
2. **1.7 times longer tool life than conventional tool.**
3. **Chip breaking & ejection are improved by adopting notches on the cutting edge.**

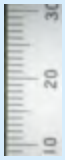
■ CUTTING PERFORMANCES

Body: SWBS5060C508 (φ50)
Material: SKD11(217HB)
Cutting Conditions: n=1,350min^{-1}, f=0.6mm/rev, ae=10mm, ap=10mm

■ CHIPS COMPARISON

Completely breaking chips by notch

	Down cut		Up cut	
	Main blade	Sub blade	Main blade	Sub blade
SWB-N type (New type) **Smooth cutting**				
SWB type (Conventional type)				

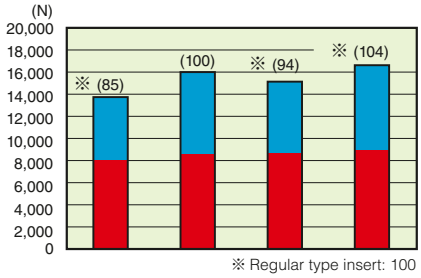


Not completely breaking chips by notch

Swing Ball SWBTYPE

● CUTTING FORCE COMPARISON

Material: SKD11 (217HB) Tool dia.: φ50mm
n=1,082min⁻¹ Vc=170m/min Vf=650mm/min f=0.5mm/rev
ap=10mm ae=10mm Down cut



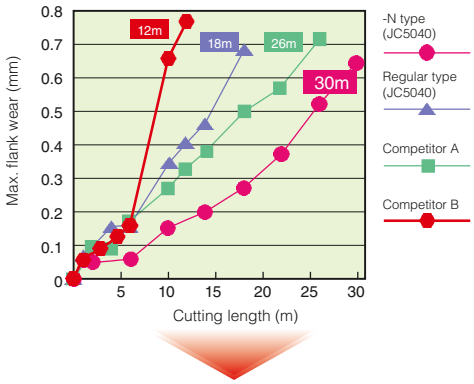
※ Regular type insert: 100

	-N type	Regular type	Competitor A	Competitor B
Main blade	5,890	7,525	6,454	7,783
Sub blade	7,901	8,524	8,671	8,925

Compared with regular type insert, -N type insert (for low cutting forces) reduced cutting force by 15%.

● TOOL LIFE COMPARISON

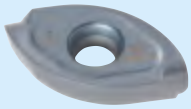
Material: SKD11 (217HB)
n=1,350min⁻¹ Vc=212m/min Vf=810mm/min f=0.6mm/rev
ap=10mm ae=10mm Down & Up cut Air Blow



Compared with regular type insert, -N type insert (for low cutting force) improved tool life by 1.6 times

② Insert for welded & hardened steel (-W type)

1. Improved insert strength and achieved longer tool life.
2. Suitable for welded & hardened steel (over 50HRC)



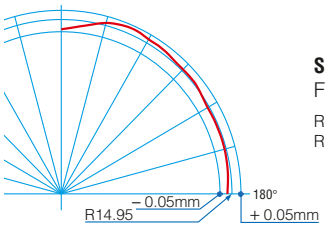
③ Insert for semi-finishing (main blade -H type)

1. Main blades -H type for semi-finishing are available for φ20mm, φ25mm and φ30mm. In case of using -H type blade, please confirm the grade of both the inserts. It should be the same grade.
2. Able to use for semi-finishing by improving nose radius accuracy.
   Do not recommend to use for roughing.

● INSERT COMPARISON

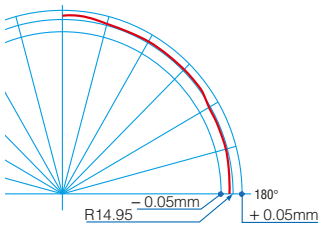
SWB-HM type
Regular type

R min. 14.906
R max. 14.981

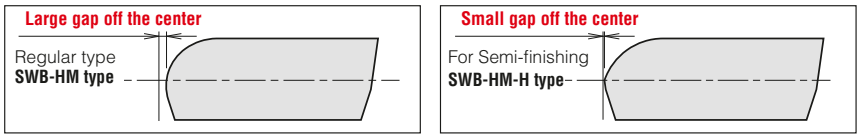


SWB-HM-H type
For Semi-finishing

R min. 14.938
R max. 14.983



Radius form accuracy on body



Swing Ball SWBTYPE

G-Body

Fig.1

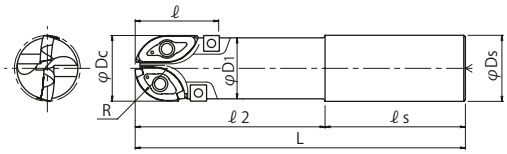


Fig.2

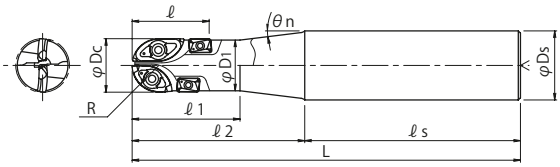
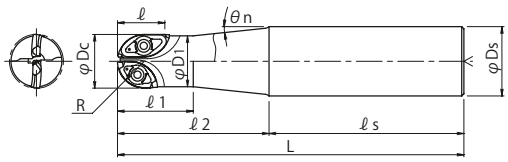


Fig.3



■ BODY

Type	Cat. No.	Stock	No. of inserts			Dimensions (mm)											Fig.
			Main Blade	Sub Blade	Peripheral Blade	R	φDc	ℓ	ℓ2	ℓs	L	ℓ1	φD1	θn	φDs	Md	
Straight Shank	SWB-20080S-S20	●	1	1	2	10	20	30	80	80	160	–	18.7	–	20	–	1
	SWB-20120S-S20	□	1	1	2			30	120	80	200	–	18.7	–	20	–	1
	SWB-20170S-S20	□	1	1	2			30	170	80	250	–	18.7	–	20	–	1
	SWBS2030S25	●	1	1	2			30	80	100	180	40	18.7	3°30′	25	–	2
	SWBM2030S25	●	1	1	2			30	100	100	200	40	18.7	2°	25	–	2
	SWBS2018S25	●	1	1	–			18	70	90	160	30	18.7	3°30′	25	–	3
	SWBS2535S32	●	1	1	2	12.5	25	35	80	100	180	50	23.5	7°	32	–	2
	SWBM2535S32	●	1	1	2			35	100	100	200	50	23.5	4°	32	–	2
	SWBS2522S32	●	1	1	–			22	70	90	160	35	23.5	6°	32	–	3
	SWBS3242S32-G	●	1	1	2	16	32	44	60	120	180	–	29.9	–	32	–	1
	SWBM3242S32-G	●	1	1	2			44	60	160	220	–	29.9	–	32	–	1

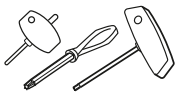
Note) 1) All cutters are supplied without inserts
2) Please refer page C167-C171 for recommended cutting conditions and refer page C170 for machined form.
3) Please refer page C164 for selection of inserts.

Modular Head Type Please refer Page B107

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Swing Ball SWBTYPE

■ PARTS

Applicable Holders φDc	Clamp Screw		Wrench		Inserts		
	For main & sub blade	For peri-pheral blade	For main & sub blade	For peri-pheral blade	Main blade	Sub blade	Peripheral blade
							
φ20	DSW-307H	ESW-206	A-10	A-08SD	SWB220HM	SWB220HS	ZCMT100308R
					SWB220HM-H (For semi-finishing)	SWB220HS (Be sure to use the same grade of main blade)	
					SWB220MMW (For welded & hardened steel)	SWB220MSW (For welded & hardened steel)	
φ25	DSW-4085	ESW-206	A-15	A-08SD	SWB225HM	SWB225HS	ZCMT100308R
					SWB225HM-H (For semi-finishing)	SWB225HS (Be sure to use the same grade of main blade)	
					SWB225MMW (For welded & hardened steel)	SWB225MSW (For welded & hardened steel)	
φ32	TSW-511	ESW-206	A-20	A-08SD	SWB232HM-G	SWB232HS-G	ZCMT100308R
					SWB232MMW-G (For welded & hardened steel)	SWB232MSW-G (For welded & hardened steel)	

Note) 1. In case of using main blade -H type for semi-finishing, be sure to use the same grade for sub blade.
2. In case of using -N type for low cutting force, be sure to use the same notched inserts (-N type) for main blade and sub blade.

Clamp Screw	Recommended torque (N•m)
DSW-307H	1.8
DSW-4085	3.6
TSW-511	5.5
ESW-206	0.9

Swing Ball SWBTYPE

Straight Shank Type

Fig.2

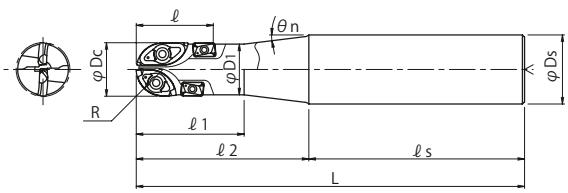
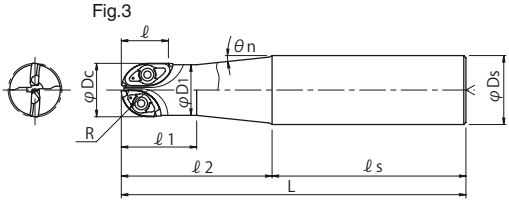


Fig.3



■ BODY

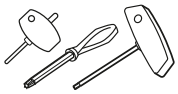
Type	Cat. No.	Stock	No. of inserts			Dimensions (mm)											Fig.
			Main Blade	Sub Blade	Peripheral Blade	R	φDc	ℓ	ℓ2	ℓs	L	ℓ1	φD1	θn	φDs	Md	
Straight Shank	SWBL2030S25	□	1	1	2			30	100	150	250	40	18.7	2°	25	–	2
	SWBL2030S32	□	1	1	2			30	100	150	250	40	18.7	5°30′	32	–	2
	SWBE2030S32	□	1	1	2			30	110	190	300	40	18.7	4°30′	32	–	2
	SWBM2018S25	●	1	1	–	10	20	18	100	100	200	30	18.7	2°	25	–	3
	SWBL2018S25	□	1	1	–			18	110	140	250	30	18.7	1°30′	25	–	3
	SWBL2018S32	□	1	1	–			18	110	140	250	30	18.7	4°	32	–	3
	SWBE2018S32	●	1	1	–			18	120	180	300	30	18.7	3°30′	32	–	3
	SWBSS2535S25	●	1	1	2			35	70	80	150	–	23.5	–	25	–	2
	SWBML2535S25	□	1	1	2			35	70	150	220	–	23.5	–	25	–	2
	SWBL2535S32	□	1	1	2			35	110	140	250	50	23.5	3°30′	32	–	2
	SWBE2535S32	●	1	1	2	12.5	25	35	120	180	300	50	23.5	3°	32	–	2
	SWBM2522S32	□	1	1	–			22	100	100	200	35	23.5	3°	32	–	3
	SWBL2522S32	●	1	1	–			22	110	140	250	35	23.5	2°40′	32	–	3
	SWBE2522S32	□	1	1	–			22	120	180	300	35	23.5	2°20′	32	–	3
	SWBL3242S32-G	●	1	1	2	16	32	44	60	190	250	–	29.9	–	32	–	2
	SWBE3242S32-G	●	1	1	2			44	60	240	300	–	29.9	–	32	–	2

Note) 1) All cutters are supplied without inserts
2) Please refer page C167-C171 for recommended cutting conditions and refer page C170 for machined form.
3) Please refer page C164 for selection of inserts.

Modular Head Type Please refer Page B107

Swing Ball SWBTYPE

■ PARTS

Applicable Holders φDc	Clamp Screw		Wrench		Inserts		
	For main & sub blade	For peri-pheral blade	For main & sub blade	For peri-pheral blade	Main blade	Sub blade	Peripheral blade
							
φ20	DSW-307H	ESW-206	A-10	A-08SD	SWB220HM	SWB220HS	ZCMT100308R
					SWB220HM-H (For semi-finishing)	SWB220HS (Be sure to use the same grade of main blade)	
					SWB220MMW (For welded & hardened steel)	SWB220MSW (For welded & hardened steel)	
φ25	DSW-4085	ESW-206	A-15	A-08SD	SWB225HM	SWB225HS	ZCMT100308R
					SWB225HM-H (For semi-finishing)	SWB225HS (Be sure to use the same grade of main blade)	
					SWB225MMW (For welded & hardened steel)	SWB225MSW (For welded & hardened steel)	
φ32	TSW-511	ESW-206	A-20	A-08SD	SWB232HM-G	SWB232HS-G	ZCMT100308R
					SWB232MMW-G (For welded & hardened steel)	SWB232MSW-G (For welded & hardened steel)	

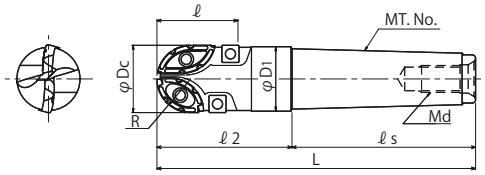
Note) 1. In case of using main blade -H type for semi-finishing, be sure to use the same grade for sub blade.
2. In case of using -N type for low cutting force, be sure to use the same notched inserts (-N type) for main blade and sub blade.

Clamp Screw	Recommended torque (N•m)
DSW-307H	1.8
DSW-4085	3.6
TSW-511	5.5
ESW-206	0.9

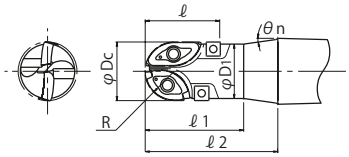
Swing Ball SWBTYPE

MT Shank Type / Weldon Shank Type / BT Shank Type

Fig.8



SWB-20070-MT3,
SWB-20100-MT3,
SWB-40090-MT5



■ BODY

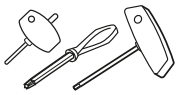
Type	Cat. No.	Stock	No. of inserts			Dimensions (mm)											Fig.
			Main Blade	Sub Blade	Peripheral Blade	R	φDc	ℓ	ℓ2	ℓs	L	ℓ1	φD1	θn	φDs	Md	
Straight Shank	SWB-20070-MT3	□	1	1	2	10	20	30	70	86	156	40	18.7	4°	MT3	M12×1.75	8
	SWB-20100-MT3	□	1	1	2			30	100	86	186	40	18.7	2°	MT3	M12×1.75	8
	SWB-25070-MT3	□	1	1	2	12.5	25	35	70	86	156	–	23.5	–	MT3	M12×1.75	8
	SWB-25100-MT3	□	1	1	2			35	100	86	186	–	23.5	–	MT3	M12×1.75	8
	SWB-32070-MT4-G	□	1	1	2	16	32	44	70	109	179	–	30.4	–	MT4	M16×2	8
	SWB-32100-MT4-G	□	1	1	2			44	100	109	209	–	30.4	–	MT4	M16×2	8
	SWB-40090-MT4	□	1	1	2	20	40	50	90	109	199	–	36.9	–	MT4	M16×2	8
	SWB-40090-MT5	□	1	1	2			50	90	136	226	66.8	36.9	8°	MT5	M20×2.5	8
	SWB-50100-MT5	□	1	1	2	25	50	60	100	136	236	–	46.8	–	MT5	M20×2.5	8
	SWB-50120-MT5	□	1	1	2			60	120	136	256	–	46.8	–	MT5	M20×2.5	8
	SWB-50150-MT5	□	1	1	2			60	150	136	286	–	46.8	–	MT5	M20×2.5	8
	SWB-50170-MT5	□	1	1	2			60	170	136	306	–	46.8	–	MT5	M20×2.5	8

Note) 1) All cutters are supplied without inserts
2) Please refer page C167-C171 for recommended cutting conditions and refer page C170 for machined form.
3) Please refer page C164 for selection of inserts.

Modular Head Type Please refer Page B107

Swing Ball SWBTYPE

■ PARTS

Applicable Holders φDc	Clamp Screw		Wrench		Inserts		
	For main & sub blade	For peri-pheral blade	For main & sub blade	For peri-pheral blade	Main blade	Sub blade	Peripheral blade
							
φ20	DSW-307H	ESW-206	A-10	A-08SD	SWB220HM	SWB220HS	ZCMT100308R
					SWB220HM-H (For semi-finishing)	SWB220HS (Be sure to use the same grade of main blade)	
					SWB220MMW (For welded & hardened steel)	SWB220MSW (For welded & hardened steel)	
φ25	DSW-4085	ESW-206	A-15	A-08SD	SWB225HM	SWB225HS	ZCMT100308R
					SWB225HM-H (For semi-finishing)	SWB225HS (Be sure to use the same grade of main blade)	
					SWB225MMW (For welded & hardened steel)	SWB225MSW (For welded & hardened steel)	
φ32	TSW-511	ESW-206	A-20	A-08SD	SWB232HM-G	SWB232HS-G	ZCMT100308R
					SWB232MMW-G (For welded & hardened steel)	SWB232MSW-G (For welded & hardened steel)	
φ40	TSW-614H	ESW-406	A-25	A-15	SWB240HMN	SWB240HSN	SPGA090304 SPMA090304
					SWB240MMW (For welded & hardened steel)	SWB240MSW (For welded & hardened steel)	
φ50	HSW-614H	CSW-510	A-30	A-20	SWB250HMN-N (For low cutting force)	SWB250HSN-N (For low cutting force)	IM-SP43GS
					SWB250MMW (For welded & hardened steel)	SWB250MSW (For welded & hardened steel)	

Note) 1. In case of using main blade -H type for semi-finishing, be sure to use the same grade for sub blade.
2. In case of using -N type for low cutting force, be sure to use the same notched inserts (-N type) for main blade and sub blade.

Clamp Screw	Recommended torque (N•m)
DSW-2563H	0.9
DSW-307H	1.8
DSW-4085	3.6
TSW-511	5.5
TSW-614H	7.5
HSW-614H	7.5
ESW-206	0.9
ESW-406	3.1
CSW-510	5.5

Swing Ball SWBTYPE

■ INSERTS

■ SWB-N type (For low cutting forces)

1. -N type insert for low cutting forces.
   Suitable for heavy roughing.
2. Reduced cutting forces compared with regular type by 15%.
   More smooth and calm cutting is possible.

Fig.1 (Main blade for low cutting forces)

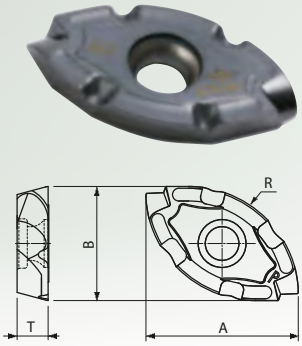
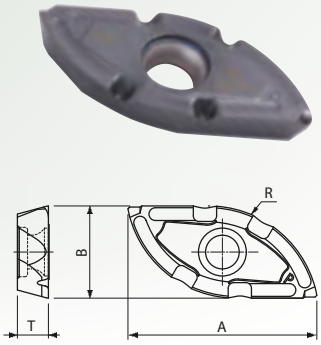


Fig.2 (Sub blade for low cutting forces)



■ SWB-H type (Main blade for semi-finishing)

1. -H type semi-finishing main blade for
   φ20, φ25, φ30
2. For use in semi-finishing only.
   (Not recommended for Roughing)

Fig.3 (Main blade for semi-finishing)

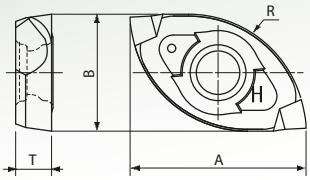


Fig.4 (Main blade)

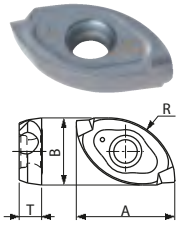


Fig.5 (Main blade)

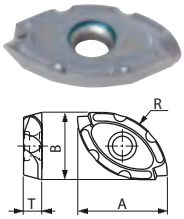


Fig.6 (Sub blade)

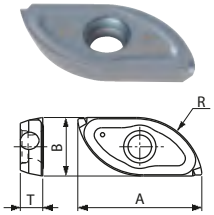


Fig.7 (Sub blade)

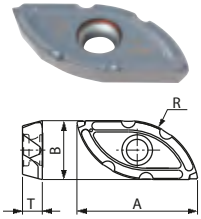


Fig.8 (Main blade for welded & hardened steel)

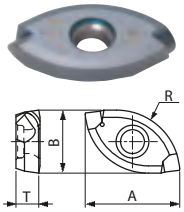


Fig.9 (Sub blade for welded & hardened steel)

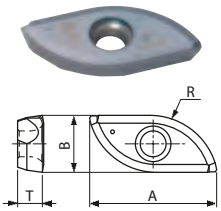


Fig.10 (Peripheral blade)

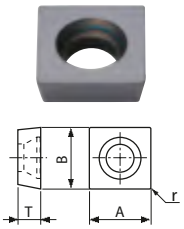


Fig.11 (Peripheral blade)

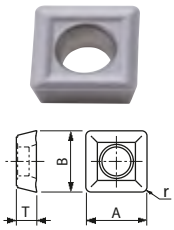
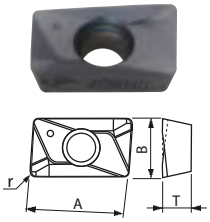


Fig.12 (Peripheral blade)



Swing Ball SWBTYPE

■ INSERTS

Cat. No.	Type	PVD coated					Dimensions (mm)					Fig.
		JC5015	JC5118	JC8015	JC8050	JC5040	R	A	B	T	r	
SWB220HM	Main blade			●		●	10	15.8	9.9	3.65	–	4
SWB220HM-H				●				16	9.9	3.65	–	3
SWB220MMW				●				15.8	9.9	3.65	–	8
SWB220HS	Sub blade			●		●		20	8.2	3.65	–	6
SWB220MSW				●				20	8.2	3.65	–	9
SWB225HM	Main blade			●		●	12.5	18.5	12.4	3.8	–	4
SWB225HM-H				□				18.9	12.4	3.8	–	3
SWB225MMW				●				18.5	12.4	3.8	–	8
SWB225HS	Sub blade			●		●		23.8	10.5	3.8	–	6
SWB225MSW				●				23.8	10.5	3.8	–	9
SWB232HM-G	Main blade			●		●	16	26	16	5.35	–	4
SWB232MMW-G				●				26	16	5.35	–	8
SWB232HS-G	Sub blade			●		●		31.7	13.9	5.35	–	6
SWB232MSW-G				●				31.7	13.9	5.35	–	9
SWB240HMN	Main blade			●		●	20	30.4	20.8	6.85	–	5
SWB240MMW				□				30.4	20.8	6.85	–	8
SWB240HSN	Sub blade			●		●		37.5	16.3	6.85	–	7
SWB240MSW				□				37.5	16.3	6.85	–	9
SWB250HMN-N	Main blade			●		●	25	34.4	25.7	7	–	1
SWB250MMW				●				34.4	25.7	7	–	8
SWB250HSN-N	Sub blade			●		●		42.6	20.8	7	–	2
SWB250MSW				●				42.6	20.8	7	–	9
SPGA090304	Peripheral blade					●	–	9.525	9.525	3.18	0.4	10
SPMA090304		●		□				9.525	9.525	3.18	0.4	10
IM-SP43GS			●			●		12.70	12.70	4.76	0.8	11
ZCMT100308R		●				●		10.4	6.35	3.4	0.8	12

10 inserts per case, but main blade (R20, R25) and sub blade (R16, R20, R25) are packed in 5pcs. per case.

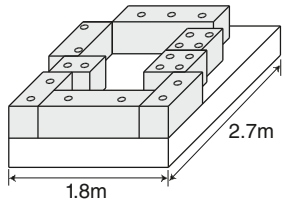
Note) 1. Please refer page C167-C171 for recommended cutting conditions and refer page C170 for machined form.
2. In case of using main blade -H type for semi-finishing, be sure to use the same grade for sub blade.
3. In case of using -N type for low cutting force, be sure to use the same notched inserts (-N type) for main blade and sub blade.

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Swing Ball SWBTYPE

■ CASE STUDIES

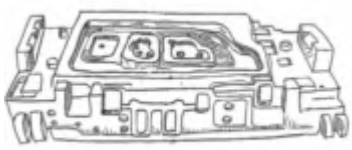
1. High feed machining.



Result: Low cutting force, no chipping occured and completed one complete die as shown above by one insert.

Work	Part name	Stamping die
	Material	SX105V (Toolsteel) (Roughing)
	Hardness	—
Tool	Tool No.	SWB-50100-MT5
	Grade	SWB250HMN-N, SWB250HSN-N, JC5040
Cutting conditions	Vc, (n)	2,000 (min^{-1}), 314 (m/min)
	Vf, (fz)	1,200 (mm/min)
	ap (mm)	10 (mm)
	ae (mm)	8 (mm)
	Coolant	Dry cut
	Machine	Double column MC

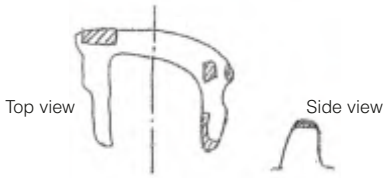
2. Improved tool life by JC8015 (Two times longer life)



Result: Heavy roughing of material GM241. Current insert got wear VBMAX=0.7mm after 2 hours. But JC8015 insert got wear VBMAX=0.2mm after 2 hours and 2 times longer tool life.

Work	Part name	Stamping die
	Material	Alloy cast iron (GM241)
	Hardness	260–320HB
Tool	Tool No.	SWBS5060C508
	Grade	SWB250HMN-N, SWB250HSN-N, JC8015
Cutting conditions	Vc, (n)	1,215 (min^{-1}), 191 (m/min)
	Vf, (fz)	560 (mm/min)
	ap (mm)	20 (mm)
	ae (mm)	12 (mm)
	Coolant	Dry cut
	Machine	Double column MC

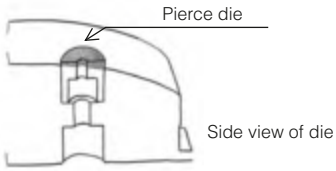
3. Machining welded part



Result: After machining of welded and hardened stamping die for 40 mins, inserts were still in good conditions.

Work	Part name	Stamping die
	Material	Cast steel (ICD5) + welded part
	Hardness	58HRC
Tool	Tool No.	SWBS5060C508
	Grade	SWB250MMW, SWB250MSW, JC8015
Cutting conditions	Vc, (n)	1,215 (min^{-1}), 191 (m/min)
	Vf, (fz)	420 (mm/min)
	ap (mm)	1~3 (mm)
	ae (mm)	6 (mm)
	Coolant	Dry cut
	Machine	Double column MC

4. Machining pierce die (Higher feed and longer tool life)

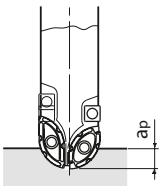
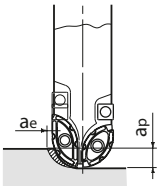
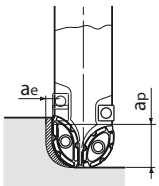


Result: After machining 1 die, exsisting tool edge got damaged and was required to indexed. In case of Swing ball, feed rate was increased by 50% and could machine another 3 dies.

Work	Part name	Stamping die
	Material	SKD11
	Hardness	58-60HRC
Tool	Tool No.	SWBM3040S32
	Grade	SWB230MMW, SWB230MSW, JC8015
Cutting conditions	Vc, (n)	1,000 (min^{-1}), 94 (m/min)
	Vf, (fz)	300 (mm/min)
	ap (mm)	Max 3 (mm)
	ae (mm)	3~5(mm)
	Coolant	Dry cut
	Machine	Double column MC

Swing Ball SWBTYPE

■ RECOMMENDED CUTTING CONDITIONS FOR SWING BALL φ50mm

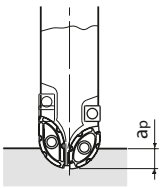
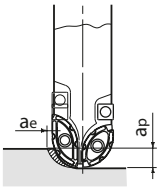
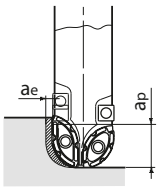
Type of Machining						
Work Materials	Insert Grades	Cutting conditions	Slotting	Shoulder milling		Shoulder milling (Deep)
Medium carbon steel S50C, S55C (C50 ,C55) 150-250HB	JC5040	n (min⁻¹)	1,500	1,500	1,500	1,200
		Vf (mm/min)	720	1,000	680	420
		ap (mm)	15	10	25	40
		ae (mm)	–	10	15	10
Cast steel GM190, ICD5 (1.7225) 150-285HRC	JC5040 JC8015 For over 40HRC	n (min⁻¹)	1,350	1,350	1,350	1,100
		Vf (mm/min)	650	900	600	380
		ap (mm)	15	10	25	40
		ae (mm)	–	10	15	10
Die steel SKD11, SX105V (1.2379) 150-255HRC	JC5040	n (min⁻¹)	1,250	1,250	1,250	1,000
		Vf (mm/min)	550	750	500	300
		ap (mm)	15	10	25	40
		ae (mm)	–	10	15	5
Hardened steel SKD61, DAC (1.2344) 40-50HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,200	1,200	1,200	–
		Vf (mm/min)	420	540	400	–
		ap (mm)	~6	~5	~8	–
		ae (mm)	–	6	10	–
Welded & Hardened steel SKD11 (1.2379) 55-63HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,200	1,200	–	–
		Vf (mm/min)	360	400	–	–
		ap (mm)	~3	~3	–	–
		ae (mm)	–	6	–	–
Grey cast iron FC250 (GG25) 160-260HB	JC8015	n (min⁻¹)	1,500	1,500	1,500	1,200
		Vf (mm/min)	970	1,400	900	480
		ap (mm)	15	10	25	40
		ae (mm)	–	10	15	10
Nodular cast iron FCD700, GM241 (GGG70) 170-300HB	JC8015	n (min⁻¹)	1,300	1,300	1,300	1,050
		Vf (mm/min)	700	1,000	650	370
		ap (mm)	15	10	25	40
		ae (mm)	–	10	15	10

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Pick feed

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. Use air blow

Swing Ball SWBTYPE

■ RECOMMENDED CUTTING CONDITIONS FOR SWING BALL φ40mm

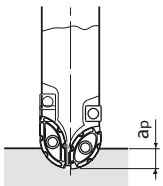
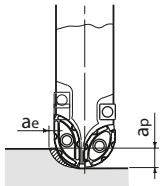
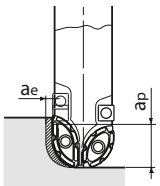
Type of Machining						
Work Materials	Insert Grades	Cutting conditions	Slotting	Shoulder milling		Shoulder milling (Deep)
Medium carbon steel S50C, S55C (C50 ,C55) 150-250HB	JC5040	n (min⁻¹)	1,850	1,850	1,850	1,500
		Vf (mm/min)	800	1,070	740	480
		ap (mm)	12	10	20	35
		ae (mm)	–	8	12	8
Cast steel GM190, ICD5 (1.7225) 150-285HRC	JC5040 JC8015 For over 40HRC	n (min⁻¹)	1,670	1,670	1,670	1,340
		Vf (mm/min)	720	960	670	420
		ap (mm)	12	10	20	35
		ae (mm)	–	8	12	8
Die steel SKD11, SX105V (1.2379) 150-255HRC	JC5040	n (min⁻¹)	1,560	1,560	1,560	1,250
		Vf (mm/min)	620	810	560	350
		ap (mm)	12	10	20	35
		ae (mm)	–	8	12	4
Hardened steel SKD61, DAC (1.2344) 40-50HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,200	1,200	1,200	–
		Vf (mm/min)	420	540	420	–
		ap (mm)	~5	~4	~6.5	–
		ae (mm)	–	5	8	–
Welded & Hardened steel SKD11 (1.2379) 55-63HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,000	1,000	–	–
		Vf (mm/min)	300	350	–	–
		ap (mm)	~3	~3	–	–
		ae (mm)	–	5	–	–
Grey cast iron FC250 (GG25) 160-260HB	JC8015	n (min⁻¹)	1,850	1,850	1,850	1,500
		Vf (mm/min)	1,100	1,500	1,000	570
		ap (mm)	12	10	20	35
		ae (mm)	–	8	12	8
Nodular cast iron FCD700, GM241 (GGG70) 170-300HB	JC8015	n (min⁻¹)	1,650	1,650	1,650	1,320
		Vf (mm/min)	830	1,100	760	450
		ap (mm)	12	10	20	35
		ae (mm)	–	8	12	8

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Pick feed

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. Use air blow

Swing Ball SWBTYPE

■ RECOMMENDED CUTTING CONDITIONS FOR SWING BALL φ32mm

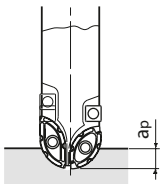
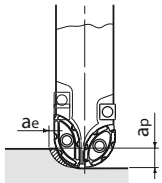
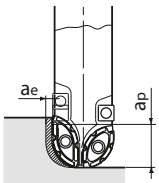
Type of Machining						
Work Materials	Insert Grades	Cutting conditions	Slotting	Shoulder milling		Shoulder milling (Deep)
Medium carbon steel S50C, S55C (C50 ,C55) 150-250HB	JC5040	n (min⁻¹)	2,300	2,300	2,300	1,800
		Vf (mm/min)	800	1,020	770	450
		ap (mm)	10	10	16	28
		ae (mm)	–	6	9	6
Cast steel GM190, ICD5 (1.7225) 150-285HRC	JC5040 JC8015 For over 40HRC	n (min⁻¹)	2,090	2,090	2,090	1,670
		Vf (mm/min)	720	920	700	420
		ap (mm)	10	10	16	28
		ae (mm)	–	6	9	6
Die steel SKD11, SX105V (1.2379) 150-255HRC	JC5040	n (min⁻¹)	1,950	1,950	1,950	1,560
		Vf (mm/min)	630	810	600	390
		ap (mm)	10	10	16	28
		ae (mm)	–	6	9	3
Hardened steel SKD61, DAC (1.2344) 40-50HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,600	1,600	1,600	–
		Vf (mm/min)	400	480	400	–
		ap (mm)	~4	~4	~6.5	–
		ae (mm)	–	5	8	–
Welded & Hardened steel SKD11 (1.2379) 55-63HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,400	1,400	–	–
		Vf (mm/min)	280	350	–	–
		ap (mm)	~3	~3	–	–
		ae (mm)	–	5	–	–
Grey cast iron FC250 (GG25) 160-260HB	JC8015	n (min⁻¹)	2,300	2,300	2,300	1,840
		Vf (mm/min)	1,140	1,380	1,020	640
		ap (mm)	10	10	16	28
		ae (mm)	–	6	9	6
Nodular cast iron FCD700, GM241 (GGG70) 170-300HB	JC8015	n (min⁻¹)	2,060	2,060	2,060	1,650
		Vf (mm/min)	890	1,130	820	500
		ap (mm)	10	10	16	28
		ae (mm)	–	6	9	6

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Pick feed

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. Use air blow

Swing Ball SWBTYPE

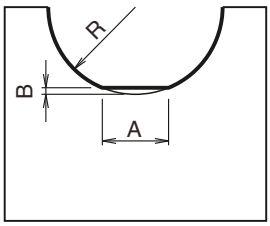
■ RECOMMENDED CUTTING CONDITIONS FOR SWING BALL φ25mm

Type of Machining						
Work Materials	Insert Grades	Cutting conditions	Slotting	Shoulder milling		Shoulder milling (Deep)
Medium carbon steel S50C, S55C (C50 ,C55) 150-250HB	JC5040	n (min⁻¹)	2,550	2,550	2,550	2,290
		Vf (mm/min)	760	890	690	500
		ap (mm)	6	6	12.5	20
		ae (mm)	–	5	6.5	3
Cast steel GM190, ICD5 (1.7225) 150-285HRC	JC5040 JC8015 For over 40HRC	n (min⁻¹)	2,400	2,400	2,400	2,160
		Vf (mm/min)	720	840	640	480
		ap (mm)	6	6	12.5	20
		ae (mm)	–	5	6.5	3
Die steel SKD11, SX105V (1.2379) 150-255HRC	JC5040	n (min⁻¹)	2,160	2,160	2,160	1,910
		Vf (mm/min)	590	690	540	420
		ap (mm)	6	6	12.5	20
		ae (mm)	–	5	6.5	3
Hardened steel SKD61, DAC (1.2344) 40-50HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,600	1,600	1,600	–
		Vf (mm/min)	350	400	350	–
		ap (mm)	~3	~3	~5	–
		ae (mm)	–	4	5	–
Welded & Hardened steel SKD11 (1.2379) 55-63HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,400	1,400	–	–
		Vf (mm/min)	280	350	–	–
		ap (mm)	~2	~2	–	–
		ae (mm)	–	4	–	–
Grey cast iron FC250 (GG25) 160-260HB	JC8015	n (min⁻¹)	2,550	2,550	2,550	2,290
		Vf (mm/min)	1,000	1,150	900	650
		ap (mm)	6	6	12.5	20
		ae (mm)	–	5	6.5	3
Nodular cast iron FCD700, GM241 (GGG70) 170-300HB	JC8015	n (min⁻¹)	2,400	2,400	2,400	2,160
		Vf (mm/min)	860	1,000	770	600
		ap (mm)	6	6	12.5	20
		ae (mm)	–	5	6.5	3

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Pick feed

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. Use air blow

■ MACHINED FORM BY SWING BALL



Note) At center point as shown in above figure, material can be left as mentioned in chart.

● **SWB type**

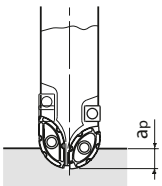
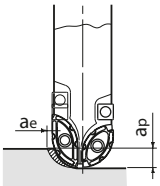
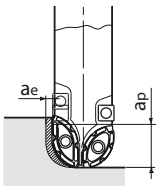
R	A	B
8	0.5	0.01
10	2.1	0.05
12.5	3.0	0.09
15	3.3	0.09
16	3.4	0.09
20	4.3	0.12
25	5.2	0.14

● **SWB-H type (For semi-finishing)**

R	A	B
10	0.6	0.01
12.5	0.7	0.01
15	0.9	0.01

Swing Ball SWBTYPE

■ RECOMMENDED CUTTING CONDITIONS FOR SWING BALL φ20mm

Type of Machining						
Work Materials	Insert Grades	Cutting conditions	Slotting	Shoulder milling		Shoulder milling (Deep)
Medium carbon steel S50C, S55C (C50 ,C55) 150-250HB	JC5040	n (min⁻¹)	3,180	3,180	3,180	2,860
		Vf (mm/min)	890	1,000	800	570
		ap (mm)	5	5	10	16
		ae (mm)	–	4	5	2
Cast steel GM190, ICD5 (1.7225) 150-285HRC	JC5040 JC8015 For over 40HRC	n (min⁻¹)	3,020	3,020	3,020	2,700
		Vf (mm/min)	820	920	760	540
		ap (mm)	5	5	10	16
		ae (mm)	–	4	5	2
Die steel SKD11, SX105V (1.2379) 150-255HRC	JC5040	n (min⁻¹)	2,700	2,700	2,700	2,390
		Vf (mm/min)	680	810	630	480
		ap (mm)	5	5	10	16
		ae (mm)	–	4	5	2
Hardened steel SKD61, DAC (1.2344) 40-50HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,750	1,750	1,750	–
		Vf (mm/min)	350	400	320	–
		ap (mm)	~2	~2	~4	–
		ae (mm)	–	3	4	–
Welded & Hardened steel SKD11 (1.2379) 55-63HRC	JC8015 (Recommend to use -M○W type insert)	n (min⁻¹)	1,400	1,400	–	–
		Vf (mm/min)	280	350	–	–
		ap (mm)	~1	~1	–	–
		ae (mm)	–	3	–	–
Grey cast iron FC250 (GG25) 160-260HB	JC8015	n (min⁻¹)	3,180	3,180	3,180	2,860
		Vf (mm/min)	1,160	1,300	1,040	740
		ap (mm)	5	5	10	16
		ae (mm)	–	4	5	2
Nodular cast iron FCD700, GM241 (GGG70) 170-300HB	JC8015	n (min⁻¹)	3,020	3,020	3,020	2,700
		Vf (mm/min)	980	1,100	910	650
		ap (mm)	5	5	10	16
		ae (mm)	–	4	5	2

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Pick feed

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. Use air blow

■ MAXIMUM PLUNGING DEPTH AND FEED RATE

Materials	Max. D.O.C. Max. Feed rate	Tool dia.: φDc (mm)				
		20	25	30, 32	40	50
Cast iron FC, FCD, GM (GG, GGG)	ap (mm)	4	5	10	15	15
	f (mm/rev)	0.30	0.40	0.40	0.40	0.40
Cast steel Alloy steel Die steel	ap (mm)	3	4	8	10	10
	f (mm/rev)	0.25	0.30	0.30	0.30	0.30

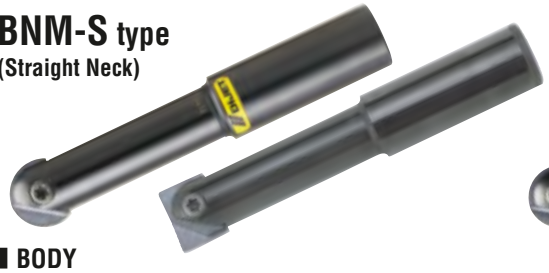
Note) In case of using -H type insert (main blade for semi-finishing), plunging is not recommended.

Mirror Ball

BNM TYPE

1. Ultimate precision indexable ball nose end mill with two effective cutting edge
   Radius form accuracy: within ±0.010mm mounted on holder
   (Radius form accuracy of insert: within ±0.006mm)
2. High precision clamping system
   Easy and strong clamping and accurate location mechanism by using the single precision clamp screw gives high repeatability and rigidity.
3. Full radius insert with improved edge sharpness
   Adopted full radius insert is able to reduce vibration even in perpendicular wall milling and can cut smoothly for intricate shape copy milling with high speed.
4. In case of super finishing application (removal stock below Dc/40), MIRROR RADIUS Insert can be mounted on MIRROR BALL Bodies.

BNM-S type
(Straight Neck)



BNM-T type
(Taper Neck)

■ BODY

Cat. No.	Stock	Fig.	Dimensions (mm) R	φDc	ℓ1	ℓ2	L	φD1	φDs	θκ°	θn° Taper angle	Parts: Clamp Screw	Parts: Wrench	Inserts	
BNMS-060030T-S10	□	2	3	6	15	30	80	5.4	10	4°14′	8°15′	FSW-2005H	A-06	BNM-060...	
BNMS-080035T-S12	□	2	4	8	18.5	35	92	7.2	12	3°41′	7°45′	FSW-2506H	A-07	BNM-080...	RNM-080...
BNMM-080053T-S12	□				18.5	53	110			2°20′	3°30′				
BNML-080075T-S12	□				18.5	75	132			1°37′	1°30′				
BNMS-100035T-S12	□	2	5	10	21	35	92	9	12	1°55′	5°45′	FSW-3007H	A-08	BNM-100...	RNM-100...
BNMM-100053T-S12	□				21	53	110			1°12′	2°30′				
BNML-100075T-S12	□				21	75	132			0°49′	1°				
BNMS-120026S-S12	●	1	6	12	–	26	83	11	12	–	–	FSW-3509H	A-10	BNM-120...	RNM-120...
BNMM-120053S-S12	●				–	53	110			–	–				
BNMM-120053T-S12	□	2			22	53	110			–	1°30′				
BNML-120085T-S16	□				22	85	145		16	1°27′	1°30′				
BNMS-160032S-S16	●	1	8	16	–	32	92	14	16	–	–	FSW-4013H	A-15	BNM-160...	RNM-160...
BNMM-160063S-S16	●				–	63	123			–	–				
BNMM-160063T-S16	□	2			28	63	123			–	1°30′				
BNML-160100T-S20	□				28	100	166		20	1°13′	1°30′				
BNMS-200038S-S20	●	1	10	20	–	38	104	17	20	–	–	FSW-5016H	A-20W	BNM-200...	RNM-200...
BNMM-200075S-S20	●				–	75	141		20	–	–				
BNMM-200075T-S20	□	2			34	75	141			–	2°				
BNML-200115T-S25	□				34	115	191		25	1°22′	1°50′				

Note) 1. All cutters are supplied without inserts.
2. Please refer page C186-C189 for recommended cutting conditions.

Modular Head Type Please refer Page B153

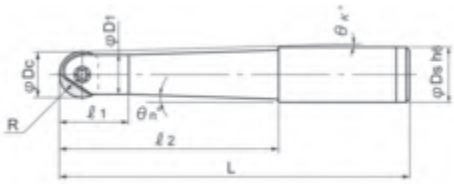
Clamp Screw	Recommended torque (N•m)
FSW-2005H	0.5
FSW-2506H	0.9
FSW-3007H	1.2
FSW-3509H	2.0
FSW-4013H	3.0
FSW-5016H	4.0
FSW-6020	5.0
FSW-8025	6.0

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Mirror Ball BNMTYPE

Fig.1 (Straight Neck)

Fig.2 (Taper Neck)



■ BODY

Cat. No.	Stock	Fig.	Dimensions (mm) R	φDc	ℓ1	ℓ2	L	φD1	φDs	θκ°	θn° Taper angle	Parts: Clamp Screw	Parts: Wrench	Inserts	
BNMS-250045S-S25	●	1	12.5	25	–	45	121	21	25	–	–	FSW-6020	A-30	BNM-250...	RNM-250...
BNMM-250090S-S25	●	1			–	90	166			–	–				
BNMM-250090T-S25	●	2			41	90	166			–	2°20′				
BNML-250135T-S32	●				41	135	215		32	1°38′	1°30′				
BNMS-300053S-S32	□	1	15	30	–	53	133	26	32	–	–	FSW-8025	A-40	BNM-300...	RNM-300...
BNMM-300106S-S32	□	1			–	106	186			–	–				
BNMM-300106T-S32	□	2			49	106	186			0°38′	3°				
BNML-300160T-S32	□				49	160	240			0°24′	1°10′				
BNMS-320053S-S32	□	1	16	32	–	53	133	26	32	–	–	FSW-8025	A-40	BNM-320...	RNM-320...
BNMM-320106S-S32	□	1			–	106	186			–	–				
BNMM-320106T-S32	□	2			49	106	186			–	3°				
BNML-320160T-S32	□				49	160	240			–	1°10′				

Note) 1. All cutters are supplied without inserts.
2. Please refer page C186-C189 for recommended cutting conditions.

Modular Head Type Please refer Page B153

Clamp Screw	Recommended torque (N•m)
FSW-2005H	0.5
FSW-2506H	0.9
FSW-3007H	1.2
FSW-3509H	2.0
FSW-4013H	3.0
FSW-5016H	4.0
FSW-6020	5.0
FSW-8025	6.0

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Mirror Ball

C Body carbide shank

BNM TYPE

Mirror Ball Carbide Shanks

1. It is possible to machine deeper mold with high quality and high accuracy at higher cutting parameters due to increased tool rigidity and minimize the vibration.
2. By adopting carbide shank, tool rigidity is equal to solid carbide ball nose end mill.
3. Compared with steel shank, the tool life is almost more than double.
4. Carbide shank can be used on shrink-fit type holders.
5. In case of super finishing application (removal stock below Dc/40), MIRROR RADIUS Insert can be mounted on MIRROR BALL Bodies.

Radius form accuracy of insert mounted on holder: within ±0.010mm

BNM-S-C type
(Straight Neck)

BNM-T-C type
(Taper Neck)

■ BODY

Cat. No.	Stock	Fig.	Dimensions (mm) R	φDc	ℓ1	ℓ2	L	φD1	φDs	θκ°	θn° Taper angle	Parts: Clamp Screw	Parts: Wrench	Inserts	
BNMS-060017S-S06C	●	1	3	6	–	17	60	5.4	6	–	–	FSW-2005H	A-06	BNM-060... (BNM-070)	
BNMS-060030T-S10C	●	2			15	30	80		10	4°14′	6°				
BNMM-060035S-S06C	●	1			–	35	92		6	–	–				
BNML-060017S-S06C	●	1			–	17	120			–	–				
BNMS-080025S-S08C	●	1	4	8	–	25	90	7.2	8	–	–	FSW-2506H	A-07	BNM-080...	RNM-080...
BNMM-080035S-S08C	●				–	35	92			–	–				
BNML-080075S-S08C	●				–	75	140			–	–				
BNML-080095S-S08C	●				–	95	160			–	–				
BNML-080075T-S12C	●	2			20	75	132		12	1°37′	2°				
BNMS-100030S-S10C	●	1	5	10	–	30	100	9	10	–	–	FSW-3007H	A-08	BNM-100... (BNM-110)	RNM-100...
BNMM-100043S-S10C	●				–	43	100			–	–				
BNML-100075S-S10C	●				–	75	140			–	–				
BNML-100095S-S10C	●				–	95	160			–	–				
BNML-100140S-S10C	●				–	140	220			–	–				
BNML-100075T-S12C	●	2			23	75	132		12	0°49′	1°30′				
BNMS-120028S-S12C	●	1	6	12	–	28	84	11	12	–	–	FSW-3509H	A-10	BNM-120...	RNM-120...
BNMM-120053S-S12C	●				–	53	110			–	–				
BNML-120095S-S12C	●				–	95	160			–	–				
BNML-120085T-S16C	●	2			27	85	145	10	16	1°27′	2°30′				
BNML-120150S-S12C	●	1			–	150	220	11	12	–	–				
BNMS-160033S-S16C	●	1	8	16	–	33	93	15	16	–	–	FSW-4013H	A-15	BNM-160...	RNM-160...
BNMM-160063T-S20C	●	2			30.5	63	123	14	20	2°5′	4°				
BNML-160070S-S16C	●	1			–	70	140	15	16	–	–				
BNML-160090S-S16C	●				–	90	160			–	–				
BNML-160100T-S20C	●	2			30.5	100	166	14	20	1°15′	2°				
BNML-160110S-S16C	●	1			–	110	180	15	16	–	–				
BNML-160150S-S16C	●				–	150	220			–	–				

Note) 1. All cutters are supplied without inserts.
2. Please refer page C186-C189 for recommended cutting conditions.

Please refer page C175 for ★ Caution for the mounting on shrink-fit holder

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

Mirror Ball

C Body carbide shank

BNMTYPE

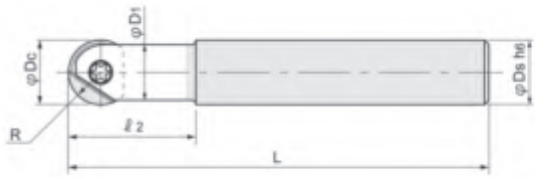


Fig.1 (Straight Neck)

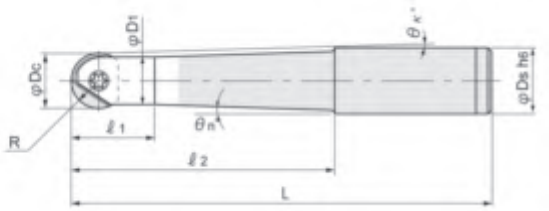


Fig.2 (Taper Neck)

■ BODY

Cat. No.	Stock	Fig.	Dimensions (mm) R	φDc	ℓ1	ℓ2	L	φD1	φDs	θκ°	θn° Taper angle	Parts: Clamp Screw	Parts: Wrench	Inserts	
BNMS-200039S-S20C	●				–	39	105			–	–				
BNMM-200075S-S20C	●	1			–	75	141	19	20	–	–				
BNML-200105S-S20C	●		10	20	–	105	180			–	–	FSW-5016H	A-20W	BNM-200...	RNM-200...
BNML-200115T-S25C	●	2			36	115	191	17	25	1°22′	2°				
BNML-200125S-S20C	●	1			–	125	200	19	20	–	–				
BNML-200170S-S20C	●				–	170	250			–	–				
BNMM-250090S-S25C	●	1	12.5	25	–	90	166	24	25	–	–	FSW-6020	A-30	BNM-250...	RNM-250...
BNML-250140S-S25C	●				–	140	220			–	–				

Note) 1. All cutters are supplied without inserts.
2. Please refer page C186-C189 for recommended cutting conditions.

Modular Head Type Please refer Page B153

Clamp Screw	Recommended torque (N•m)	Clamp Screw	Recommended torque (N•m)
FSW-2005H	0.5	FSW-4013H	3.0
FSW-2506H	0.9	FSW-5016H	4.0
FSW-3007H	1.2	FSW-6020	5.0
FSW-3509H	2.0	FSW-8025	6.0

★ Caution for the mounting on shrink-fit holder (In case of BNM-C Body, RNM-C Body)

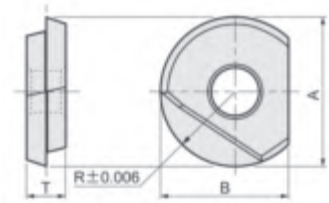
When you use a carbide shank (C Body) on the shrink-fit holder, please shrink-fit only carbide shank without putting insert and clamp screw.

Please mount the insert and tighten the clamp screw after shrink-fit.

Note) If it shrink-fits with the insert and clamp screw, it will be difficult to loose the clamp screw.

Mirror Ball Insert

■ INSERTS



Radius form accuracy of inserts:
within ±0.006mm

Cat. No.	PVD coated		Diamond coated	Uncoated	Dimensions (mm)			
	JC5015 (Z10~20)	DH103 (Z05)	JC10000	KT9 (K10)	R	A	B	T
BNM-060	●	●	●	●	3	6	5	2
BNM-080	●	●	●	●	4	8	7	2.4
BNM-100	●	●	□	●	5	10	8.5	2.6
BNM-120	●	●	●	●	6	12	10	3
BNM-160	●	●	□	●	8	16	12	4
BNM-200	●	●	●	●	10	20	15	5
BNM-250	●	●		□	12.5	25	18.5	6
BNM-300	●	●		□	15	30	22.5	7
BNM-320	●	●		●	16	32	23.5	7

2 inserts per case, but in case of grade JC10000: 1 piece per case.

Cat. No.	Uncoated	Dimensions (mm)				
	FZ05 (Z01)	R	A	B	C	T
BNM-060-S	●	3	6	5	–	2
BNM-080-S	●	4	8	7	0.5	2.4
BNM-100-S	●	5	10	8.5	1	2.6
BNM-120-S	●	6	12	10	1	3
BNM-160-S	●	8	16	12	1	4
BNM-200-S	●	10	20	15	1	5
BNM-250-S	●	12.5	25	18.5	1	6
BNM-300-S	●	15	30	22.5	1	7
BNM-320-S	●	16	32	23.5	1	7

2 inserts per case.

★ Instructions for mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Do not tighten the clamp screw too hard.

Refer the right table for recommended tightening torque.

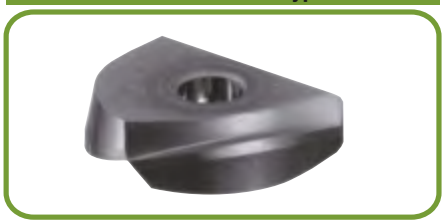
Dimensions (mm) φDc	Recommended torque (N·m)
6	0.5
8	0.9
10	1.2
12	2.0
16	3.0
20	4.0
25	5.0
30	6.0
32	6.0

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

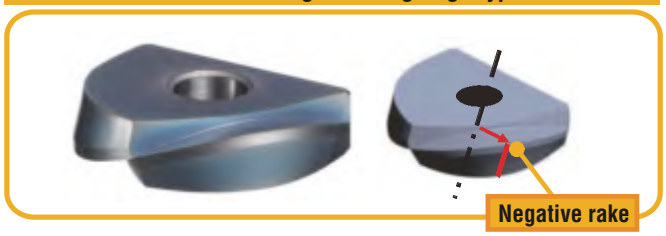
Mirror Ball BNMTYPE

■ INSERT (S type, TG type) Mirror S

BNM-S: Standard type

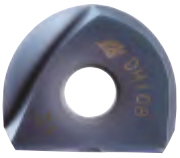


BNM-TG: Stronger cutting edge type



BNM-SS Type

Fig. 1 Below R8
(Tool dia. Below 16mm)



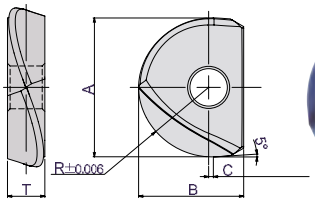
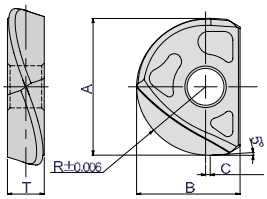


Fig. 2 Above R10
(Tool dia. Above 20mm)



Radius form accuracy of inserts: within ±0.006mm

Cat. No.	PVD coated DH108 (Z10)	Dimensions (mm)				
		R	A	B	C	T
BNM-060-SS	●	3	6	5	–	2
BNM-080-SS	●	4	8	7	0.5	2.4
BNM-100-SS	●	5	10	8.5	1	2.6
BNM-120-SS	●	6	12	10	1	3
BNM-160-SS	●	8	16	12	1	4
BNM-200-SS	●	10	20	15	1	5
BNM-250-SS	●	12.5	25	18.5	1	6
BNM-300-SS	●	15	30	22.5	1	7
BNM-320-SS		16	32	23.5	1	7

Cat. No.	PVD coated DH102 (Z01)	Dimensions (mm)				
		R	A	B	C	T
BNM-060-TG	●	3	6	5	–	2
BNM-080-TG	●	4	8	7	0.5	2.4
BNM-100-TG	●	5	10	8.5	1	2.6
BNM-120-TG	●	6	12	10	1.5	3
BNM-160-TG	●	8	16	12	1.5	4
BNM-200-TG	●	10	20	15	2	5
BNM-250-TG	●	12.5	25	18.5	2	6
BNM-300-TG	●	15	30	22.5	2	7
BNM-320-TG	●	16	32	23.5	2	7

2 inserts per case.

Note) 1. "Mirror S, Mirror TG" inserts are exclusive use of MIRROR BALL.
Please use only in MIRROR BALL body and modular head.
2. BNM-060-SS and BNM-060-TG don't have straight cutting edge.

Please refer page C176 for "Instructions for mounting insert"

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

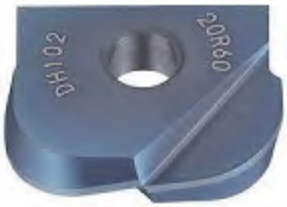
Mirror Ball GRMTYPE

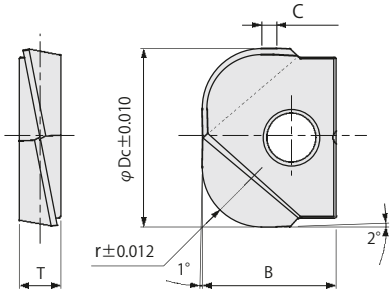
Mirror Series „MIRROR BALL“ Indexable Ball Nose End Mills

■ „GRM type“ radius Inserts for MIRROR BALL

NEW GRM

- Reduced the hand finishing and try out times by improved surface quality.
- Body durability is higher than ball nose end mill with same radius, therefore prevents chattering problem, and larger pick feed improved machining efficiency.
- Possible to high precision & high efficient machining even in case of low speed machine.
- Adopted new PVD coated grade “DH102” suitable for high hardened material, and PVD coated grade “JC8015” for general steel.





Corner radius accuracy of inserts: below ±0.012mm

Cat. No.	PVD coated		Dimensions (mm)				
	JC8015 (Z10~20)	NEW DH102 (Z01)	φDc	r	B	C	T
GRM-160-R50	●	●	16	5	12	1.1	4
GRM-200-R60	●	●	20	6	15	1.7	5
GRM-250-R80	●	●	25	8	18.5	2	6
GRM-300-R100	●	●	30	10	22.5	2.5	7

2 inserts per case.

Note) 1. GRM type insert is exclusive use of MIRROR BALL.
Please use only MIRROR BALL carbide shank bodies (page C174-C175) or modular head MBN type (page B153).

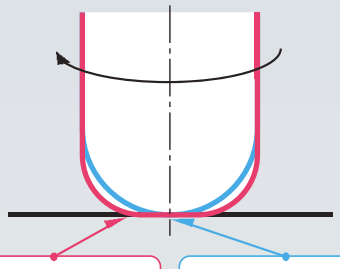
2. Please refer page C190-C191 for recommended cutting conditions.

Mirror Ball GRM TYPE

■ Application for choice of GRM type insert

For relatively flat surface

● Surface roughness



◎ GRM

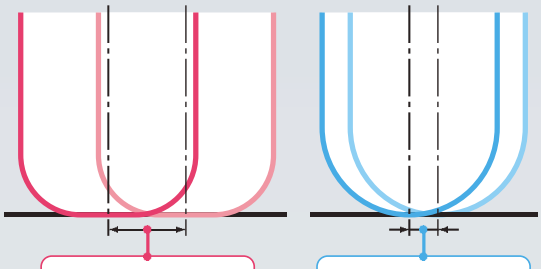
Cutting by periphery edge, therefore able to keep nominal cutting speed.

Ball nose end mill

Cutting speed at the center point becomes "0", therefore generate cutter mark easily.

Control cutter mark and achieved good surface roughness.

● Machining efficiency



◎ GRM

Large pick feed

Ball nose end mill

Small pick feed

Improved machining efficiency

◎ GRM **Possible to high precision & high efficient machining even in case of low speed machine.**

Attention for 3D profile milling

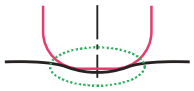
△ GRM

For wide concave surface

Good

For narrow concave surface

Remains stock removal.



Ball nose end mill

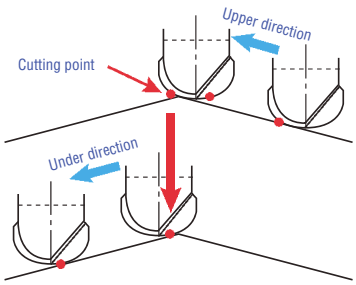
For wide concave surface

Good

For narrow concave surface

Good

Attention for ramping milling

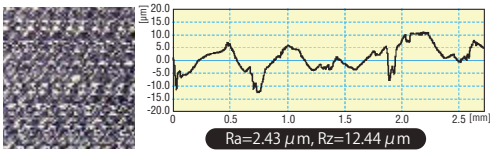


Note) Due to cutting point of insert changes at top of slope, the cutting marks sometimes changes with a program. But there are no problems with the forming accuracy.

Machined surface comparison (flat surface)

Material: FCD700 GGG70
Tool No.: MBN-300-M16+MSN-M16-77-S32C
Insert No.: GRM-300-R100 (φ30mm × R10)
n=8,000min^{-1}, f=4,800mm/min, fz=0.6mm/t,
a_p=0.1mm, a_e=0.6mm

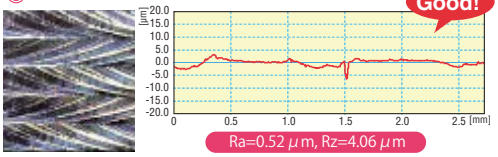
● Ball nose end mill



Ra=2.43 μm, Rz=12.44 μm

◎ GRM Radius end mill

Good!



Ra=0.52 μm, Rz=4.06 μm

Mirror Ball BNMTYPE

■ CONTROLLED TORQUE WRENCH (WITH REPLACEABLE BLADE)

● **Tightening a screw is controlled with proper torque wrench**

Wrenches are pre-set to protect screws and tools against damage during tightening and loosening processes. This wrench is recommended to use especially with Mirror ball.

● **Size: T6, T7, T8, T10**

● **Replaceable blades**

● Controlled torque wrench (with replaceable blade)

Cat. No.	Torx No.	Torque value	Applicable blades	Applicable holders
TQC-06	T6	0.5Nm	B-06	BNM◯-06…type RNM◯-06…type
TQC-07	T7	0.9Nm	B-07	BNM◯-08…type RNM◯-08…type
TQC-08	T8	1.2Nm	B-08	BNM◯-10…type RNM◯-10…type
TQC-10	T10	2.0Nm	B-10	BNM◯-12…type RNM◯-12…type

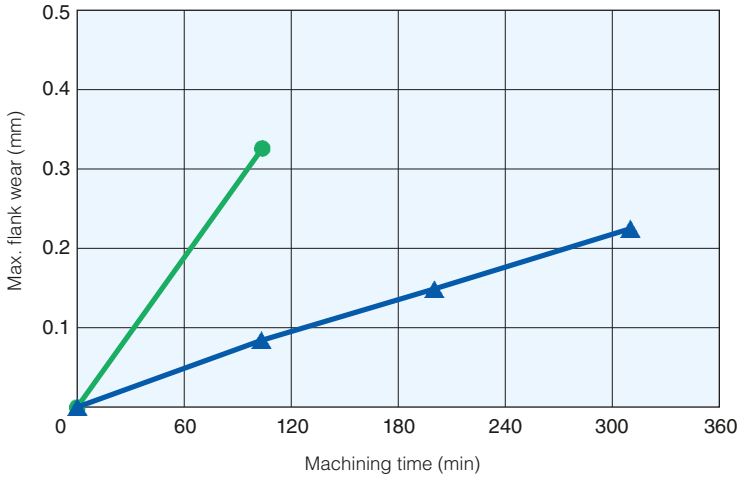
● Blades

Cat. No.	Torx No.	Applicable torque control wrench
B-06	T6	TQC-06
B-07	T7	TQC-07
B-08	T8	TQC-08
B-10	T10	TQC-10

Mirror Ball BNMTYPE

■ CUTTING PERFORMANCE

● Tool Life Comparison "Carbide Shank C Body vs Steel Shank"



Steel Shank
BNML-080075T-S12
Insert grade JC5015

Carbide Shank
BNML-080075T-S12C
Insert grade JC5015

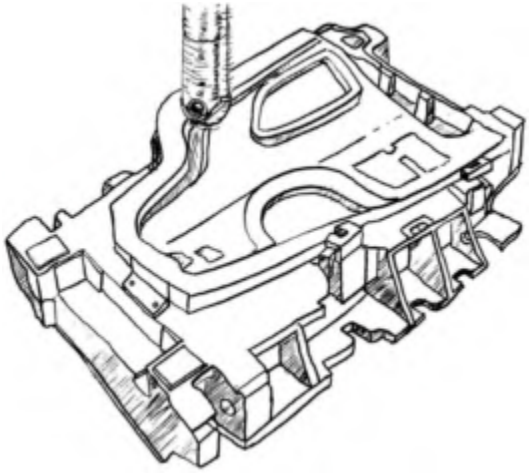
Material: SKD11

Spindle speed	: n=12,000min^{-1}
Cutting speed	: Vc=302m/min
Feed speed	: Vf=3,000mm/min
Feed per revolution	: f=0.25mm/rev
Depth of cut	: ap=0.4mm
Pick feed	: ae=0.3mm
Coolant	: Air Blow

● Tool Life Comparison MIRROR BALL Carbide Shank vs Competitior A's Carbide Shank.

■ Cutting condition

Work material:	Hardened die steel
Hardness:	60HRC
Part name:	Press die
Cutting speed:	Vc=402m/min
Spindle speed:	n=8,000min^{-1}
Feed speed:	Vf=4,000mm/min
Feed per revolution:	f=0.5mm/rev
Depth of cut:	ap=0.2mm
Pick feed:	ae=0.3mm
Coolant:	Dry
Spindle:	HSK50E



■ Test results

Tool name	Machining time	Wear of rake face	Wear of flank face
DIJET MIRROR BALL Carbide Shank φ16	**9 hours**	**Normal wear**	**Normal wear**
Competitor A (Carbide shank)	6~7 hours	Worn out	Worn out

- **DIJET MIRROR BALL Carbide Shank (C-Body) completed the job and the condition of insert was still good after 9 hours.**
- **Competitor A's insert worn out in 4 hours only and could not maintain 0.05 targeting tolerance after 6-7 hours.**

Mirror Ball BNMTYPE

■ CASE STUDIES

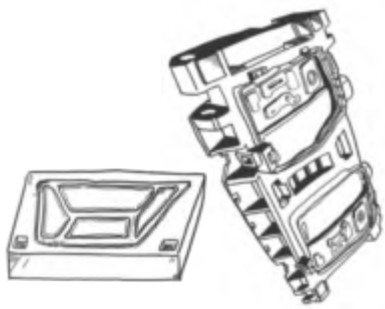
1. Replacement of solid carbide ball nose end mill with Mirror ball.

Overhung length: 40mm

Work	Part name	Turbine blade
	Material	Stainless steel (SUS420)
	Hardness	—
Tool	Tool No.	BNMM-080035S-S08C
	Grade	BNM-080 (JC5015)
Cutting conditions	Vc, (n)	n=2,000min^{-1}, Vc=50m/min
	Vf, (f)	Vf=800mm/min, f=0.4mm/rev
	ap (mm)	0.15mm
	ae (mm)	0.15mm
	Coolant	Oil coolant
	Machine	Vertical MC

Result: Mirror ball achieved very good finishing. No chatter marks was observed on blade surface compared with the competitor's solid carbide ball nose end mill.

2. Replacement of steel shank body with carbide shank body.



Work	Part name	Stamping die
	Material	GM241 (Cast steel)
	Hardness	250-300 HB
Tool	Tool No.	BNML-300170S-S32C (C Body)
	Grade	BNM-300, JC5015
Cutting conditions	Vc, (n)	6,000min^{-1}, 565m/min
	Vf, (f)	5,000mm/min, 0.83mm/rev
	ap (mm)	0.1mm
	ae (mm)	0.7mm
	Coolant	Dry
	Machine	Double column MC

Result: Achieved long tool life 5,080m and improved surface roughness compared with exisiting steel shank. Reduced the hand finishing process by 10 hours.

3. Replacement of solid carbide ball nose end mill.

Semi-Finishing・Finishing by Carbide Shank

Tool life: 2 hours

Work	Part name	Rubber mold
	Material	SUS630
	Hardness	35HRC
Tool	Tool No.	BNMM-060035S-S06C (C Body)
	Grade	BNM-060, JC5015
Cutting conditions	Vc, (n)	14,400min^{-1}, 271m/min
	Vf, (f)	2,880mm/min, 0.2mm/rev
	ap (mm)	Semi-fnishing 0.1mm, Finishing 0.05mm
	ae (mm)	0.1mm
	Coolant	Mist coolant
	Machine	High speed vertical MC

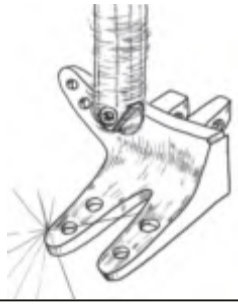
Result: Exisiting solid carbide ball nose end mill n=9,000min^{-1}, Vf=2,800mm/min Improved machining time by 20%. Next polishing process is drastically reduced.

Mirror Ball BNMTYPE

■ CASE STUDIES

4. High speed & high precision machining (Aircraft parts)

Required surface roughness Rz: 6.3μm



Result	No chatter and very smooth cutting. Improved surface quality compared with solid ball nose end mill. Achieved the reduction in machining time.

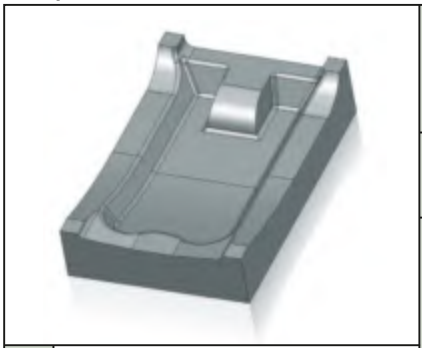
Work	Part name	Vertical tail parts
	Material	SCM440
	Hardness	40HRC
Tool	Tool No.	BNML-120095S-S12C (C Body)
	Grade	BNM-120, JC5015
Cutting conditions	Vc, (n)	10,000min^{-1}, 377m/min
	Vf, (f)	800mm/min, 0.08mm/rev
	ap (mm)	0.2mm
	ae (mm)	0.1mm
	Coolant	Water soluble
	Machine	Vertical MC

Mirror Ball

Mirror S BNMTYPE

■ CASE STUDIES "MIRROR S"

1. Replacement of solid carbide ball nose end mill with Mirror ball.

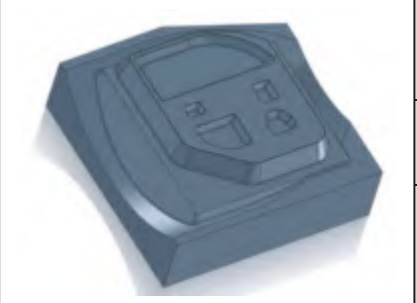


Work	Part name	Upper die
	Material	Die steel
	Hardness	32-35HRC
Tool	Tool No.	BNMM-250090S-S25C
	Grade	BNM-250-S (JC8008)
Cutting conditions	Vc, (n)	n=3,000min^{-1}, Vc=235m/min
	Vf, (f)	Vf=2,500mm/min, f=0.83mm/rev
	ap (mm)	0.3mm
	ae (mm)	0.25mm
	Coolant	Dry
	Machine	Vertical MC

Result: After machining 18 hours, BNM-S insert showed just normal wear. Work surface was also good compared with competitor's tool.

2. Finishing by Mirror ball.

Overhung length 150mm~160mm

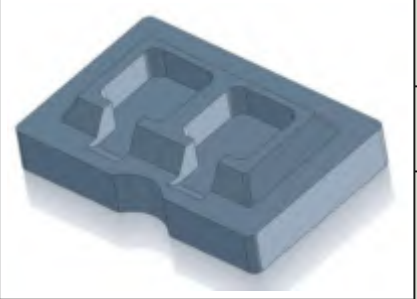


Work	Part name	—
	Material	ZAS
	Hardness	—
Tool	Tool No.	BNML-300160T-S32
	Grade	BNM-300-S (FZ05)
Cutting conditions	Vc, (n)	n=2,200min^{-1}, Vc=207m/min
	Vf, (f)	Vf=2,000mm/min, f=0.9mm/rev
	ap (mm)	0.6mm
	ae (mm)	0.6mm
	Coolant	Air blow
	Machine	Vertical MC

Result: Smoother cutting and 2 times longer tool life than competitor A.

3. Replacement of solid carbide ball nose end mill with Mirror ball.

Overhung length: 30 mm with shrink fit holder



Work	Part name	Insert core
	Material	Die steel (DH21: heat-treated)
	Hardness	48HRC
Tool	Tool No.	BNMS-100030S-S10C
	Grade	BNM-100-S (JC8008)
Cutting conditions	Vc, (n)	n=10,000min^{-1}, Vc=314m/min
	Vf, (f)	Vf=3,000mm/min, f=0.3mm/rev
	ap (mm)	0.1mm
	ae (mm)	0.1mm
	Coolant	Air blow
	Machine	Vertical MC

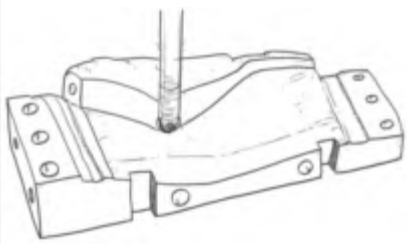
Result: Machining with Mirror ball could give more tool life than the competitor's solid carbide ball nose end mill.

Mirror Ball

Mirror S BNMTYPE

■ CASE STUDIES "MIRROR S"

4. Super finishing by MIRROR S insert.



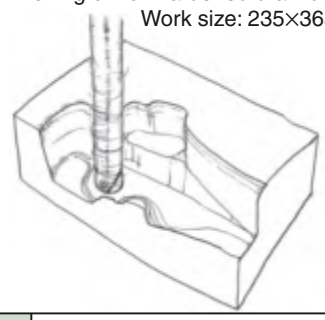
Work	Part name	Bumper mold
	Material	S55C
	Hardness	—
Tool	Tool No.	BNML-200105S-S20C
	Grade	BNM-200-S, JC8008
Cutting conditions	Vc, (n)	8,000min^{-1}, 503m/min
	Vf, (f)	4,000mm/min, 0.5mm/rev
	ap (mm)	0.05mm
	ae (mm)	0.4mm
	Coolant	Mist coolant
	Machine	Vertical MC

Result

Achieved excellent surface roughness, observed VBmax= below 0.025mm even after 5.7 hours machining. Insert was still in good condition.

5. Finishing on high hardened die steel

Finishing on full hardened draw die
Work size: 235×365



Work	Part name	Stamping die
	Material	SKD11
	Hardness	58~62HRC
Tool	Tool No.	BNML-160090S-S16C
	Grade	BNM-160-S, JC8008
Cutting conditions	Vc, (n)	5,000min^{-1}, 250m/min
	Vf, (fz)	2,300mm/min, 0.46mm/rev
	ap (mm)	0.2mm
	ae (mm)	0.3mm
	Coolant	Dry cut
	Machine	Vertical MC

Result

No chatter and very smooth cutting. Mirror S could finish entire job for 5.5h. Flatness was within 0.05mm.

Mirror Ball BNMTYPE

■ GENERAL RECOMMENDED CUTTING CONDITIONS

● Calculation of cutting conditions

1. Spindle speed

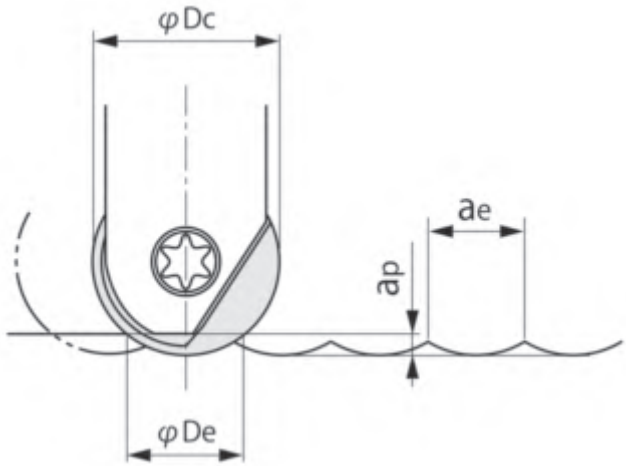
$$n = \frac{Vc \times 1000}{\pi \times De} \quad (min^{-1})$$

$$De = 2 \times \sqrt{ap \times (Dc - ap)} \quad (mm)$$

2. Feed speed

$$Vf = n \times f \quad (mm/min)$$

$$f = h\ max. \times \frac{Dc}{\sqrt{ap \times (Dc - ap)}} \quad (mm/rev)$$



n = Spindle speed (min^{-1})
Vc = Cutting speed (m/min), refer Table 1.
De = Effective tool diameter (mm), refer Table 2.
ap = Axial depth of cut (mm)
ae = Pick feed, radial depth of cut (mm)
Vf = Feed speed (mm/min)
f = feed per revolution (mm/rev), refer Table 1.
h max. = Max. chip thickness (mm), refer Table 3.

Table 1. Nominal cutting speed and feed values

Work Materials	Hardness	Insert Grades			Cutting speed Vc (m/min)	Nominal feed rate: f (mm/rev) Tool dia. Dc (mm)									Max depth of cut ap (mm)	Max pick feed ae (mm)
		JC8003 DH103	JC10000	KT9		6	8	10	12	16	20	25	30	32		
Grey cast iron (FC250, FC300)	160~260HB	◎			200~400	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	Dc/10	Dc/10
Nodular cast iron (FCD600, FCD700)	170~300HB	◎			150~350	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	Dc/15	Dc/15
Carbon steel (S50C, S55C)	180~280HB	○			180~230	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	Dc/15	Dc/15
Low alloy steel (SCM440)	180~280HB	○			150~200	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	Dc/15	Dc/15
Mold steel (HPM, NAK)	280~400HB	◎			110~170	0.15	0.25	0.3	0.4	0.4	0.4	0.5	0.5	0.5	Dc/20	Dc/20
Tool & Die steel (SKD61, SKD11)	180~255HB	○			130~180	0.15	0.25	0.3	0.4	0.5	0.5	0.6	0.6	0.6	Dc/20	Dc/20
Hardened steel (SKD61, SKD11)	40~55HRC	◎			70~ 90	0.15	0.25	0.3	0.4	0.5	0.5	0.6	0.6	0.6	Dc/30	Dc/30
Stainless steel (SUS304, SUS316)	150~250HB	○			90~130	0.15	0.25	0.3	0.4	0.4	0.4	0.5	0.5	0.5	Dc/20	Dc/20
Copper alloy	80~150HB			◎	150~200	0.25	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.8	Dc/10	Dc/10
Aluminium alloy	30~100HB			◎	200~300	0.25	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.8	Dc/6	Dc/6
Graphite			◎		200~400	0.3	0.5	0.6	0.7	0.8	0.8	0.9	0.9	0.9	Dc/5	Dc/5

Note) 1. Data is applicable to short series tools and over φ12mm middle series tools.
2. Refer table 4 for additional data in case of using long series tools and up to φ12mm middle series tools.

◎:First choice
○:Second choice

Mirror Ball BNMTYPE

Table 2. Effective tool diameter chart

Tool dia. φDc (mm)	Effective tool diameter: De (mm)													
	Axial depth of cut: ap (mm)													
	0.2	0.3	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
6	2.2	2.6	3.3	4.5										
8	2.5	3	3.9	5.3	6.2									
10	2.8	3.4	4.4	6	7.1	8								
12	3.1	3.7	4.8	6.6	7.9	8.9	9.7							
16	3.6	4.3	5.6	7.7	9.3	10.6	11.6	12.5						
20	4	4.9	6.2	8.7	10.5	12	13.2	14.3	15.2	16				
25	4.5	5.4	7	9.8	11.9	13.6	15	16.2	17.3	18.3	19.2	20		
30	4.9	6	7.7	10.8	13.1	15	16.6	18	19.3	20.4	21.4	22.4	23.2	24
32	5	6.2	7.9	11.1	13.5	15.5	17.2	18.7	20	21.2	22.2	23.2	24.1	25

Table 3. Maximum chip thickness chart

Work Materials	Hardness	Max. chip thickness: h max (mm)								
		Tool dia.: Dc (mm)								
		6	8	10	12	16	20	25	30	32
Grey cast iron (FC250, FC300)	160~260HB	0.07	0.09	0.12	0.15	0.18	0.18	0.21	0.21	0.21
Nodular cast iron (FCD600, FCD700)	170~300HB	0.05	0.07	0.10	0.12	0.15	0.15	0.17	0.17	0.17
Carbon steel (S50C, S55C)	180~280HB	0.05	0.07	0.10	0.10	0.12	0.12	0.15	0.15	0.15
Low alloy steel (SCM440)	180~280HB	0.05	0.07	0.10	0.10	0.12	0.12	0.15	0.15	0.15
Mold steel (HPM, NAK)	280~400HB	0.03	0.05	0.065	0.09	0.09	0.09	0.11	0.11	0.11
Tool & Die steel (SKD61, SKD11)	180~255HB	0.03	0.05	0.065	0.09	0.11	0.11	0.13	0.13	0.13
Hardened die steel (SKD61, SKD11)	40~55HRC	0.02	0.04	0.05	0.07	0.09	0.09	0.11	0.11	0.11
Stainless steel (SUS304, SUS316)	150~250HB	0.03	0.05	0.065	0.09	0.09	0.09	0.11	0.11	0.11
Copper alloy	80~150HB	0.10	0.12	0.15	0.18	0.21	0.21	0.24	0.24	0.24
Aluminium alloy	30~100HB	0.12	0.15	0.18	0.22	0.26	0.26	0.30	0.30	0.30
Graphite		0.15	0.20	0.24	0.28	0.32	0.32	0.36	0.36	0.36

Table 4. Reduction ratio of recommended cutting conditions

Tool dia. φDc (mm)	Short series				Middle series				Long series			
	ℓ2	ℓ2/Dc	min^{-1} %	Feed %	ℓ2	ℓ2/Dc	min^{-1} %	Feed %	ℓ2	ℓ2/Dc	min^{-1} %	Feed %
6	30	5.0	100	100	35	5.8	100	100	70	11.7	45	45
8	35	4.4	100	100	53	6.6	60	65	75	9.4	50	50
10	35	3.5	100	100	53	5.3	70	80	75	7.5	60	65
12	26	2.2	100	100	53	4.4	90	90	85	7.1	65	65
16	32	2.0	100	100	63	3.9	100	100	100	6.3	70	70
20	38	1.9	100	100	75	3.8	100	100	115	5.8	75	75
25	45	1.8	100	100	90	3.6	100	100	135	5.4	80	80
30	53	1.8	100	100	106	3.5	100	100	160	5.3	80	90
32	53	1.7	100	100	106	3.3	100	100	160	5.0	80	90

Note) In case of using long series tools, recommend to reduce cutting conditions as per the above percentages.

Mirror Ball BNMTYPE

■ RECOMMENDED CUTTING CONDITIONS/HIGH SPEED MACHINING

● BNM type insert + Carbide shank holder (C-Body)

Work Materials	Hardness	Insert Grades	Cutting speed Vc (m/min)	Nominal feed rate f (mm/rev) Tool dia. Dc (mm) 6	8	10	12	16	20	25	30	32	Max depth of cut ap (mm)	Max depth of cut ap (mm)
Grey cast iron (FC250, FC300)	160~260HB	DH103	400~500	0.4	0.5	0.5	0.6	0.8	0.8	1.0	1.0	1.0	0.1~0.3	Dc/40
Nodular cast iron (FCD600, FCD700)	170~300HB	DH103	300~400	0.3	0.4	0.4	0.5	0.6	0.6	0.8	0.8	0.8	0.1~0.3	Dc/40
Carbon steel (S50C, S55C)	180~280HB	DH103	300~400	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.1~0.3	Dc/50
Low alloy steel (SCM440)	180~280HB	DH103	300~400	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.1~0.3	Dc/50
Mold steel (HPM, NAK)	280~400HB	DH103	300~350	0.25	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.1~0.2	Dc/50
Tool & Die steel (SKD61, SKD11)	180~255HB	DH103	300~350	0.25	0.3	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.1~0.2	Dc/50
Hardened die steel (SKD61, SKD11)	40~55HRC	DH103	250~350	0.25	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.1~0.2	Dc/50
Hardened die steel (SKD61, SKD11)	55HRC~	DH103	150~250	0.2	0.25	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.1~0.2	Dc/50
Stainless steel (SUS304, SUS316)	150~250HB	DH103	200~300	0.25	0.35	0.45	0.6	0.65	0.7	0.8	0.8	0.8	0.1~0.2	Dc/50
Copper alloy	80~150HB	KT9	300~400	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.1~0.5	Dc/40
Aluminium alloy	30~100HB	KT9	400~500	0.35	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.1~0.5	Dc/40
Graphite		JC10000	600~800	0.4	0.6	0.6	0.7	0.8	0.8	0.9	0.9	0.9	0.1~0.5	Dc/40

Note) This data is applicable to short series tools and middle series tools.

Mirror Ball BNMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● BNM-SS, BNM-TG type insert Carbide shank holder (C-Body)

Work Materials	Insert Grades	Cutting speed Vc (m/min)	Nominal feed rate f (mm/rev) Tool dia. Dc (mm) 6	8	10	12	16	20	25	30	32	Max depth of cut ap (mm)	Max pick feed ae (mm)
Greycastiron (FC250, FC300) 160~260HB	DH102 DH108	400~500	0.2~0.35	0.25~0.4	0.3~0.5	0.4~0.6	0.5~0.7	0.6~0.8	0.6~0.8	0.8~1.0	0.8~1.0	0.02Dc	0.025Dc
Nodular cast iron (FCD600, FCD700) 170~300HB	DH102 DH108	300~400	0.2~0.3	0.25~0.35	0.3~0.4	0.4~0.5	0.5~0.6	0.5~0.7	0.5~0.7	0.6~0.8	0.6~0.8	0.02Dc	0.025Dc
Carbon steel (S50C, S55C) 180~280HB	DH108	300~400	0.2~0.3	0.25~0.35	0.3~0.4	0.3~0.5	0.4~0.6	0.4~0.6	0.4~0.7	0.5~0.8	0.5~0.8	0.02Dc	0.02Dc
Low alloy steel (SCM440) 180~280HB	DH108	300~400	0.2~0.3	0.25~0.35	0.3~0.4	0.3~0.5	0.4~0.6	0.4~0.6	0.4~0.7	0.5~0.8	0.5~0.8	0.02Dc	0.02Dc
Mold steel (HPM, NAK) 280~400HB	DH108	300~400	0.2~0.3	0.25~0.35	0.3~0.4	0.3~0.5	0.4~0.6	0.4~0.6	0.4~0.7	0.5~0.8	0.5~0.8	0.02Dc	0.02Dc
Tool & Die steel (SKD61, SKD11) 180~255HB	DH108	300~400	0.2~0.3	0.25~0.35	0.3~0.4	0.3~0.5	0.4~0.6	0.4~0.6	0.4~0.7	0.5~0.8	0.5~0.8	0.02Dc	0.02Dc
Hardened die steel (SKD61, SKD11) 40~55HRC	DH102 DH108	200~300	0.15~0.25	0.2~0.3	0.25~0.3	0.3~0.4	0.4~0.5	0.4~0.5	0.4~0.6	0.4~0.7	0.4~0.7	0.015Dc	0.02Dc
Hardened die steel (SKD61, SKD11) 56~63HRC	DH102 DH108	150~250	0.15~0.25	0.2~0.3	0.25~0.3	0.3~0.4	0.4~0.5	0.4~0.5	0.4~0.6	0.4~0.7	0.4~0.7	0.01Dc	0.02Dc
Stainless steel (SUS304, SUS316) 150~250HB	DH108	250~350	0.2~0.3	0.25~0.35	0.3~0.4	0.3~0.5	0.4~0.6	0.4~0.6	0.4~0.7	0.5~0.8	0.5~0.8	0.02Dc	0.02Dc
Copper alloy 80~150HB	JC20003 FZ05	300~400	0.2~0.35	0.25~0.4	0.3~0.5	0.4~0.6	0.5~0.7	0.6~0.8	0.6~0.8	0.8~1.0	0.8~1.0	0.02Dc	0.025Dc
Aluminium alloy 30~100HB		400~500	0.2~0.35	0.25~0.4	0.3~0.5	0.4~0.6	0.5~0.7	0.6~0.8	0.6~0.8	0.8~1.0	0.8~1.0	0.03Dc	0.03Dc
Graphite	JC20003	600~800	0.2~0.35	0.25~0.4	0.3~0.5	0.4~0.6	0.5~0.7	0.6~0.8	0.6~0.8	0.8~1.0	0.8~1.0	0.03Dc	0.03Dc

Note) This data is applicable to short series tools and middle series tools.

Mirror Ball GRM TYPE

■ H.S.C. RECOMMENDED CUTTING CONDITIONS

● BNM-C (carbide shank) with GRM insert

Work Materials	Grades	Cutting speed Vc (m/min)	Tool dia. (mm) φ16 x R5 n (min⁻¹)	φ16 x R5 Vf (mm/min)	φ20 x R6 n (min⁻¹)	φ20 x R6 Vf (mm/min)	Depth of cut ap (mm)	Profile milling Max. Pick ae (mm)	Face milling Pick ae (mm)
Grey cast iron (160-260HB)	DH102	750	15,000	10,000	12,000	9,000	0.05–0.15	0.02D	~0.20D
Nodular cast iron (170-300HB)	DH102 (JC8015)	600	12,000	7,000	9,600	6,700	0.05–0.15	0.02D	~0.20D
Carbon steel (180-280HB)	DH102 (JC8015)	600	12,000	7,000	9,600	6,700	0.05–0.15	0.02D	~0.15D
Low alloy steel (180-280HB)	DH102 (JC8015)	600	12,000	7,000	9,600	6,700	0.05–0.15	0.02D	~0.15D
Tool & die steel (180-255HB)	DH102 (JC8015)	600	12,000	7,000	9,600	6,700	0.05–0.15	0.02D	~0.15D
Mold steel (30-36HRC)	DH102 (JC8015)	550	11,000	5,500	8,800	4,400	0.05–0.15	0.015D	~0.15D
Mold steel (38-43HRC)	DH102	500	10,000	5,000	8,000	4,000	0.05–0.15	0.015D	~0.15D
Hardened die steel (40-55HRC)	DH102	450	9,000	4,500	7,200	3,600	0.05–0.15	0.015D	~0.10D
Hardened die steel (56-63HRC)	DH102	300	6,000	3,000	4,800	2,400	0.05–0.1	0.015D	~0.10D
Stainless steel (150-250HB)	DH102 (JC8015)	400	8,000	4,800	6,400	3,800	0.05–0.15	0.02D	~0.15D

Work Materials	Grades	Cutting speed Vc (m/min)	Tool dia. (mm) φ25 x R8 n (min⁻¹)	φ25 x R8 Vf (mm/min)	φ30 x R10 n (min⁻¹)	φ30 x R10 Vf (mm/min)	Depth of cut ap (mm)	Profile milling Max. Pick ae (mm)	Face milling Pick ae (mm)
Grey cast iron (160-260HB)	DH102	750	9,600	8,000	8,000	8,000	0.05–0.15	0.02D	~0.20D
Nodular cast iron (170-300HB)	DH102 (JC8015)	600	7,700	6,000	6,500	6,000	0.05–0.15	0.02D	~0.20D
Carbon steel (180-280HB)	DH102 (JC8015)	600	7,700	6,000	6,500	6,000	0.05–0.15	0.02D	~0.15D
Low alloy steel (180-280HB)	DH102 (JC8015)	600	7,700	6,000	6,500	6,000	0.05–0.15	0.02D	~0.15D
Tool & die steel (180-255HB)	DH102 (JC8015)	600	7,700	6,000	6,500	6,000	0.05–0.15	0.02D	~0.15D
Mold steel (30-36HRC)	DH102 (JC8015)	550	7,000	4,200	5,800	4,000	0.05–0.15	0.015D	~0.15D
Mold steel (38-43HRC)	DH102	500	6,400	3,800	5,300	3,700	0.05–0.15	0.015D	~0.15D
Hardened die steel (40-55HRC)	DH102	450	5,750	3,450	4,800	3,360	0.05–0.15	0.015D	~0.10D
Hardened die steel (56-63HRC)	DH102	300	3,850	2,300	3,200	2,200	0.05–0.1	0.015D	~0.10D
Stainless steel (150-250HB)	DH102 (JC8015)	400	5,100	3,600	4,200	3,300	0.05–0.15	0.02D	~0.15D

n: Spindle speed, Vf: Feed speed

Note) When machining both profile and flat surface simultaneously, use the profile milling conditions.

★ Attention to mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Do not tightened the clamp screw too hard.
   Recommend to use Torque control wrenches. (page C180)
   See the right table for recommended tightening torque.
   (See table)

Dimensions (mm) φDc	Recommended torque (N·m)
10	1.2
12	2.0
16	3.0
20	4.0
25	5.0
30	6.0
32	6.0

Mirror Ball GRM TYPE

■ RECOMMENDED CUTTING CONDITIONS

● BNM-C (carbide shank) with GRM insert

Work Materials	Grades	Cutting speed Vc (m/min)	Tool dia. (mm) φ16 x R5 n (min⁻¹)	φ16 x R5 Vf (mm/min)	φ20 x R6 n (min⁻¹)	φ20 x R6 Vf (mm/min)	Depth of cut ap (mm)	Profile milling Max. Pick ae (mm)	Face milling Pick ae (mm)
Grey cast iron (160-260HB)	DH102 (JC8015)	450	9,000	4,500	7,200	4,300	0.1–0.3	0.02D	~0.25D
Nodular cast iron (170-300HB)	DH102 (JC8015)	350	7,000	3,500	5,600	3,000	0.1–0.2	0.02D	~0.25D
Carbon steel (180-280HB)	JC8015	350	7,000	3,500	5,600	3,000	0.1–0.2	0.02D	~0.20D
Low alloy steel (180-280HB)	JC8015	350	7,000	3,500	5,600	3,000	0.1–0.2	0.02D	~0.20D
Tool & die steel (180-255HB)	JC8015	350	7,000	3,500	5,600	3,000	0.1–0.2	0.02D	~0.20D
Mold steel (30-36HRC)	DH102 (JC8015)	300	6,000	2,400	4,800	2,200	0.1–0.2	0.015D	~0.20D
Mold steel (38-43HRC)	DH102 (JC8015)	280	5,600	2,200	4,500	2,000	0.1–0.2	0.015D	~0.20D
Hardened die steel (40-55HRC)	DH102	250	5,000	2,000	4,000	1,800	0.05–0.15	0.015D	~0.15D
Hardened die steel (56-63HRC)	DH102	200	4,000	1,400	3,200	1,300	0.05–0.1	0.015D	~0.15D
Stainless steel (150-250HB)	JC8015	300	6,000	3,000	4,800	2,400	0.1–0.2	0.02D	~0.20D

Work Materials	Grades	Cutting speed Vc (m/min)	Tool dia. (mm) φ25 x R5 n (min⁻¹)	φ25 x R5 Vf (mm/min)	φ30 x R10 n (min⁻¹)	φ30 x R10 Vf (mm/min)	Depth of cut ap (mm)	Profile milling Max. Pick ae (mm)	Face milling Pick ae (mm)
Grey cast iron (160-260HB)	DH102 (JC8015)	450	6,000	4,000	5,000	4,000	0.1–0.3	0.02D	~0.25D
Nodular cast iron (170-300HB)	DH102 (JC8015)	350	4,500	2,700	4,000	2,800	0.1–0.2	0.02D	~0.25D
Carbon steel (180-280HB)	JC8015	350	4,500	2,700	4,000	2,800	0.1–0.2	0.02D	~0.20D
Low alloy steel (180-280HB)	JC8015	350	4,500	2,700	4,000	2,800	0.1–0.2	0.02D	~0.20D
Tool & die steel (180-255HB)	JC8015	350	4,500	2,700	4,000	2,800	0.1–0.2	0.02D	~0.20D
Mold steel (30-36HRC)	DH102 (JC8015)	300	3,800	1,900	3,200	1,800	0.1–0.2	0.015D	~0.20D
Mold steel (38-43HRC)	DH102 (JC8015)	280	3,600	1,800	3,000	1,700	0.1–0.2	0.015D	~0.20D
Hardened die steel (40-55HRC)	DH102	250	3,200	1,600	2,700	1,400	0.05–0.15	0.015D	~0.15D
Hardened die steel (56-63HRC)	DH102	200	2,600	1,300	2,000	1,000	0.05–0.1	0.015D	~0.15D
Stainless steel (150-250HB)	JC8015	300	3,850	2,100	3,200	2,000	0.1–0.2	0.02D	~0.20D

n: Spindle speed, Vf: Feed speed

Note) When machining both profile and flat surface simultaneously, use the profile milling conditions.

★ Attention to mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Do not tightened the clamp screw too hard.
   Recommend to use Torque control wrenches. (page C180)
   See the right table for recommended tightening torque.
   (See table)

Dimensions (mm) φDc	Recommended torque (N·m)
10	1.2
12	2.0
16	3.0
20	4.0
25	5.0
30	6.0
32	6.0

Mirror Radius

RNM TYPE

1. High precision indexable end mill with two effective cutting edges.
   Corner radius accuracy: within 0.010mm
   (In case of mounting RNM type insert)
2. High precision and high rigid clamping system, as same eccentric mechanism of MIRROR BALL.
   This is very well proven mechanism in industry.
3. Excellent bottom edge run-out. Establishment of high precision below 5μm which no one can duplicate. (In case of mounting RNM type insert)
4. Realization of high precision machining. Superior surface quality and minimum deflection are better than those of competitors.
5. Insert locates accurately in any of the two radial positions.
   It is entered into the body. Unlike some competitor's products.

Fig.1 (Taper Neck)

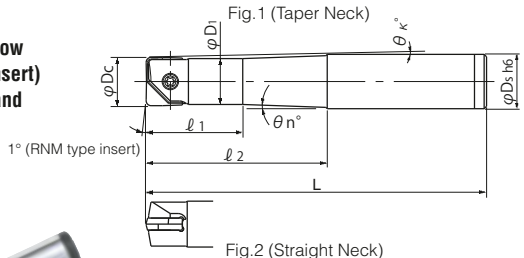
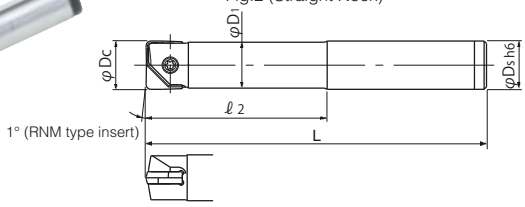
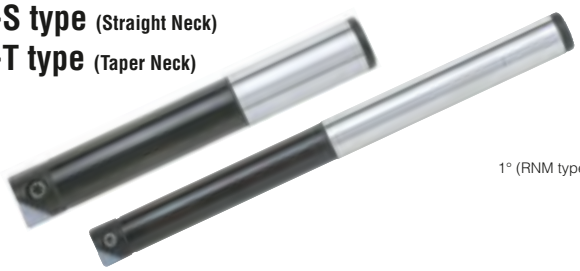


Fig.2 (Straight Neck)



RNM-S type (Straight Neck)
RNM-T type (Taper Neck)



■ BODY

Cat. No.	Stock	Dimensions (mm) φDc	L	ℓ1	ℓ2	φD1	φDs	θκ°	θn° Taper angle	Parts: Inserts	Clamp screw	Wrench	Fig.
RNMM-080053T-S12	□	8	110	18.5	53	7.2	12	2°10′	2°30′	RNM-080...	FSW-2506H	A-07	1
RNML-080075T-S12	□		140	18.5	75			1°32′	2°				
RNMM-100053T-S12	□	10	110	21	53	9	12	1°5′	2°	RNM-100...	FSW-3007H	A-08	1
RNML-100075T-S12	□		140	21	75			0°46′	1°				
RNMM-120053S-S12	□	12	110	–	53	11	12	–	–	RNM-120... RNM-130...	FSW-3509H	A-10	2
RNML-120095T-S16	□		160	22	95		16	1°12′	1°15′				1
RNMM-160070S-S16	□	16	140	–	70	15	16	–	–	RNM-160... RNM-170...	FSW-4013H	A-15	2
RNMM-160090S-S16	□		160	–	90			–	–				
RNML-160100S-S16	□		200	–	100			–	–				
RNMM-200075S-S20	□	20	141	–	75	19	20	–	–	RNM-200... RNM-210...	FSW-5016H	A-20W	2
RNMM-200105S-S20	□		180	–	105			–	–				
RNML-200125S-S20	□		250	–	125			–	–				
RNMM-250090S-S25	□	25	166	–	90	24	25	–	–	RNM-250... RNM-260...	FSW-6020	A-30	2
RNMM-250140S-S25	□		220	–	140			–	–				
RNML-250150S-S25	□		300	–	150			–	–				
RNMM-300106S-S32	□	30	186	–	106	29	32	–	–	RNM-300...	FSW-8025	A-40	2
RNMM-300140S-S32	□		220	–	140			–	–				
RNMM-320106S-S32	□	32	186	–	106	31	32	–	–	RNM-320...	FSW-8025	A-40	2
RNMM-320140S-S32	□		220	–	140			–	–				

Note) 1. All cutters are supplied without inserts.
2. Please refer page C204 for recommended cutting conditions.

Modular Head Type Please refer Page B163

Clamp Screw	Recommended torque (N•m)	Clamp Screw	Recommended torque (N•m)
FSW-2005H	0.5	FSW-4013H	3.0
FSW-2506H	0.9	FSW-5016H	4.0
FSW-3007H	1.2	FSW-6020	5.0
FSW-3509H	2.0	FSW-8025	6.0

Mirror Radius

C Body carbide shank

RNMTYPE

1. By adopting carbide shank, tool rigidity is equal to solid carbide radius end mill.
2. Tool life increased to twice compared with MIRROR RADIUS steel shank.
3. Carbide shank can be used on shrink-fit type holders.
4. Insert locates accurately in any of the two radial positions. It is mounted into the cutter body.

RNM-S-C type (Straight Neck)
RNM-T-C type (Taper Neck)

Fig.1 (Taper Neck)

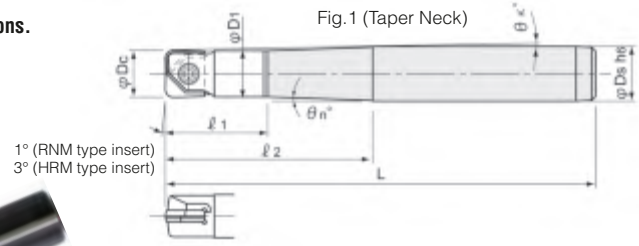
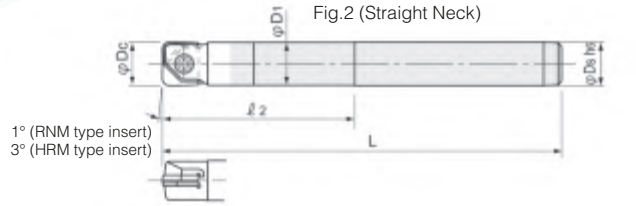


Fig.2 (Straight Neck)



■ BODY

Cat. No.	Stock	Dimensions (mm) φDc	L	ℓ1	ℓ2	φD1	φDs	θκ°	θn° Taper angle	Parts: Inserts	Clamp screw	Wrench	Fig.
RNMS-060015U-S06C	●	6	60	–	15	5.7	6	–	–	RNM-060... HRM-060...	FSW-2005H	A-06	2
RNMM-060030U-S06C	●		80	–	30								
RNMS-080020U-S08C	●	8	70	–	20	7.6	8	–	–	RNM-080... HRM-080/090... FRM-080...	FSW-2506H	A-07	2
RNMM-080040U-S08C	●		90	–	40		8	–	–				2
RNMM-080053T-S12C	●		110	20	53	7.8	12	2°12′	2°				1
RNML-080075S-S08C	●		140	–	75		8	–	–				2
RNMS-100025U-S10C	●	10	75	–	25	9.5	10	–	–	RNM-100... HRM-100/110... FRM-100...	FSW-3007H	A-08	2
RNMM-100050U-S10C	●		100	–	50			–	–				2
RNMM-100050S-S10C	●		110	–	50	9.8		–	–				2
RNMM-100053T-S12C	●		110	22.5	53		12	1°7′	1°				1
RNML-100075S-S10C	●		140	–	75		10	–	–				2
RNMS-120030U-S12C	●	12	80	–	30	11.5	12	–	–	RNM-120... RNM-130... HRM-120/130... FRM-120...	FSW-3509H	A-10	2
RNMM-120060U-S12C	●		110	–	60			–	–				2
RNMM-120053S-S12C	●		110	–	53	11.8		–	–				2
RNML-120095S-S12C	●		160	–	95			–	–				
RNMS-160035U-S16C	●	16	90	–	35	15.5	16	–	–	RNM-160... RNM-170... HRM-160/170... FRM-160... FRM-170...	FSW-4013H	A-15	2
RNMM-160070S-S16C	●		140	–	70	15.8		–	–				2
RNMM-160090S-S16C	●		160	–	90			–	–				
RNML-160120S-S16C	●		210	–	120			–	–				
RNML-160150S-S16C	●		220	–	150			–	–				

Note) 1. All cutters are supplied without inserts.
2. Please refer page C205-C213 or recommended cutting conditions.

Modular Head Type Please refer Page B163

Clamp Screw	Recommended torque (N•m)	Clamp Screw	Recommended torque (N•m)
FSW-2005H	0.5	FSW-4013H	3.0
FSW-2506H	0.9	FSW-5016H	4.0
FSW-3007H	1.2	FSW-6020	5.0
FSW-3509H	2.0	FSW-8025	6.0

Please refer page C194 for "Caution for the mounting onshrink-fit holder"

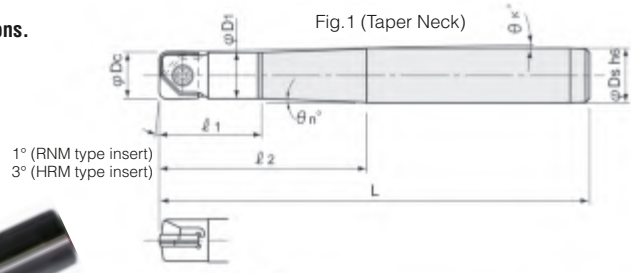
● : Standard stock items ☐ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted

Mirror Radius

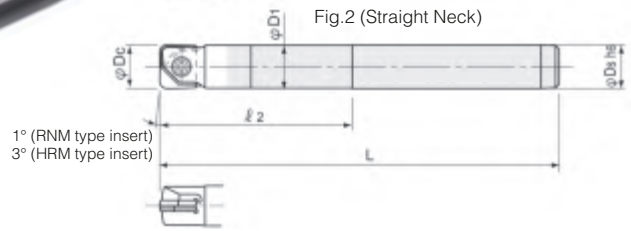
C Body carbide shank

RNM TYPE

1. By adopting carbide shank, tool rigidity is equal to solid carbide radius end mill.
2. Tool life increased to twice compared with MIRROR RADIUS steel shank.
3. Carbide shank can be used on shrink-fit type holders.
4. Insert locates accurately in any of the two radial positions. It is mounted into the cutter body.



RNM-S-Ctype (Straight Neck)
RNM-T-Ctype (Taper Neck)



■ BODY

Cat. No.	Stock	Dimensions (mm) φDc	L	ℓ1	ℓ2	φD1	φDs	θκ°	θn° Taper angle	Parts: Inserts	Clamp screw	Wrench	Fig.
RNMS-200040U-S20C	●		105	–	40	19.5		–	–	RNM-200... RNM-210... HRM-200/220... FRM-200/210...	FSW-5016H	A-20W	2
RNMM-200075S-S20C	●		141	–	75			–	–				
RNMM-200105S-S20C	●	20	180	–	105	19.8	20	–	–				2
RNML-200150S-S20C	●		220	–	150			–	–				
RNML-200170S-S20C	●		250	–	170			–	–				
RNMM-250090S-S25C	●		166	–	90			–	–	RNM-250... RNM-260... FRM-250...	FSW-6020	A-30	2
RNMM-250140S-S25C	●	25	220	–	140	24.8	25	–	–				
RNML-250190S-S25C	□		260	–	190			–	–				
RNMM-300106S-S32C	●	30	186	–	106	29.8	32	–	–	RNM-300... FRM-300...	FSW-8025	A-40	2
RNMM-320106S-S32C	●	32	186	–	106	31.8	32	–	–	RNM-320... FRM-320...	FSW-8025	A-40	2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C205-C213 for recommended cutting conditions.

Modular Head Type Please refer Page B163

Clamp Screw	Recommended torque (N•m)	Clamp Screw	Recommended torque (N•m)
FSW-2005H	0.5	FSW-4013H	3.0
FSW-2506H	0.9	FSW-5016H	4.0
FSW-3007H	1.2	FSW-6020	5.0
FSW-3509H	2.0	FSW-8025	6.0

★ Caution for the mounting on shrink-fit holder (In case of BNM-C Body, RNM-C Body)

When you use a carbide shank (C Body) on the shrink-fit holder, please shrink-fit only carbide shank without putting insert and clamp screw.

Please mount the insert and tighten the clamp screw after shrink-fit.

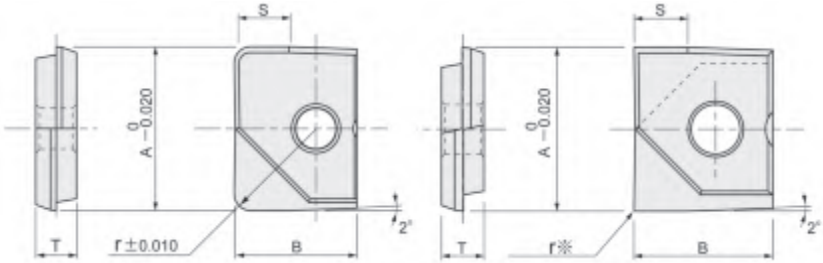
Note) If it shrink-fits with the insert and clamp screw, it will be difficult to loose the clamp screw.

Mirror Radius RNMTYPE

Radius form accuracy of insert: within ±0.010mm

■ INSERTS

● RNM-□□□-R0



Cat. No.	PVD coated		Diamond coated	Uncoated	Dimensions (mm)				
	JC8015 (Z10~20)	DH103 (Z05)	JC10000	KT9 (K10)	r	S	A	B	T
RNM-060-R03	●	●			0.3	2	6	5	2
RNM-060-R05	●	●			0.5				
RNM-060-R10	●	●			1				
RNM-080-R03	●	●		□	0.3	2.7	8	7	2.4
RNM-080-R05	●	●	●	●	0.5				
RNM-080-R10	●	●	□	●	1				
RNM-100-R0	●				※	3.3	10	8.5	2.6
RNM-100-R03	●	●		□	0.3				
RNM-100-R05	●	●	●	●	0.5				
RNM-100-R10	●	●	□	●	1				
RNM-100-R15	□			□	1.5				
RNM-100-R20	●	●		●	2				
RNM-120-R0	●				※	4	12	10	3
RNM-120-R03	●	●		□	0.3				
RNM-120-R05	●	●	□	●	0.5				
RNM-120-R10	●	●	□	●	1				
RNM-120-R15	●	●		●	1.5				
RNM-120-R20	●	●		●	2				
RNM-160-R0	●				※	5.3	16	12	4
RNM-160-R03	●	●		●	0.3				
RNM-160-R05	●	●		●	0.5				
RNM-160-R10	●	●		●	1				
RNM-160-R15	●	●		□	1.5				
RNM-160-R20	●	●		●	2				
RNM-200-R0	●				※	6.7	20	15	5
RNM-200-R03	●	●		●	0.3				
RNM-200-R05	●	●		●	0.5				
RNM-200-R10	●	●		●	1				

2 inserts per case, but grade JC10000 insert is packed in 1 piece per case.

※ Corner radius: Below 0.1mm

Note) Please refer page C204 for "Instructions for mounting insert."

● : Standard stock items □ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted

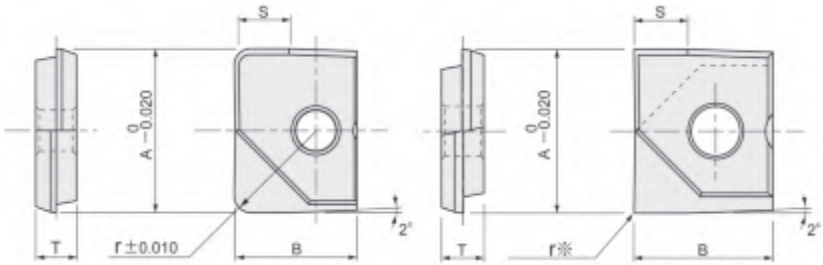
Mirror Radius

RNMTYPE

Radius form accuracy of insert: within ±0.010mm

■ INSERTS

● RNM-□□□-R0



Cat. No.	PVD coated		Diamond coated	Uncoated	Dimensions (mm)				
	JC8015 (Z10~20)	DH103 (Z05)	JC10000	KT9 (K10)	r	S	A	B	T
RNM-200-R15	●	●		□	1.5	6.7	20	15	5
RNM-200-R20	●	●		□	2				
RNM-200-R30	●				3				
RNM-250-R0	●				※	8.3	25	18.5	6
RNM-250-R03	●	●			0.3				
RNM-250-R05	●	●			0.5				
RNM-250-R10	●	●			1				
RNM-250-R15	□	●			1.5				
RNM-250-R20	●	●			2				
RNM-250-R30	●				3				
RNM-300-R03	□	●			0.3	10	30	22.5	7
RNM-300-R05	□	●			0.5				
RNM-300-R10	□	●			1				
RNM-300-R15	□				2				
RNM-300-R20	□	●			2				
RNM-300-R30	□				3				
RNM-320-R03	●	●			0.3	10.7	32	23.5	7
RNM-320-R05	●	●			0.5				
RNM-320-R10	●	●			1				
RNM-320-R15	●				1.5				
RNM-320-R20	●	●			2				
RNM-320-R30	●				3				

2 inserts per case, but grade JC10000 insert is packed in 1 piece per case.

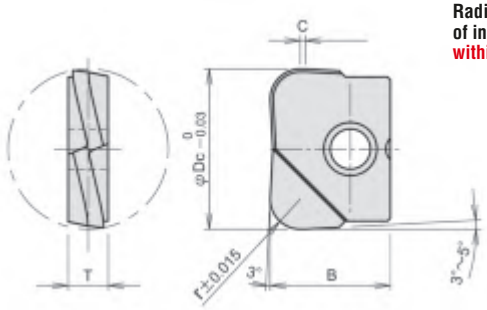
※ Corner radius: Below 0.1mm

Note) Please refer page C204 for "Instructions for mounting insert."

● : Standard stock items □ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted

Mirror Radius HRMTYPE

■ INSERTS



Radius form accuracy of insert: within ±0.015mm

Cat. No.	PVD coated JC8015 (Z10~20)	Dimensions (mm) φDc	r	B	C	T
HRM-060-R05	●		0.5			
HRM-060-R10	●	6	1	5	–	2
HRM-060-R15	●		1.5			
HRM-080-R20	●	8	2	7	0.3	2.4
HRM-090-R20	●	9	2	7	0.3	2.4
HRM-100-R20	●	10	2	8.5	0.3	2.6
HRM-110-R20	●	11	2	8.5	0.3	2.6
HRM-120-R20	●	12	2	10	0.5	3

Cat. No.	PVD coated JC8015 (Z10~20)	Dimensions (mm) φDc	r	B	C	T
HRM-130-R20	●	13	2	10	0.5	3
HRM-160-R20	●	16	2	12	0.5	4
HRM-160-R30	●		3			
HRM-170-R30	●	17	3	12	0.5	4
HRM-200-R20	●	20	2	15	0.5	5
HRM-200-R30	●		3			
HRM-220-R30	●	22	3	15	0.5	5

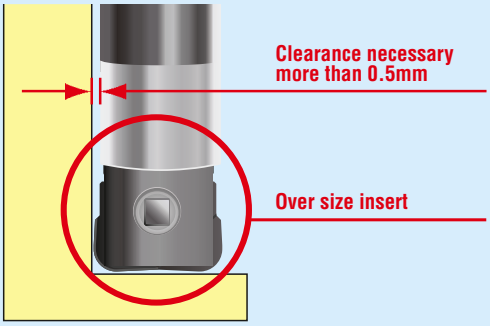
2 inserts per case

Note) "HRM" insert is exclusive use of MIRROR RADIUS carbide shank body.
Please use only in MIRROR RADIUS carbide shank body and modular head.

Features of "MIRROR RADIUS" Over size inserts

In case of using HRM inserts, recommend to use over size inserts for increasing side clearance to prevent the damage of shank by sticking chips

(※) HRM-090-R20, HRM-110-R20, HRM-130-R20, HRM-170-R30, HRM-220-R30



Please refer page C204 for "Instructions for mounting insert"

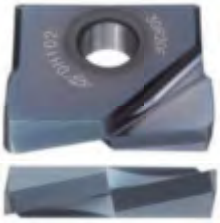
Mirror Radius FRM TYPE

NEW FRM

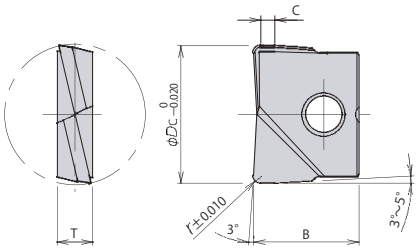
FRM type insert for MIRROR RADIUS RNM/MRN type.

- **Adopted new PVD coated grade "DH102" suitable for high hardened material, and PVD coated grade "JC8015" suitable for general steel.**
- **Adopting positive rake cutting edge achieved low cutting force and sharpness. And available large size over 25mm.**
- **Intensive tool management can be possible from roughing to finishing with same body by using inserts properly.**

Side & bottom face finishing for high hardened steel, etc.



Corner radius accuracy of inserts:
below ±0.010mm



Longer periphery straight edge achieved longer tool life, better surface roughness and deflection on vertical wall application.

Cat. No.	PVD coated		Dimensions (mm)				
	JC8015	DH102	φDc	r	B	C	T
FRM-060-R05	●	●	6	0.5	5	0.8	2
FRM-060-R10	●	●		1			
FRM-080-R05	●	●	8	0.5	7	1.2	2.4
FRM-080-R10	●	●		1			
FRM-100-R05	●	●	10	0.5	8.5	1.5	2.6
FRM-100-R10	●	●		1			
FRM-100-R20		●		2			
FRM-120-R05	●	●	12	0.5	10	1.5	3
FRM-120-R10	●	●		1			
FRM-120-R20	●	●		2			
FRM-120-R30		●		3			
FRM-160-R05	●	●	16	0.5	12	2	4
FRM-160-R10	●	●		1			
FRM-160-R15		●		1.5			
FRM-160-R20	●	●		2			
FRM-160-R30		●		3			
FRM-170-R10	●	●	17	1	12	2	4
FRM-200-R05	●	●	20	0.5	15	2	5
FRM-200-R10	●	●		1			
FRM-200-R15		●		1.5			
FRM-200-R20	●	●		2			
FRM-200-R30		●		3			
FRM-210-R10	●	●	21	1	15	2	5
FRM-250-R05		●	25	0.5	18.5	2.5	6
FRM-250-R10	●	●		1			
FRM-250-R20	●	●		2			
FRM-250-R30		●		3			
FRM-300-R05		□	30	0.5	22.5	3	7
FRM-300-R10	●	●		1			
FRM-300-R20	●	●		2			
FRM-300-R30		□		3			
FRM-320-R05		●	32	0.5	23.5	3	7
FRM-320-R10	●	●		1			
FRM-320-R20	●	●		2			
FRM-320-R30		●		3			

2 inserts per case

Note) Recommend to use FRM inserts combined with Mirror Radius End Mill carbide shank body (page C193-C194) or Mirror Radius modular heads (page B163).

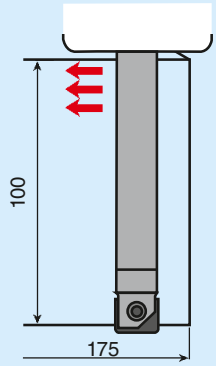
Please see page C204 for Attention to mounting insert.

● : Standard stock items □ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted

Mirror Radius FRMTYPE

■ CUTTING PERFORMANCE OF FRM-F TYPE INSERT

Machining accuracy



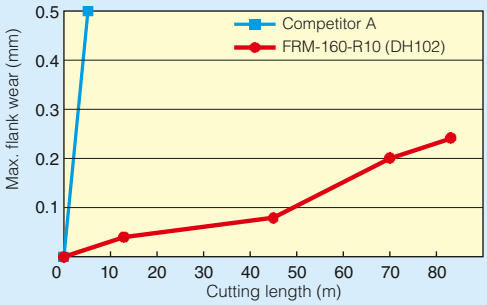
- Tool dia.: φ16mm (Carbide shank)
- Material: DH31 (1.2344), 48HRC
  Work size: 100mm×175mm
- n=3,383min^{-1}, Vc=170m/min, Vf=1,200mm/min, f=0.35mm/rev, ap=0.8mm, ae=0.15mm
- Overhung length ℓ =105mm, Dry

※ Measuring deflection at the center of work material.

Tool life

■ SKD11 (1.2379), 60HRC

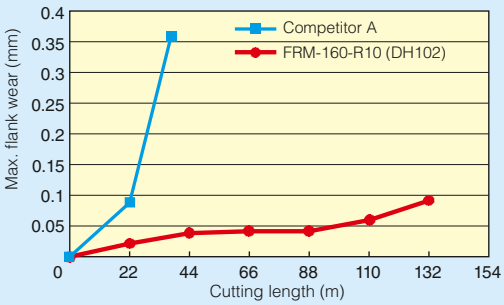
- Tool dia.: φ16mm (Carbide shank)
- n=2,785min^{-1}, Vc=140m/min, Vf=975mm/min, f=0.35mm/rev, ap=0.8mm, ae=0.15mm
- Overhung length ℓ =105mm, Dry



Achieved 8 times longer tool life

■ DH31 (1.2344), 48HRC

- Tool dia.: φ16mm (Carbide shank)
- n=3,383min^{-1}, Vc=170m/min, Vf=1,200mm/min, f=0.35mm/rev, ap=0.8mm, ae=0.15mm
- Overhung length ℓ =105mm, Dry



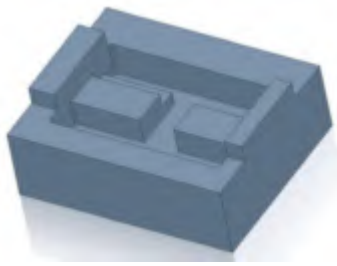
Achieved 3 times longer tool life

Mirror Radius RNMTYPE

■ CASE STUDIES

1. Replacement of solid carbide ball nose end mill with Mirror radius

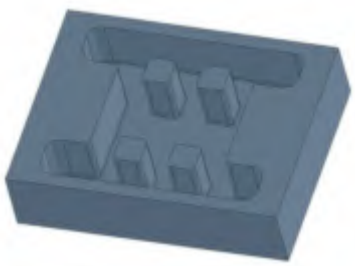
Overhung length: 30mm



Work	Part name	—
	Material	Die steel (DH21: Heat treated)
	Hardness	48HRC
Tool	Tool No.	RNMM-060030U-S06C
	Grade	RNM-060-R10, JC8015
Cutting conditions	Vc, (n)	Semi-finishing: n=5,000min^{-1}, Vc=94m/min Finishing: n=10,000min^{-1}, Vc=188m/min
	Vf, (fz)	Semi-finishing: Vf=1,500mm/min, f=0.3mm/min Finishing: Vf=2,000mm/min, f=0.2mm/min
	ap (mm)	Semi-finishing: 0.25mm Finishing: 0.05mm
	ae (mm)	Semi-finishing: 3.5mm Finishing: 0.3mm
	Coolant	Air blow
	Machine	Vertical MC

Result: Finished entire job for 5 hours by 1 insert and still able to continue. Reduced the polishing process by improved surface quality.

2. Improved efficiency

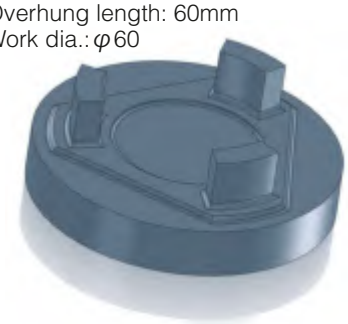


Work	Part name	Plastic mold
	Material	Mold steel (P20)
	Hardness	30-33HRC
Tool	Tool No.	RNMM-200075S-S20C
	Grade	RNM-200-R03, JC8015
Cutting conditions	Vc, (n)	n=3,200min^{-1}, Vc=200m/min
	Vf, (fz)	Vf=1,600mm/min, f=0.5mm/rev
	ap (mm)	0.05mm
	ae (mm)	10-12mm
	Coolant	Air blow
	Machine	Vertical MC

Result: Achieved 3 times faster feed speed than competitor A

3. Replacement of solid carbide end mill with Mirror radius (Roughing for inner side wall).

Overhung length: 60mm
Work dia.: φ60



Work	Part name	Electrode
	Material	Copper (Cu)
	Hardness	—
Tool	Tool No.	RNMM-120060U-S12C
	Grade	RNM-120-R03, JC8003
Cutting conditions	Vc, (n)	n=3,000min^{-1}, Vc=113m/min
	Vf, (fz)	Vf=1,000mm/min, f=0.3mm/rev
	ap (mm)	0.5mm
	ae (mm)	5.8mm
	Coolant	Water soluble
	Machine	Vertical MC

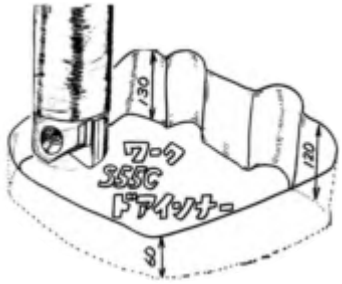
Result: Achieved 100m tool life and reduced machining time compared with competitor's solid carbide end mill.

Mirror Radius RNMTYPE

■ CASE STUDIES

4. High speed and high accuracy machining

Finishing for inner side wall

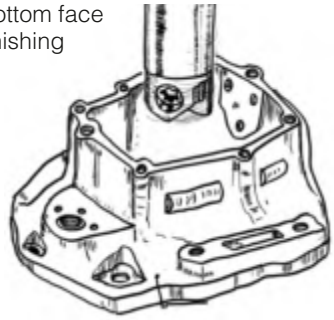


Result: Achieved excellent surface accuracy with 1.7 times higher cutting speed. Deflection was below 0.005mm. RNM could finish entire job by single process.

Work	Part name	Injection mold for door inner panel
	Material	S55C
	Hardness	—
Tool	Tool No.	RNML-250150S-S25
	Grade	RNM-250-R10, JC8015
Cutting conditions	Vc, (n)	5,000min^{-1}, 393m/min
	Vf, (fz)	2,500mm/min, 0.5mm/rev
	ap (mm)	0.5mm
	ae (mm)	0.1mm
	Coolant	Dry cut
	Machine	Double column MC

5. Replacement of solid carbide ball nose end mill with Mirror radius

Bottom face finishing



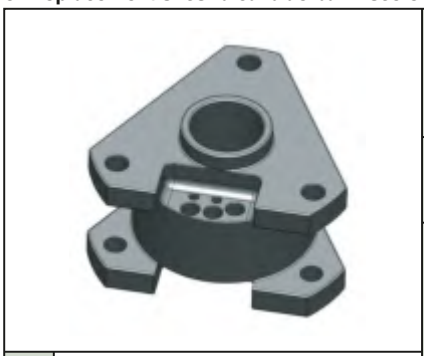
Result: 2 times higher feed speed than exisiting solid carbide end mill. Observed smoother cutting and better surface roughness.

Work	Part name	Clutch case
	Material	Aluminium alloy (ADC)
	Hardness	—
Tool	Tool No.	RNMM-160100S-S16
	Grade	RNM-160-R10, JC8015
Cutting conditions	Vc, (n)	5,000min^{-1}, 251m/min
	Vf, (fz)	1,200mm/min
	ap (mm)	0.7+0.5mm 2pass
	ae (mm)	10mm
	Coolant	Wet cutting
	Machine	Vertical MC

Mirror Radius HRMTYPE

■ CASE STUDIES

6. Replacement of solid carbide ball nose end mill with Mirror radius

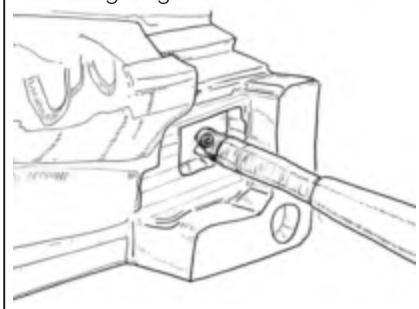


Work	Part name	Electric parts
	Material	S50C
	Hardness	–
Tool	Tool No.	RNMS-060015U-S06C
	Grade	HRM-060-R15, JC8015
Cutting conditions	Vc, (n)	n=8,000min^{-1}, Vc=150m/min
	Vf, (fz)	Vf=6,400mm/min, f=0.8mm/rev
	ap (mm)	0.2mm
	ae (mm)	0.2mm
	Coolant	Water soluble (External)
	Machine	Vertical MC

Result: 3.3 times more productivity and 1.2 times longer tool life than exisiting solid carbide ball nose end mill.

7. Improved efficiency on mold steel

Overhung length: 285mm



Work	Part name	Injection mold
	Material	Pre hardened steel
	Hardness	28HRC
Tool	Tool No.	RNMM-160070S-S16C
	Grade	HRM-160-R30, JC8015
Cutting conditions	Vc, (n)	3,600min^{-1}, 181m/min
	Vf, (fz)	4,000mm/min, 1.1mm/rev
	ap (mm)	0.5mm (30' ramping until 70mm)
	ae (mm)	8mm
	Coolant	Air blow
	Machine	Horizontal MC (22kW)

Result: Reduced the machining time 1/2 of the competitor's.
Less vibration and stable machining

Mirror Radius RNMTYPE

■ RECOMMENDED CUTTING CONDITIONS

● RNM type insert

Work Materials	Insert Grades	Cutting speed Vc (m/min)	Nominal feed rate: f (mm/rev) / Maximum ap or ae (mm) / Tool dia. Dc (mm)								
			6	8	10	12/13	16/17	20/21	25/26	30	32
Grey cast iron (FC250, FC300) 160~260HB	JC8003 DH103 JC8015	250	0.25	0.35	0.4	0.45	0.5	0.5	0.5	0.5	0.5
			0.2	0.3	0.3	0.4	0.5	0.7	0.8	1.0	1.0
Nodular cast iron (FCD600, FCD700) 170~300HB	JC8003 DH103 JC8015	200	0.2	0.3	0.35	0.35	0.4	0.4	0.4	0.4	0.4
			0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	0.8
Carbon steel (S50C, S55C) 180~280HB	JC8003 DH103 JC8015	200	0.2	0.3	0.35	0.35	0.4	0.4	0.4	0.4	0.4
			0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	0.8
Low alloy steel (SCM440) 180~280HB	JC8003 DH103 JC8015	180	0.26	0.28	0.32	0.32	0.36	0.36	0.36	0.36	0.36
			0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	0.8
Mold steel (HPM, NAK) 280~400HB	JC8003 DH103 JC8015	150	0.18	0.25	0.28	0.28	0.32	0.32	0.32	0.32	0.32
			0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	0.8
Tool & Die steel (SKD61, SKD11) 180~255HB	JC8003 DH103 JC8015	150	0.18	0.25	0.28	0.28	0.32	0.32	0.32	0.32	0.32
			0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	0.8
Hardened die steel (SKD61, SKD11) 40~55HRC	JC8003 DH103	80	0.13	0.2	0.23	0.23	0.25	0.25	0.25	0.25	0.25
			0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.6	0.6
Stainless steel (SUS304, SUS316) 150~250HB	JC8003 DH103 JC8015	130	0.13	0.2	0.23	0.23	0.25	0.25	0.25	0.25	0.25
			0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.8	0.8
Copper alloy 80~150HB	JC8003 DH103 KT9	250	0.25	0.35	0.4	0.4	0.5	0.5	0.5	0.5	0.5
			0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.6	1.6
Aluminium alloy 30~100HB	JC8003 DH103 KT9	300	0.25	0.35	0.4	0.4	0.5	0.5	0.5	0.5	0.5
			0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.6	1.6
Graphite	JC8003 DH103 JC10000	300	0.25	0.35	0.4	0.4	0.5	0.5	0.5	0.5	0.5
			0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.6	1.6

Note) This data is applicable to short series tools and middle series tools.

★ Instructions for mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Please use torque wrenches to tighten the clamp screw.

Recommend to use Torque control wrenches (C180)
See the right table for recommended tightening torque.

Dimensions (mm) φDc	Recommended torque (N•m)
6	0.5
8	0.9
10	1.2
12	2.0
16	3.0
20	4.0
25	5.0
30	6.0
32	6.0

Mirror Radius HRM/FRM TYPE

■ RECOMMENDED CUTTING CONDITIONS

● HRM, FRM type insert + Carbide shank holder (C-Body)

※ Recommended to reduce depth of cut ap by corner radius with keeping feed speed Vf. (Refer the below table)

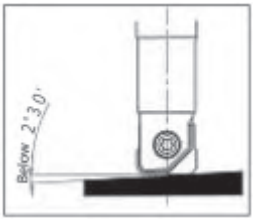
Work Materials	Insert Grades	Tool dia. (mm) φ6×R1.5					φ8×R2/φ9×R2				
		ℓ (mm)	ae (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	ℓ(mm)	ae (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015	15	2.1	0.20	9,000	8,000	20	2.8	0.40	7,500	8,200
		30	2.1	0.15	9,000	7,200	40	2.8	0.40	7,500	6,750
		–	–	–	–	–	60	2.8	0.25	7,500	6,750
		–	–	–	–	–	80	2.8	0.20	7,500	6,750
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8015	15	2.1	0.20	8,500	7,600	20	2.8	0.40	7,100	7,800
		30	2.1	0.15	8,500	6,800	40	2.8	0.40	7,100	6,400
		–	–	–	–	–	60	2.8	0.25	7,100	6,400
		–	–	–	–	–	80	2.8	0.20	7,100	6,400
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015	15	2.1	0.20	8,500	7,600	20	2.8	0.40	7,100	7,800
		30	2.1	0.15	8,500	6,800	40	2.8	0.40	7,100	6,400
		–	–	–	–	–	60	2.8	0.25	7,100	6,400
		–	–	–	–	–	80	2.8	0.20	7,100	6,400
Stainless steel SUS304 Below 250HB	JC8015	15	2.1	0.20	8,000	6,400	20	2.8	0.40	6,700	7,300
		30	2.1	0.15	8,000	5,600	40	2.8	0.40	6,700	6,000
		–	–	–	–	–	60	2.8	0.25	6,700	6,000
		–	–	–	–	–	80	2.8	0.20	6,700	6,000
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC8015	15	2.1	0.15	6,900	5,500	20	2.8	0.20	6,000	6,600
		30	2.1	0.10	6,900	4,800	40	2.8	0.20	6,000	4,800
		–	–	–	–	–	60	2.8	0.15	6,000	4,800
		–	–	–	–	–	80	2.8	0.10	6,000	4,800
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015	15	2.1	0.20	7,400	6,600	20	2.8	0.40	6,400	7,600
		30	2.1	0.15	7,400	5,900	40	2.8	0.40	6,400	5,700
		–	–	–	–	–	60	2.8	0.25	6,400	5,700
		–	–	–	–	–	80	2.8	0.20	6,400	5,700

Depth of cut adjustment by corner radius ap× ratio	Corner radius		Corner radius	
	R0.5	ap×0.65	R0.5	ap×0.60
	R1	ap×0.80	R1	ap×0.70
	R1.5	ap×1.0	R2	ap×1.0
	※ Recommend to reduce depth of cut ap according to above table with keeping feed speed			

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of good surface requirement, recommend to reduce feed speed.
7) In case of ramping, ramping angle up to 2° 30′ is recommended.
8) In case of slotting with overhung length exceeding 5 x Dc, recommend to reduce depth of cut and feed speed.



★ Instructions for mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Please use torque wrenches to tighten the clamp screw.

Recommend to use Torque control wrenches (C180)
See the right table for recommended tightening torque.

Dimensions (mm) φDc	Recommended torque (N•m)
6	0.5
8	0.9
10	1.2
12	2.0
16	3.0
20	4.0

Mirror Radius HRM/FRM TYPE

■ RECOMMENDED CUTTING CONDITIONS

● HRM, FRM type insert + Carbide shank holder (C-Body)

※ Recommended to reduce depth of cut ap by corner radius with keeping feed speed Vf. (Refer the below table)

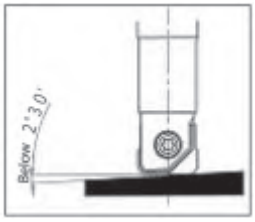
Work Materials	Insert Grades	Tool dia. (mm) φ10×R2/φ11×R2 ℓ (mm)	ae (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	φ12×R2/φ13×R2 ℓ (mm)	ae (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015	25	4.2	0.40	6,000	7,200	30	5.6	0.50	5,000	6,000
		50	4.2	0.40	6,000	6,000	60	5.6	0.40	5,000	5,000
		75	4.2	0.25	6,000	6,000	90	5.6	0.25	5,000	5,000
		100	4.2	0.20	6,000	6,000	120	5.6	0.20	5,000	5,000
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8015	25	4.2	0.40	5,700	6,800	30	5.6	0.40	4,700	5,600
		50	4.2	0.40	5,700	5,700	60	5.6	0.40	4,700	4,700
		75	4.2	0.25	5,700	5,700	90	5.6	0.25	4,700	4,700
		100	4.2	0.20	5,700	5,700	120	5.6	0.20	4,700	4,700
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015	25	4.2	0.40	5,700	6,800	30	5.6	0.40	4,700	5,600
		50	4.2	0.40	5,700	5,700	60	5.6	0.40	4,700	4,700
		75	4.2	0.25	5,700	5,700	90	5.6	0.25	4,700	4,700
		100	4.2	0.20	5,700	5,700	120	5.6	0.20	4,700	4,700
Stainless steel SUS304 Below 250HB	JC8015	25	4.2	0.40	5,400	6,400	30	5.6	0.40	4,500	5,400
		50	4.2	0.40	5,400	5,400	60	5.6	0.40	4,500	4,500
		75	4.2	0.25	5,400	5,400	90	5.6	0.25	4,500	4,500
		100	4.2	0.20	5,400	5,400	120	5.6	0.20	4,500	4,500
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC8015	25	4.2	0.20	4,700	5,600	30	5.6	0.20	4,000	4,800
		50	4.2	0.20	4,700	4,700	60	5.6	0.20	4,000	4,000
		75	4.2	0.15	4,700	4,700	90	5.6	0.15	4,000	4,000
		100	4.2	0.10	4,700	4,700	120	5.6	0.10	4,000	4,000
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015	25	4.2	0.40	5,100	6,100	30	5.6	0.40	4,200	5,000
		50	4.2	0.40	5,100	5,100	60	5.6	0.40	4,200	4,200
		75	4.2	0.25	5,100	5,100	90	5.6	0.25	4,200	4,200
		100	4.2	0.20	5,100	5,100	120	5.6	0.20	4,200	4,200

Depth of cut adjustment by corner radius (ap × ratio)	Corner radius		Corner radius	
	R0.5	ap×0.60	R0.5	ap×0.60
	R1	ap×0.70	R1	ap×0.70
	R2	ap×1.0	R1.5	ap×0.85
			R2	ap×1.0
	※ Recommend to reduce depth of cut ap according to above table with keeping feed speed			

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of good surface requirement, recommend to reduce feed speed.
7) In case of ramping, ramping angle up to 2° 30′ is recommended.
8) In case of slotting with overhung length exceeding 5 x Dc, recommend to reduce depth of cut and feed speed.



★ Instructions for mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Please use torque wrenches to tighten the clamp screw.

Recommend to use Torque control wrenches (C180)
See the right table for recommended tightening torque.

Dimensions (mm) φDc	Recommended torque (N•m)
6	0.5
8	0.9
10	1.2
12	2.0
16	3.0
20	4.0

Mirror Radius HRM/FRM TYPE

■ RECOMMENDED CUTTING CONDITIONS

● HRM, FRM type insert + Carbide shank holder (C-Body)

※ Recommended to reduce depth of cut ap by corner radius with keeping feed speed Vf. (Refer the below table)

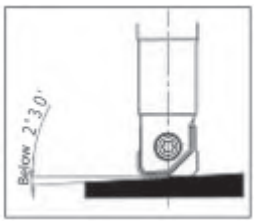
Work Materials	Insert Grades	Tool dia. (mm) φ16×R3/φ17×R3 ℓ (mm)	ae (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)	φ20×R3/φ22×R3 ℓ (mm)	ae (mm)	ap (mm)	n (min⁻¹)	Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015	35	7.0	0.60	3,800	4,500	40	9.8	0.60	3,000	3,600
		80	7.0	0.60	3,800	3,800	100	9.8	0.60	3,000	3,000
		120	7.0	0.40	3,800	3,800	150	9.8	0.40	3,000	3,000
		160	7.0	0.30	3,800	3,800	200	9.8	0.30	3,000	3,000
Mold steel HPM7, PX5, NAK80, P20 (1.2311, P20) 30-43HRC	JC8015	35	7.0	0.60	3,500	4,200	40	9.8	0.60	2,800	3,300
		80	7.0	0.60	3,500	3,500	100	9.8	0.60	2,800	2,800
		120	7.0	0.40	3,500	3,500	150	9.8	0.40	2,800	2,800
		160	7.0	0.30	3,500	3,500	200	9.8	0.30	2,800	2,800
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015	35	7.0	0.60	3,500	4,200	40	9.8	0.60	2,800	3,300
		80	7.0	0.60	3,500	3,500	100	9.8	0.60	2,800	2,800
		120	7.0	0.40	3,500	3,500	150	9.8	0.40	2,800	2,800
		160	7.0	0.30	3,500	3,500	200	9.8	0.30	2,800	2,800
Stainless steel SUS304 Below 250HB	JC8015	35	7.0	0.60	3,400	4,000	40	9.8	0.60	2,700	3,200
		80	7.0	0.60	3,400	3,400	100	9.8	0.60	2,700	2,700
		120	7.0	0.40	3,400	3,400	150	9.8	0.40	2,700	2,700
		160	7.0	0.30	3,400	3,400	200	9.8	0.30	2,700	2,700
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 40-50HRC	JC8015	35	7.0	0.30	3,000	3,600	40	9.8	0.30	2,400	2,800
		80	7.0	0.30	3,000	3,000	100	9.8	0.30	2,400	2,400
		120	7.0	0.25	3,000	3,000	150	9.8	0.25	2,400	2,400
		160	7.0	0.20	3,000	3,000	200	9.8	0.20	2,400	2,400
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015	35	7.0	0.60	3,200	3,800	40	9.8	0.60	2,500	3,000
		80	7.0	0.60	3,200	3,200	100	9.8	0.60	2,500	2,500
		120	7.0	0.40	3,200	3,200	150	9.8	0.40	2,500	2,500
		160	7.0	0.30	3,200	3,200	200	9.8	0.30	2,500	2,500

Depth of cut adjustment by corner radius (ap× ratio)	Corner radius		Corner radius	
	R1	ap×0.50	R1	ap×0.50
	R1.5	ap×0.60	R1.5	ap×0.60
	R2	ap×0.75	R2	ap×0.75
	R3	ap×1.0	R3	ap×1.0
	※ Recommend to reduce depth of cut ap according to above table with keeping feed speed			

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) If machine does not have enough power, recommend to reduce depth of cut first and reduce spindle speed and feed speed.
4) Use air blow to flush the chips out.
5) In case of 50-55HRC (Hardened die steel), recommend to reduce 30% above ap, n, Vf.
6) In case of good surface requirement, recommend to reduce feed speed.
7) In case of ramping, ramping angle up to 2° 30′ is recommended.
8) In case of slotting with overhung length exceeding 5 x Dc, recommend to reduce depth of cut and feed speed.



★ Instructions for mounting insert

1. Clean the insert seat carefully.
2. Clean the insert, especially hole and location face.
3. Change the clamp screw when the screw gets worn out.
4. Please use torque wrenches to tighten the clamp screw.

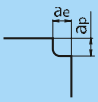
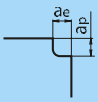
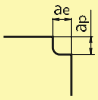
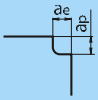
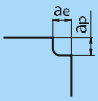
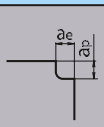
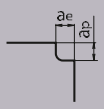
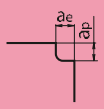
Recommend to use Torque control wrenches (C180)
See the right table for recommended tightening torque.

Dimensions (mm) φDc	Recommended torque (N•m)
6	0.5
8	0.9
10	1.2
12	2.0
16	3.0
20	4.0

Mirror Radius FRM TYPE

■ RECOMMENDED CUTTING CONDITIONS / SIDE FACE FINISHING

● FRM type insert + Carbide shank holder (C-Body)

Work Materials	Insert Grades	Type of machining	Cutting speed Vc (m/min)	Tool dia. (mm) φ8 n (min⁻¹)	φ8 Vf (mm/min)	φ10 n (min⁻¹)	φ10 Vf (mm/min)	φ12 n (min⁻¹)	φ12 Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015		300	11,940	3,580	9,550	2,860	7,960	2,380
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015		300	11,940	3,580	9,550	2,860	7,960	2,380
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Stainless steel SUS304 Below 250HB	JC8015		280	11,150	3,350	8,910	2,670	7,420	2,220
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 DH102		300	11,940	3,580	9,550	2,860	7,960	2,380
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102		280	11,150	3,350	8,910	2,670	7,420	2,220
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102		250	9,950	1,000	7,960	800	6,630	800
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102		200	7,950	800	6,360	640	5,300	640
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.08		0.10		0.12	
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 DH102		350	13,930	4,180	11,140	3,900	9,280	3,710
			ap (mm)	0.20		0.25		0.30	
			ae (mm)	0.10		0.15		0.20	

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed

■ NOTE

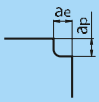
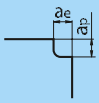
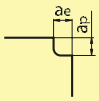
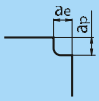
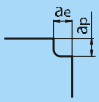
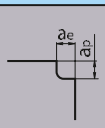
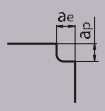
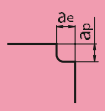
1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) In case of overhung length over 3 x Dc, cutting speed and feed speed to be reduced according to the right table.
4) Use air blow to flash out the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%
5Dc~10Dc Over 5Dc, up to 10Dc	50%	50%

Mirror Radius FRMTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FACE FINISHING

● FRM type insert + Carbide shank holder (C-Body)

Work Materials	Insert Grades	Type of machining	Cutting speed Vc (m/min)	Tool dia. (mm) φ16 n (min⁻¹)	φ16 Vf (mm/min)	φ20 n (min⁻¹)	φ20 Vf (mm/min)	φ21 n (min⁻¹)	φ21 Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015		300	5,970	2,390	4,770	1,910	4,550	1,820
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015		300	5,970	2,390	4,770	1,910	4,550	1,820
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Stainless steel SUS304 Below 250HB	JC8015		280	5,570	2,230	4,560	1,820	4,240	1,700
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 DH102		300	5,970	2,390	4,770	1,910	4,550	1,820
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102		280	5,570	1,670	4,560	1,370	4,240	1,270
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102		250	4,970	750	3,980	600	3,790	570
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102		200	3,980	600	3,180	480	3,000	450
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.16		0.20		0.10	
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 DH102		350	6,960	3,480	5,570	3,340	5,300	3,180
			ap (mm)	0.40		0.50		0.50	
			ae (mm)	0.20		0.25		0.20	

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed

■ NOTE

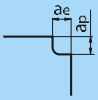
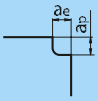
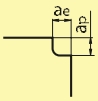
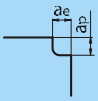
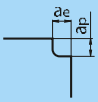
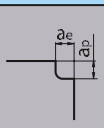
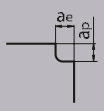
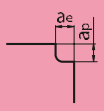
1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) In case of overhung length over 3 x Dc, cutting speed and feed speed to be reduced according to the right table.
4) Use air blow to flash out the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, upto5Dc	70%	70%
5Dc~10Dc Over 5Dc, upto 10Dc	50%	50%

Mirror Radius FRMTYPE

■ RECOMMENDED CUTTING CONDITIONS/SIDE FACE FINISHING

● FRM type insert + Carbide shank holder (C-Body)

Work Materials	Insert Grades	Type of machining	Cutting speed Vc (m/min)	Tool dia. (mm) φ25 n (min⁻¹)	φ25 Vf (mm/min)	φ30 n (min⁻¹)	φ30 Vf (mm/min)	φ32 n (min⁻¹)	φ32 Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015		300	3,820	1,530	3,180	1,270	2,980	1,190
			ap (mm)	0.80		1.0		1.2	
			ae (mm)	0.10		0.10		0.10	
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015		300	3,820	1,530	3,180	1,270	2,980	1,190
			ap (mm)	0.80		1.0		1.2	
			ae (mm)	0.10		0.10		0.10	
Stainless steel SUS304 Below 250HB	JC8015		280	3,560	1,420	2,970	1,190	2,780	1,110
			ap (mm)	0.80		1.0		1.2	
			ae (mm)	0.10		0.10		0.10	
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 DH102		300	3,820	1,530	3,180	1,270	2,980	1,190
			ap (mm)	0.80		1.0		1.2	
			ae (mm)	0.10		0.10		0.10	
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102		280	3,560	1,070	2,970	890	2,780	830
			ap (mm)	0.80		1.0		1.2	
			ae (mm)	0.10		0.10		0.10	
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102		250	3,180	480	2,650	400	2,480	370
			ap (mm)	0.60		0.80		1.0	
			ae (mm)	0.10		0.10		0.10	
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102		200	2,540	380	2,120	320	1,990	300
			ap (mm)	0.60		0.80		1.0	
			ae (mm)	0.10		0.10		0.10	
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 DH102		350	4,450	2,670	3,710	2,230	3,480	2,090
			ap (mm)	0.80		1.0		1.2	
			ae (mm)	0.20		0.20		0.20	

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed

■ NOTE

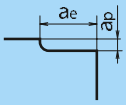
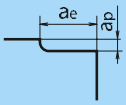
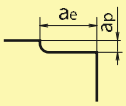
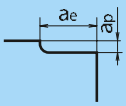
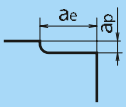
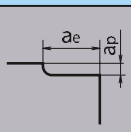
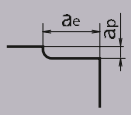
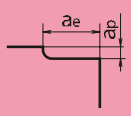
1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) In case of overhung length over 3 x Dc, cutting speed and feed speed to be reduced according to the right table.
4) Use air blow to flash out the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%
5Dc~10Dc Over 5Dc, up to 10Dc	50%	50%

Mirror Radius FRMTYPE

■ RECOMMENDED CUTTING CONDITIONS / BOTTOM FACE FINISHING

● FRM type insert + Carbide shank holder (C-Body)

Work Materials	Insert Grades	Type of machining	Cutting speed Vc (m/min)	Tool dia. (mm) φ8 n (min⁻¹)	φ8 Vf (mm/min)	φ10 n (min⁻¹)	φ10 Vf (mm/min)	φ12 n (min⁻¹)	φ12 Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015		260	10,340	3,100	8,280	2,480	6,900	2,070
			ap (mm)	0.15		0.15		0.20	
			ae (mm)	1.0		1.2		1.5	
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015		260	10,340	3,100	8,280	2,480	6,900	2,070
			ap (mm)	0.15		0.15		0.20	
			ae (mm)	1.0		1.2		1.5	
Stainless steel SUS304 Below 250HB	JC8015		240	9,550	2,860	7,640	2,290	6,360	1,900
			ap (mm)	0.15		0.15		0.20	
			ae (mm)	1.0		1.2		1.5	
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 DH102		260	10,340	3,100	8,280	2,480	6,900	2,060
			ap (mm)	0.15		0.15		0.20	
			ae (mm)	1.0		1.2		1.5	
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102		240	9,550	2,860	7,640	2,290	6,360	1,900
			ap (mm)	0.15		0.15		0.20	
			ae (mm)	1.0		1.2		1.5	
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102		190	7,560	760	6,050	610	5,040	600
			ap (mm)	0.10		0.10		0.15	
			ae (mm)	0.70		0.90		1.1	
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102		130	5,170	520	4,140	410	3,450	410
			ap (mm)	0.10		0.10		0.15	
			ae (mm)	0.60		0.90		1.2	
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 DH102		300	11,940	3,580	9,450	3,310	7,960	3,180
			ap (mm)	0.15		0.15		0.20	
			ae (mm)	1.2		1.5		1.8	

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed

■ NOTE

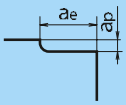
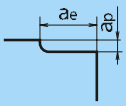
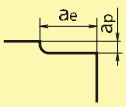
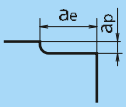
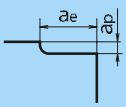
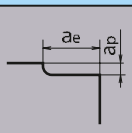
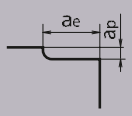
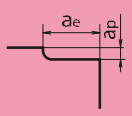
1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) In case of overhung length over 3 x Dc, cutting speed and feed speed to be reduced according to the right table.
4) Use air blow to flash out the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%
5Dc~10Dc Over 5Dc, up to 10Dc	50%	50%

Mirror Radius FRMTYPE

■ RECOMMENDED CUTTING CONDITIONS / BOTTOM FACE FINISHING

● FRM type insert + Carbide shank holder (C-Body)

Work Materials	Insert Grades	Type of machining	Cutting speed Vc (m/min)	Tool dia. (mm) φ16 n (min⁻¹)	φ16 Vf (mm/min)	φ20 n (min⁻¹)	φ20 Vf (mm/min)	φ21 n (min⁻¹)	φ21 Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015		260	5,170	2,070	4,140	1,660	3,940	1,570
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	2.0		2.5		2.5	
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015		260	5,170	2,070	4,140	1,660	3,940	1,570
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	2.0		2.5		2.5	
Stainless steel SUS304 Below 250HB	JC8015		240	4,770	1,910	3,810	1,520	3,640	1,450
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	2.0		2.5		2.5	
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 DH102		260	5,170	2,070	4,140	1,660	3,940	1,570
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	2.0		2.5		2.5	
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102		240	4,770	1,430	3,810	1,140	3,640	1,090
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	2.0		2.5		2.5	
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102		190	3,780	570	3,020	450	2,880	430
			ap (mm)	0.15		0.15		0.15	
			ae (mm)	1.4		1.8		1.8	
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102		130	2,590	390	2,070	310	1,970	290
			ap (mm)	0.15		0.15		0.15	
			ae (mm)	1.2		1.5		1.5	
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 DH102		300	5,970	2,390	4,770	1,910	4,550	1,820
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	2.4		3.0		3.0	

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed

■ NOTE

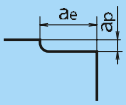
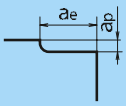
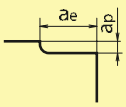
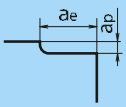
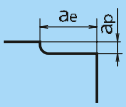
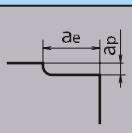
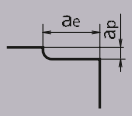
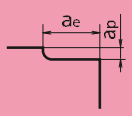
1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) In case of overhung length over 3 x Dc, cutting speed and feed speed to be reduced according to the right table.
4) Use air blow to flash out the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%
5Dc~10Dc Over 5Dc, up to 10Dc	50%	50%

Mirror Radius FRMTYPE

■ RECOMMENDED CUTTING CONDITIONS / BOTTOM FACE FINISHING

● FRM type insert + Carbide shank holder (C-Body)

Work Materials	Insert Grades	Type of machining	Cutting speed Vc (m/min)	Tool dia. (mm) φ25 n (min⁻¹)	φ25 Vf (mm/min)	φ30 n (min⁻¹)	φ30 Vf (mm/min)	φ32 n (min⁻¹)	φ32 Vf (mm/min)
Carbon steel S50C, S55C (C50, C55) Below 250HB	JC8015		260	3,310	1,320	2,750	1,100	2,580	1,030
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	3.0		4.0		4.2	
Die steel SKD61, SKD11 (1.2344, 1.2379) Below 255HB	JC8015		260	3,310	1,320	2,750	1,100	2,580	1,030
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	3.0		4.0		4.2	
Stainless steel SUS304 Below 250HB	JC8015		240	3,050	1,220	2,540	1,020	2,380	950
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	3.0		4.0		4.2	
Mold steel HPM7, PX5, P20 (1.2311, P20) 30-36HRC	JC8015 DH102		260	3,310	1,320	2,750	1,100	2,580	1,030
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	3.0		4.0		4.2	
Mold steel NAK80, HPM1, P21 (1.2311, P21) 38-43HRC	DH102		240	3,050	910	2,540	760	2,380	710
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	3.0		4.0		4.2	
Hardened die steel SKD61, DAC, DHA (1.2344, 1.2379) 42-52HRC	DH102		190	2,420	360	2,010	300	1,890	280
			ap (mm)	0.15		0.15		0.15	
			ae (mm)	2.2		2.7		2.8	
Hardened die steel SKD11, SLD, DC11 (1.2344, 1.2379) 55-62HRC	DH102		130	1,650	250	1,380	200	1,290	190
			ap (mm)	0.15		0.15		0.15	
			ae (mm)	1.8		2.2		2.3	
Grey & Nodular cast iron FC, FCD (GG, GGG) Below 300HB	JC8015 DH102		300	3,820	1,900	3,180	1,590	2,980	1,490
			ap (mm)	0.20		0.20		0.20	
			ae (mm)	3.0		4.0		4.2	

ℓ: Overhung length, ap: Depth of cut, ae: Pick feed, Vc: Cutting speed, n: Spindle speed, Vf: Feed speed

■ NOTE

1) The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2) In case chatter occurrs, recommend to reduce depth of cut or feed speed.
3) In case of overhung length over 3 x Dc, cutting speed and feed speed to be reduced according to the right table.
4) Use air blow to flash out the chips out.

Overhung length ℓ/Dc	Vc (m/min)	Vf (mm/min)
~3Dc 3Dc or less	100%	100%
3Dc~5Dc Over 3Dc, up to 5Dc	70%	70%
5Dc~10Dc Over 5Dc, up to 10Dc	50%	50%

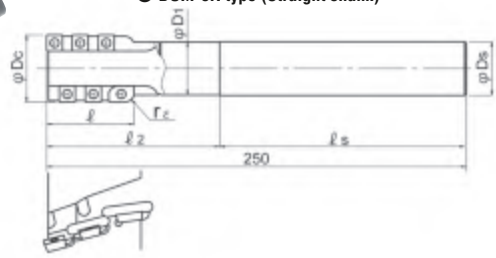
Under Cutter DUMTYPE

Side relief cutting for blanking dies and shearing dies.
R6 corner radius insert can reduce the risk of cracking at edge of dies after hardening.

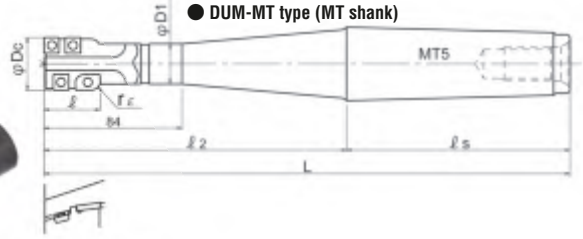
Under Milling

DUM-6R type
(Straight shank)

● DUM-6R type (Straight shank)

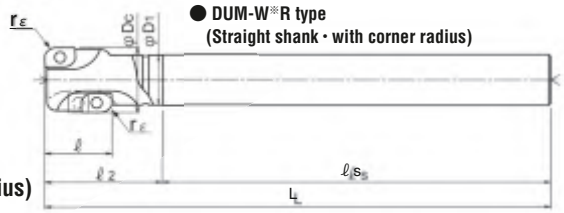


● DUM-MT type (MT shank)



DUM-W※R type
(Straight shank · with corner radius)

● DUM-W※R type
(Straight shank · with corner radius)



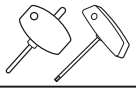
■ BODY

Cat. No.	Stock	No. of Applicable Inserts: Insert with corner radius: Bottom Side (R)	Shank Side (L)	Peripheral	Dimensions (mm): φDc	rε	ℓ	ℓ2	ℓs	L	φD1	φDs	Md
DUM-25023S20-W2R	□	1	1	—	25	R2	23.5	48.5	201.5	250	19.3	20	—
DUM32034S25-6R	□	—	1	3	32	R6	34	83	167		24.5	25	
DUM32050S25-6R *C Body (Carbide shank)	□		1	5			50	—	—		24.5		
DUM320184T-MT5	□		1	3			34	184	136	320	24.5	MT5	M20×2.5
DUM-32033S25-W6R	□	1	1	1			33	58	192	250	24.5	25	
DUM36038S32-6R	□	—	1	3	36		38	89	161		31	32	
DUM36050S32-6R	□		1	5			50	101	149				
DUM40040S32-6R	□		2	8	40		40	91	159		31.5		
DUM40052S32-6R	□		2	10			52	103	147				
DUM50020S42-6R	□		2	2	50		20	70	180		41	42	
DUM50036S42-6R	□		2	6			36	87	163		40		
DUM50050S42-6R	□		2	10			50	107	143		40		
DUM-50055S42-W6R	□	2	2	8			55.7	90	160		41		

Note) 1. All cutters are supplied without inserts.
2. Please refer page C216 for recommended cutting conditions.

Under Cutter DUMTYPE

■ PARTS

Applicable holders	Applicable inserts			Parts	
	Bottom side (R)	Shank side (L)	Peripheral	Clamp screw	Wrench
					
DUM-6R type	—	APGW150360L	SPGA090304 or SPMA090304	DSW-4085	A-15T
DUM-MT5 type					
DUM-W2R type	ZPMT13T320R	ZPMT13T320L		DSW-307	A-10
DUM-W6R type	APGW150360R	APGW150360L		DSW-4085	A-15T

Note) All cutters are supplied without inserts.

Clamp screw	Recommended torque (N•m)
DSW-4085	3.6
DSW-307	1.4

■ INSERTS

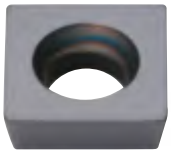


Fig.1 Peripheral insert

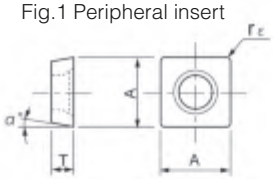


Fig.2 Shank side insert

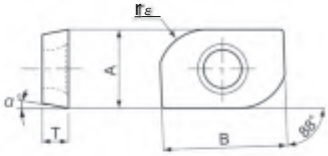


Fig.3 Bottom side insert

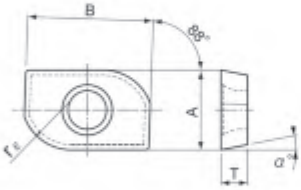


Fig.4 Shank side insert

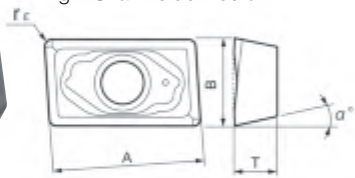
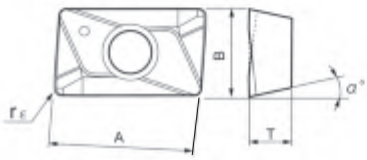


Fig.5 Bottom side insert



Cat. No.	PVD coated		Dimensions (mm)					Fig.
	JC5015	**JC5040**	A	B	T	rε	α°	
SPGA090304		●	9.525	—	3.18	0.4	11°	1
SPMA090304	●		9.525	—	3.18	0.4	11°	1
APGW150360L	●	●	9.525	15	3.18	6.0	11°	2
APGW150360R		●	9.525	15	3.18	6.0	11°	3
ZDMT13T320L	●	●	12.9	7.938	3.97	2.0	15°	4
ZPMT13T320R	●	●	13.3	7.938	3.97	2.0	11°	5

10 inserts per case

Under Cutter DUMTYPE

■ RECOMMENDED CUTTING CONDITIONS

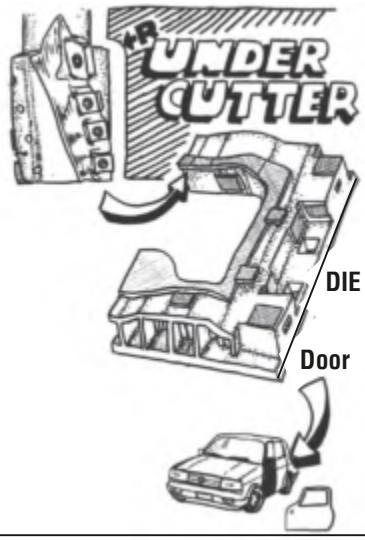
Tool dia. φDc (mm)	Work Materials	Cast iron (FC, FCD)		Die steel (SKD)	
	Max. depth of cut (mm) / Cutting conditions	**ap=1Dc, ae=1mm**	**ap=1Dc, ae=2mm**	**ap=1Dc, ae=1mm**	**ap=1Dc, ae=2mm**
25	n (min⁻¹)	1,000	—	900	—
	Vf (min/min)	350	—	270	—
32	n (min⁻¹)	800	650	600	—
	Vf (min/min)	300	170	170	—
36	n (min⁻¹)	700	570	620	530
	Vf (min/min)	280	150	190	110
40	n (min⁻¹)	800	640	720	560
	Vf (min/min)	450	290	350	200
50	n (min⁻¹)	700	570	640	510
	Vf (min/min)	420	280	350	220

n: Spindle speed, Vf: Feed speed, ap: Axial depth of cut, ae: Radial depth of cut

Under Cutter DUMTYPE

■ CASE STUDIES

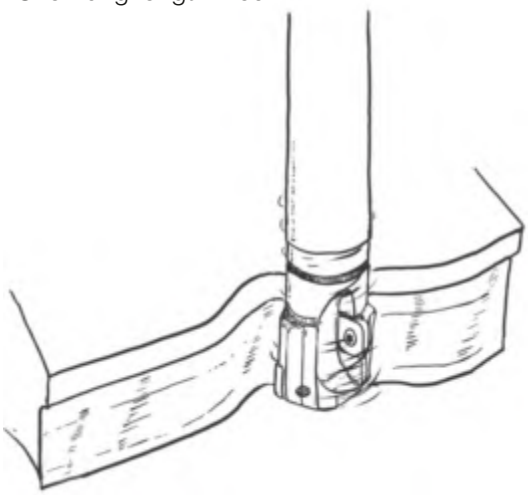
Side relief milling



Result: Observed smooth cutting and normal wear on the insert after machined 4 dies.

Work	Part name	Trimming die
	Material	SKD11
	Hardness	—
Tool	Tool No.	DUM50050S42-6R
	Grade	APGW150360L, JC5040 SPGA090304, JC5040
Cutting conditions	Spindle speed	600 (min^{-1})
	Cutting speed	94 (m/min)
	Feed speed	200~400 (mm/min)
	Feed rate	0.33~0.67 (mm/rev)
	Depth of cut	ap=30 (mm), ae=1.5 (mm)
	Coolant	Dry

Overhung length: 160mm



Result: Drastically improved productivity compared with HSS end mill.

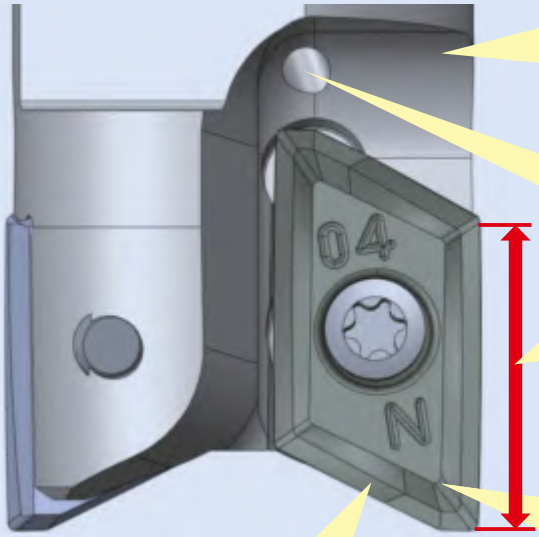
Work	Part name	Trimming die
	Material	—
	Hardness	—
Tool	Tool No.	DUM-25023S20-W2R
	Grade	ZPMT13T320R, JC5040 ZDMT13T320L, JC5040
Cutting conditions	Spindle speed	1,000 (min^{-1})
	Cutting speed	78.5 (m/min)
	Feed speed	200~400 (mm/min)
	Feed rate	0.2~0.4 (mm/rev)
	Depth of cut	ap=10~20 (mm), ae=1~1.5 (mm)
	Coolant	Dry

Aero Chipper ALXTYPE

Possible for Highprecision & High efficient machining forAluminium & Titanium alloys for Aerospace parts machining.

G-Body

Aerospace Tooling



G-Body Improved body durability by ultra-rigid "G-Body".

Internal Coolant Supply

High Precision

True 90 degrees shoulder milling up to 15 mm D.O.C

High Efficiency

High metal removal rate (Aluminium alloy, Q=2,250cc/min by dia 50mm cutter). Key on the backside of insert is for rigidity and positional stability.

Multi-purpose

Ramping, Shoulder milling, Slotting, Pocket milling and Helical interpolation are possible.

G-Body

GN surface-hardening treatment on thermal resistant high strength steel gives high hardness over 65HRC and secure insert pocket and holder against thermal deformation. Improved body durability and tool life compared with competitor's tool. Make it difficult to be damaged even under severe cutting conditions. Also rust-proof and anti-welding effect is much improved.

Aero Chipper ALXTYPE

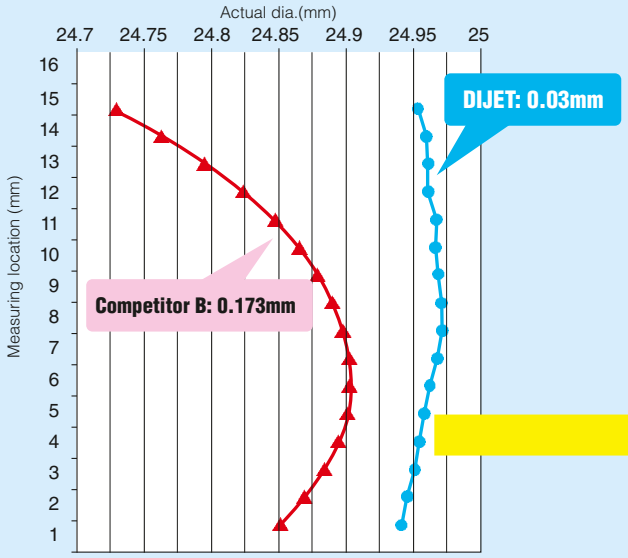
■ CUTTING PERFORMANCE of DIJET against competitor

Aerospace Tooling G-Body

Accuracy on cutting edge

High Precision

■ Accuracy comparison on cutting edge (Nominal dia.: φ25)

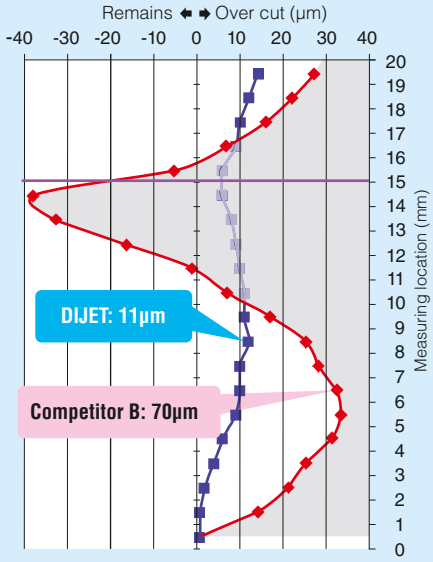


AERO CHIPPER showed much precise dimensions on insert than competitor B'sinsert.
Accuracy on cutting edge DIJET: 0.03mm, Competitor B: 0.173mm

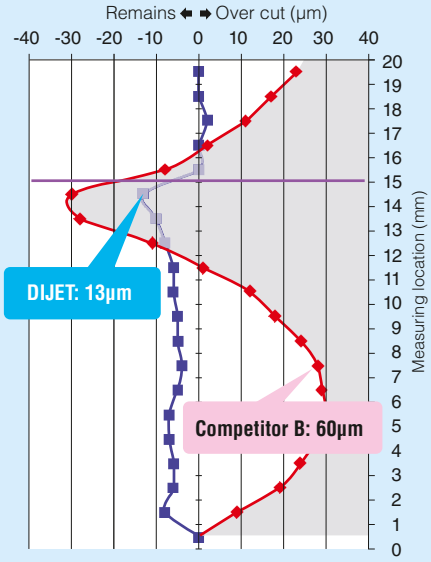
Machining accuracy

High Precision

■ Accuracy comparison on machined wall (ap=15mm, fz=0.4mm/t)



■ Accuracy comparison on machined wall (ap=15mm, fz=0.6mm/t)



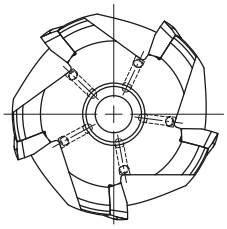
Tool dia.: φ25 (DIJET: Modular head MAL + MSN carbide shank holder)
Work material: A5056 n=20,000 (min^{-1}), Vc=1,570 (m/min), ap=15 (mm) (2 times), ae=3 (mm), Wet, Down cut

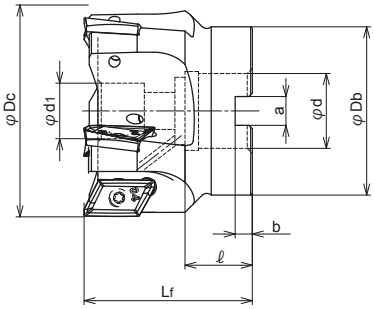
During 15mm cutting length, AERO CHIPPER showed 4 times better accuracy.

Aero Chipper ALXTYPE

G-Body Through Coolant Hole

Face Milling | Pocket Milling | Slotting | Shoulder Milling | Helical Interpolation





■ BODY / FACE MILL TYPE

Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	Lf	φDb	φd	φd1	a	b	ℓ	Weight (kg)	Max. spindle speed (min⁻¹)	Insert	Parts: Clamp Screw	Parts: Wrench
Metric Bore	**ALX4050R-22**	●	4	**50**	50	45	22	16.5	10.4	5	20	0.4	24,000	XOGT1605○○PDⓄR	DSW-4085	A-15T
	ALX5063R-22	●	5	**63**	50	50	22	16.5	10.4	5	20	0.6	21,000			

Note)
1. Please refer page C224-C225 for recommended cutting conditions
2. All cutters are supplied without inserts
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.
4. In case of cutting speed over 1,000m/min, please use arbor which is balanced for high RPM. (Recommended to use Grade G6.3 arbor)
5. Body must be modified to 2.6 radius or 2.3 chamfer at corner to use 4.0mm corner radius insert.

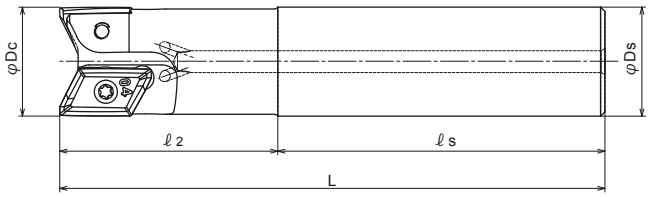
Modular Head Type Please refer Page B147

Clamp screw	Recommended torque (N・m)
DSW-4085	3.6

●: Standard stock items □: Stock in Japan ○: Soon to be deleted

Aero Chipper ALXTYPE

G-Body Through Coolant Hole



■ BODY / END MILL TYPE

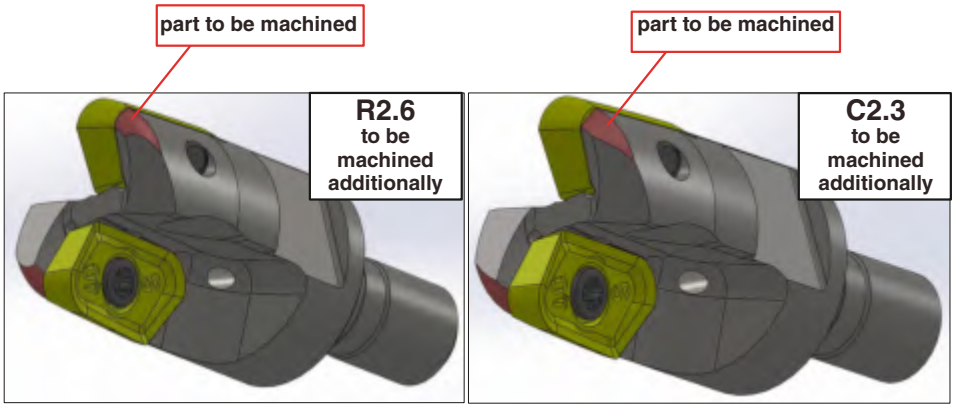
Type	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	ℓ2	ℓs	L	φDs	Max. spindle speed (min⁻¹)	Insert	Parts: Clamp Screw	Parts: Wrench
Regular type	ALXM1020S20	●	1	20	35	75	110	20	15,000	XOGT1605○PD○R	DSW-4075	A-15T
	ALXM2025S25	●	2	25	50	75	125	25	40,000		DSW-4085	
	ALXM2028S25	●	2	28	50	75	125	25	36,000			
	ALXM2032S32	●	2	32	50	100	150	32	33,000			
	ALXM2035S32	●	2	35	50	100	150	32	31,000			
	ALXM3040S32	●	3	40	80	90	170	32	28,000			

Note)
1. Please refer page C224-C225 for recommended cutting conditions
2. All cutters are supplied without inserts
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.
4. In case of cutting speed over 1,000m/min, please use arbor which is balanced for high RPM. (Recommended to use Grade G6.3 arbor)
5. Body must be modified to 2.6 radius or 2.3 chamfer at corner to use 4.0mm corner radius insert.

Modular Head Type Please refer Page B147

Clamp screw	Recommended torque (N・m)
DSW-4075	3.6
DSW-4085	3.6

■ PART TO BE MODIFIED FOR MOUNTING XOGT160540PDFR TO ALX/MAL BODY



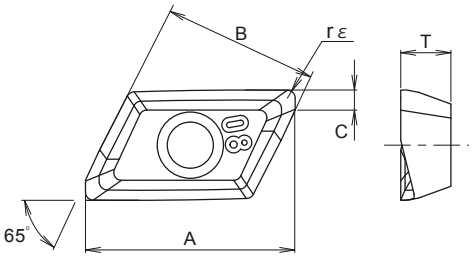
●: Standard stock items □: Stock in Japan ○: Soon to be deleted

Aero Chipper ALXTYPE

■ INSERTS

FZ05

JC5118



Cat. No.	Tole-rance	Dimensions (mm)					Uncoated	PVD coated
		A	B	C	T	rε	FZ05	JC5118
XOGT160502PDFR	G	20.8	16.35	2.5	5	0.2	●	
XOGT160504PDFR	G	21.0	16.35	2.4	5	0.4	●	
XOGT160508PDFR	G	21.0	16.35	2.4	5	0.8	●	
XOGT160512PDFR	G	20.9	16.35	2.5	5	1.2	●	
XOGT160516PDFR	G	20.7	16.35	2.6	5	1.6	●	
XOGT160520PDFR	G	20.6	16.35	2.8	5	2.0	●	
XOGT160525PDFR	G	20.3	16.35	3.0	5	2.5	●	
XOGT160530PDFR	G	20.1	16.35	3.3	5	3.0	●	
XOGT160532PDFR	G	19.9	16.35	3.5	5	3.2	●	
NEW XOGT160540PDFR	G	19.1	16.35	4.3	5	4.0	●	
XOGT160502PDER	G	20.8	16.35	2.5	5	0.2		●
XOGT160504PDER	G	21.0	16.35	2.4	5	0.4		●
XOGT160508PDER	G	21.0	16.35	2.4	5	0.8		●
XOGT160512PDER	G	20.9	16.35	2.5	5	1.2		●
XOGT160516PDER	G	20.7	16.35	2.6	5	1.6		●
XOGT160520PDER	G	20.6	16.35	2.8	5	2.0		●
XOGT160530PDER	G	20.1	16.35	3.3	5	3.0		●
XOGT160532PDER	G	19.9	16.35	3.5	5	3.2		●

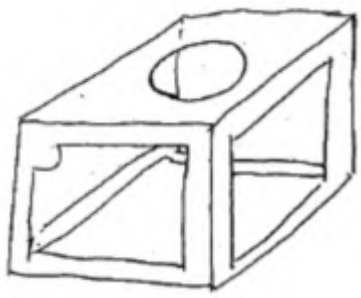
10 inserts per case

Aero Chipper ALXTYPE

■ CASE STUDIES

1. Pocket milling for Aluminium alloy

Work size: 580×600×760

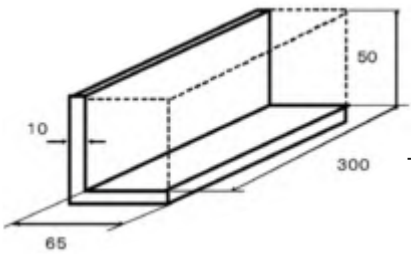


Work	Part name	Test piece
	Material	A5052
	Hardness	-
Tool	Tool No.	ALX4050R-22
	Grade	XOGT160504PDFR (FZ05)
Cutting conditions	Vc, (n)	1,885m/min (12,000min^{-1})
	Vf, (f z)	9,000mm/min (0.19mm/t)
	ap (mm)	5mm
	ae (mm)	50mm
	Coolant	Water soluble (External)
	Machine	Horizontal MC

Result: Metal removal rate was maximum Q=2,250cc/min. Low spindle load and good surface roughness.

2.Titanium alloy (Thin shape work)

Overhung length: 100mm



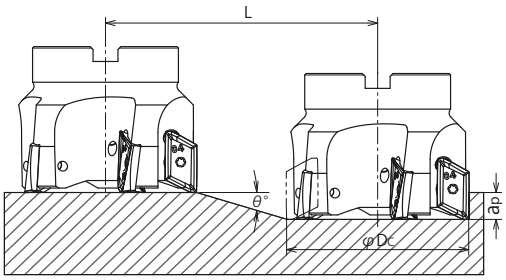
Work	Part name	Aircraft parts
	Material	Ti-6Al-4V
	Hardness	41HRC
Tool	Tool No.	ALX5063R
	Grade	XOGT160508PDER (JC5118)
Cutting conditions	Vc, (n)	40m/min (200min^{-1})
	Vf, (f z)	100mm/min (0.1mm/t)
	ap (mm)	8mm
	ae (mm)	40mm
	Coolant	Water soluble (External)
	Machine	Vertical MC

Result: Metal removal rate was maximum Q=32cc/min. No chattering on such thin shape work.

Aero Chipper ALXTYPE

■ INSTRUCTIONS FOR PROFILE MILLING

Ramping

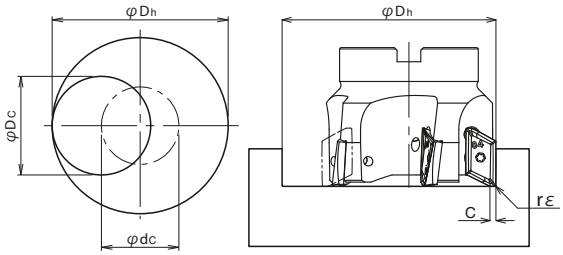


Tool dia. (mm)	Aluminium alloy		Stainless steel		Titanium alloy		Max. depth of cut (mm)
	Max. ramping angle (°)	Total cutting length (mm)	Max. ramping angle (°)	Total cutting length (mm)	Max. ramping angle (°)	Total cutting length (mm)	
φDc	θ°	L	θ°	L	θ°	L	ap
20	16	28	10	45	10	45	8
25	11	41	9	51	9	51	8
28	9	51	7	65	7	65	8
32	7	65	6	76	6	76	8
35	6	76	6	76	6	76	8
40	5	91	5	91	5	91	8
50	4	114	4	114	4	114	8
63	3	153	3	153	3	153	8

■ NOTE

1) In case of ramping, apply 70% or less feed per tooth from slotting application. (Page C225)
2) In case of Titanium alloy and Stainless steel, feed per tooth up to 0.05mm is recommended.
3) In case of Titanium alloy and Stainless steel, recommended wet cutting.

Helical Interpolation



● Calculation of tool pass dia.

$$\varphi dc = \varphi Dh - \varphi Dc$$

Tool pass dia. Bore dia. Tool dia.

● Max. bore dia.
φDh=(φDc−rφ−0.3)×2

● Min.bore dia.
φDh=(φDc−C 0.3)×2

● Depth of cut per one circuit should not exceed max. depth of cut ap

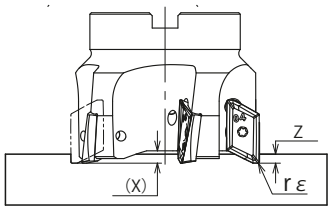
● Down cutting is recommended, so tool pass rotation should be counter clockwise.

Tool dia. (mm)	Min. bore dia. (mm)	Max. bore dia. (mm)	Helical interpolation depth/tool path rev. (mm)		
φDc	φDh min.	φDh max.	Aluminium alloy	Stainless steel	Titanium alloy
20	36.8	38.6	15	9	9
25	46.8	48.6	13	11	11
28	52.8	54.6	12	10	10
32	60.8	62.6	11	10	10
35	66.8	68.6	11	11	11
40	76.8	78.6	10	10	10
50	96.8	98.6	10	10	10
63	122.8	124.6	10	10	10

■ NOTE

1) Min. & Max. bore dia. at this table is for insert corner radius R0.4, so in case ofthe other corner radius, please calculate Min. & Max. bore dia. according to the above table for "Calculation of tool pass dia."
2) In case of helical interpolation, apply 70% or less feed per tooth from slotting application (page C225).
3) In case of Titanium alloy and Stainless steel, feed per tooth up to 0.05mm is recommended.
4) Incase of Titanium alloy and Stainless steel, recommended wet cutting.

Drilling



Insert corner radius (mm)	Max. drilling depth: Z (mm)
rε	Z
Up to R2.5	3
R3/R3.2	2

■ NOTE

1) Do not continue ramping after drilling.
2) In case of drilling, apply 50% or less Z axis feed speed from standard cutting condition table.
3) Long consecutive chips may come out in case of drilling, confirm the safe condition sufficiently.

Aero Chipper ALXTYPE

■ RECOMMENDED CUTTING CONDITIONS

● FACE MILL TYPE

Work Materials	Insert Grades	Tool dia. (mm) 50					63				
		ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ℓ (mm)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)
Aluminium alloy 50-110HB	FZ05	100	8	35	6,300	5,040	100	8	45	5,000	5,000
		150	4	35	6,300	3,020	150	4	45	5,000	3,000
		200	3	35	6,300	1,760	200	3	45	5,000	1,750
Stainless steel Below 250HB	JC5118	100	3	35	950	380	100	2	45	760	380
		150	2	35	950	190	150	2	45	760	190
Titanium alloy 35-43HRC	JC5118	100	8	35	380	122	100	8	45	300	120
		150	4	35	380	106	150	4	45	300	105
		200	2	35	380	91	200	2	45	300	90

ℓ: Overhunglength, ap: Axialdepthofcut, ae: Widthofcut, n: Spindlespeed, Vf: Feedspeed

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case chatter occurrs, recommend to reduce depth of cut or spindle speed.
3. In case of full slotting, recommend to reduce spindles peed and feed speed by70% of above figures. And depth of cut ap up to 8mm is recommended.

● END MILL TYPE

Work Materials	Insert Grades	Type of machining	Tool dia.(mm) 20				25				28			
			ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)
Aluminium alloy 50-110HB	FZ05	Shoulder Milling	12	4	14,000	2,800	12	5	12,000	4,800	12	5.6	11,000	4,400
			8	14	14,000	2,520	8	18	12,000	4,320	8	20	11,000	3,960
		Slotting	6	20	12,000	2,400	6	25	10,000	4,000	8	28	9,200	3,680
Stainless steel Below250HB	JC5118	Shoulder Milling	5	4	2,400	240	5	5	1,900	380	5	6	1,700	340
			2	14	2,400	240	2	8	1,900	380	2	20	1,700	340
		Slotting	2	20	2,000	100	2	25	1,600	160	2	28	1,400	140
Titaniumalloy 35-43HRC	JC5118	Shoulder Milling	12	4	950	95	12	5	764	153	12	5.6	685	137
			8	14	950	76	8	18	764	122	8	20	685	110
		Slotting	6	20	800	64	6	25	640	102	8	28	570	91

Work Materials	Insert Grades	Type of machining	Tool dia.(mm) 32				35				40			
			ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)	ap (mm)	ae (mm)	n (min-1)	Vf (mm/min)
Aluminium alloy 50-110HB	FZ05	Shoulder Milling	12	6.4	9,500	3,800	12	7	9,000	3,600	12	8	7,800	4,680
			8	22	9,500	3,420	8	25	9,000	3,240	8	28	7,800	4,210
		Slotting	8	32	8,000	3,200	8	35	7,200	2,880	8	40	6,400	3,840
Stainless steel Below250HB	JC5118	Shoulder Milling	8	6	1,500	300	8	7	1,355	271	3	8	1,200	360
			3	22	1,500	300	3	25	1,355	271	2	28	1,200	360
		Slotting	2	35	1,200	120	2	35	1,100	110	1	40	1,000	150
Titanium alloy 35-43HRC	JC5118	Shoulder Milling	12	6.4	600	120	12	7	545	109	12	8	480	144
			8	22	600	96	8	25	545	87	8	28	480	115
		Slotting	8	32	500	80	8	35	450	72	8	40	400	96

ap: Axial depth of cut, ae: Width of cut, n: Spindle speed, Vf: Feed speed

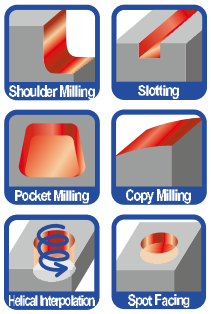
Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case chatter occurrs, recommend to reduce depth of cut or spindle speed.

Super End Chipper

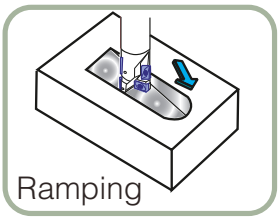
SECTYPE

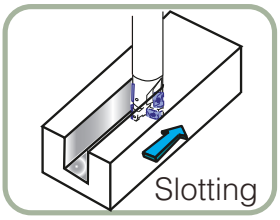
The multi-purpose indexable end mill for intelligent milling in all directions.

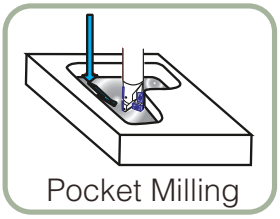
1. Ramping, plunge milling, copy milling and also drilling capability.
2. Excellent performance in opened and closed slotting, spot facing and cavity milling.
3. Large depth of cut and low cutting force at higher feed rate for high productivity.
4. Secure cutter geometry, insert geometry and grades are solutions in any operation.
5. Polished insert for Aluminium is also available.

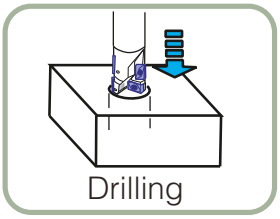


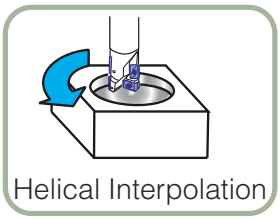
■ Versatility of "SUPER END CHIPPER"

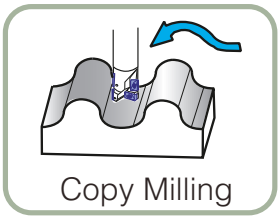


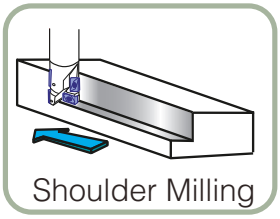


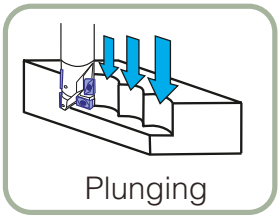






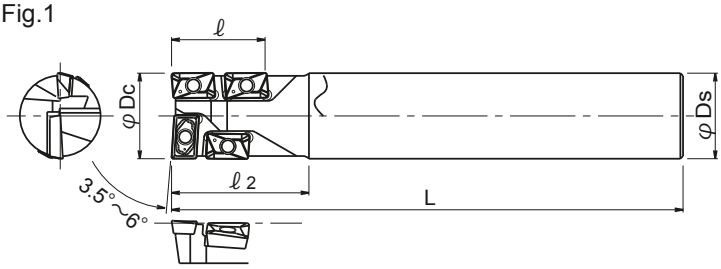






Super End Chipper SECTYPE

Fig.1



Clamp Screw	Recommended torque (N・m)
TSW-2250	0.6
ESW-206	0.9
DSW-307	1.4
TSW-408	3.1
DSW-4510H	6.0

■ BODY

	Cat. No.	Stock	No. of Inserts Central	No. of Inserts Peripheral	Dimensions (mm) φDc	ℓ	ℓ1	ℓ2	L	φDs	Inserts Central	Inserts Peripheral	Parts Clamp Screw	Parts Wrench	Fig.
Standard type	SECM1616S16	●			16	16	–	50	130	16	ZDMT08T208L○	ZPMT09T208R○	TSW-2250	A-07SD	1
	SECM2021S20	●			20	21	–	55	130	20	ZDMT100308L○	ZCMT100308R○	ESW-206	A-08SD	1
	SECM2121S20	□			21	21	–	35	130	20	ZDMT100308L○	ZCMT100308R○	ESW-206	A-08SD	1
	SECM2427S25	□			24	27	–	60	140	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECM2527S25	●	1	3	25	27	–	60	140	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECM2627S25	□			26	27	–	40	140	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECM3034S32	□			30	34.5	–	70	150	32	ZPMT150408L○	ZPMT160408R○	TSW-408	A-15	1
	SECM3234S32	●			32	34.5	–	70	150	32	ZPMT1604○○L○	ZPMT1604○○R○	TSW-408	A-15	1
	SECM3334S32	□			33	34.5	–	50	150	32	ZPMT1604○○L○	ZPMT1604○○R○	TSW-408	A-15	1
Medium long type	SECML1616S15	●			16	16	–	30	150	15	ZDMT08T208L○	ZPMT09T208R○	TSW-2250	A-07SD	1
	SECML1616S16	●			16	16	–	65	150	16	ZDMT08T208L○	ZPMT09T208R○	TSW-2250	A-07SD	1
	SECML2021S20	●			20	21	–	65	150	20	ZDMT100308L○	ZCMT100308R○	ESW-206	A-08SD	1
	SECML2121S20	□			21	21	–	35	150	20	ZDMT100308L○	ZCMT100308R○	ESW-206	A-08SD	1
	SECML2427S25	□	1	3	24	27	–	70	180	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECML2527S25	●			25	27	–	70	180	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECML2627S25	□			26	27	–	40	180	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECML3234S32	●			32	34.5	–	80	190	32	ZPMT1604○○L○	ZPMT1604○○R○	TSW-408	A-15	1
	SECML3334S32	□			33	34.5	–	50	190	32	ZPMT1604○○L○	ZPMT1604○○R○	TSW-408	A-15	1

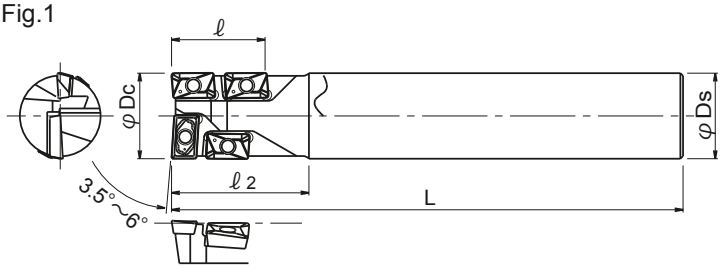
Note) 1. All cutters are supplied without inserts.
2. Please refer page C232-C236 for recommended cutting conditions.
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.

Modular Head Type Please refer Page B141

● Standard stock items □: Stock in Japan ○: Soon to be deleted

Super End Chipper SECTYPE

Fig.1



Clamp Screw	Recommended torque (N・m)
TSW-2250	0.6
ESW-206	0.9
DSW-307	1.4
TSW-408	3.1
DSW-4510H	6.0

■ BODY

	Cat. No.	Stock	No. of Inserts Central	No. of Inserts Peripheral	Dimensions (mm) φDc	ℓ	ℓ1	ℓ2	L	φDs	Inserts Central	Inserts Peripheral	Parts Clamp Screw	Parts Wrench	Fig.
Long type	SECL1616S15	●	1	3	16	16	–	30	180	15	ZDMT08T208L○	ZPMT09T208R○	TSW-2250	A-07SD	1
	SECL1616S16	●			16	16	–	75	180	16	ZDMT08T208L○	ZPMT09T208R○	TSW-2250	A-07SD	1
	SECL2021S20	●			20	21	–	75	185	20	ZDMT100308L○	ZCMT100308R○	ESW-206	A-08SD	1
	SECL2121S20	□			21	21	–	35	185	20	ZDMT100308L○	ZCMT100308R○	ESW-206	A-08SD	1
	SECL2427S25	□			24	27	–	75	220	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECL2527S25	●			25	27	–	75	220	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECL2627S25	□			26	27	–	40	220	25	ZDMT13T3○○L○	ZPMT13T3○○R○	DSW-307	A-10	1
	SECL3034S32	□			30	34.5	–	100	180	32	ZPMT150408L○	ZPMT160408R○	TSW-408	A-15	1
	SECL3234S32	●			32	34.5	–	90	230	32	ZPMT1604○○L○	ZPMT1604○○R○	TSW-408	A-15	1
	SECL3334S32	□			33	34.5	–	50	230	32	ZPMT1604○○L○	ZPMT1604○○R○	TSW-408	A-15	1

Note) 1. All cutters are supplied without inserts.
2. Please refer page C232-C236 for recommended cutting conditions.
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.

Modular Head Type Please refer Page B141

● Standard stock items □: Stock in Japan ○: Soon to be deleted

Super End Chipper SECTYPE

■ INSERTS

SERIES EXPANSION: POLISHED INSERT FOR ALUMINIUM

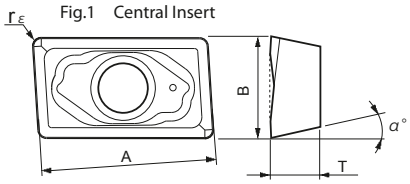
Z※MT-L type

(Central Insert)

Z※MT-LP type

(Central Insert, Polished)

Fig.1 Central Insert



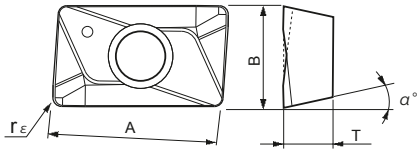
Z※MT-R type

(Peripheral Insert)

Z※MT-RP type

(Central Insert, Polished)

Fig.2 Peripheral Insert



Cat. No.	PVD coated		Uncoated	Dimensions (mm)					Fig.
	JC5015	JC5040	FZ15	A	B	T	α°	rε	
ZDMT08T208L	●	●		7.9	6	2.78	15	0.8	1
ZDMT08T208LP			●	7.9	6	2.78	15	0.8	1
ZPMT09T208R	●	●		9	5.4	2.78	11	0.8	2
ZPMT09T208RP			●	9	5.4	2.78	11	0.8	2
ZDMT100308L	●	●		10.4	6.35	3.4	15	0.8	1
ZDMT100308LP			●	10.4	6.35	3.4	15	0.8	1
ZCMT100308R	●	●		10.4	6.35	3.4	7	0.8	2
ZCMT100308RP			●	10.4	6.35	3.4	7	0.8	2
ZDMT13T308L	●	●		12.9	7.938	3.97	15	0.8	1
ZDMT13T308LP			●	12.9	7.938	3.97	15	0.8	1
ZPMT13T308R	●	●		13.3	7.938	3.97	11	0.8	2
ZPMT13T308RP			●	13.3	7.938	3.97	11	0.8	2
ZDMT13T320L	●	●		12.9	7.938	3.97	15	2.0	1
ZDMT13T320LP			□	12.9	7.938	3.97	15	2.0	1
ZPMT13T320R	●	●		13.3	7.938	3.97	11	2.0	2
ZPMT13T320RP			□	13.3	7.938	3.97	11	2.0	2
ZPMT150408L	●	●		15.45	9.525	4.76	11	0.8	1
ZPMT150408LP			●	15.45	9.525	4.76	11	0.8	1
ZPMT160408L	●	●		16.45	9.525	4.76	11	0.8	1
ZPMT160408LP			●	16.45	9.525	4.76	11	0.8	1
ZPMT160408R	●	●		16	9.525	4.76	11	0.8	2
ZPMT160408RP			●	16	9.525	4.76	11	0.8	2
ZPMT160416L	●	●		16.45	9.525	4.76	11	1.6	1
ZPMT160416LP			●	16.45	9.525	4.76	11	1.6	1

10 inserts per case

Super End Chipper SECTYPE

■ INSERTS

SERIES EXPANSION: POLISHED INSERT FOR ALUMINIUM

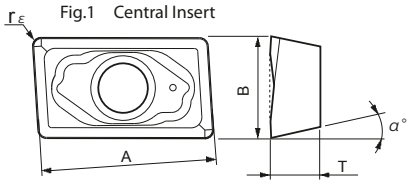
Z※MT-L type

(Central Insert)

Z※MT-LP type

(Central Insert, Polished)

Fig.1 Central Insert



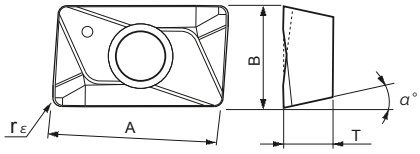
Z※MT-R type

(Peripheral Insert)

Z※MT-RP type

(Central Insert, Polished)

Fig.2 Peripheral Insert



Cat. No.	PVD coated		Uncoated	Dimensions (mm)					Fig.
	JC5015	JC5040	FZ15	A	B	T	α°	rε	
ZPMT160416R	●	●		16	9.525	4.76	11	1.6	2
ZPMT160416RP			□	16	9.525	4.76	11	1.6	2
ZPMT160420L	●	●		16.45	9.525	4.76	11	2.0	1
ZPMT160420LP			□	16.45	9.525	4.76	11	2.0	1
ZPMT160420R	●	●		16	9.525	4.76	11	2.0	2
ZPMT160420RP			□	16	9.525	4.76	11	2.0	2
ZPMT160430L	●	□		16.45	9.525	4.76	11	3.0	1
ZPMT160430LP			□	16.45	9.525	4.76	11	3.0	1
ZPMT160430R	●	●		16	9.525	4.76	11	3.0	2
ZPMT160430RP			□	16	9.525	4.76	11	3.0	2
ZPMT160432L	●	□		16.45	9.525	4.76	11	3.2	1
ZPMT160432LP			□	16.45	9.525	4.76	11	3.2	1
ZPMT160432R	●	●		16	9.525	4.76	11	3.2	2
ZPMT160432RP			□	16	9.525	4.76	11	3.2	2

10 inserts per case

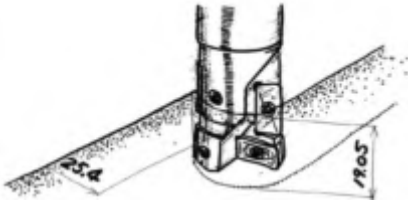
● Standard stock items □: Stock in Japan ○: Soon to be deleted

Super End Chipper SECTYPE

■ CASE STUDIES

1. Deep machining for injection mold

Plunging and Side milling

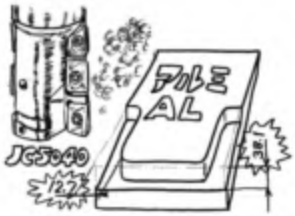


Result: Increased the productivity by 5 times against dia. 50.8 radius cutter with 5 flutes.

Work	Part name	Injection mold
	Material	P20
	Hardness	30-34HRC
Tool	Tool No.	SECL3234S32
	Grade	JC5040
Cutting conditions	Vc, (n)	1,400 (min^{-1}), 141 (m/min)
	Vf, (f z)	508 (mm/min), 0.36 (mm/rev)
	ap (mm)	19.05 (mm)
	ae (mm)	25.4 (mm)
	Coolant	Airblow
	Machine	Vertical MC

2. High efficient machining for aluminium

Shoulder milling

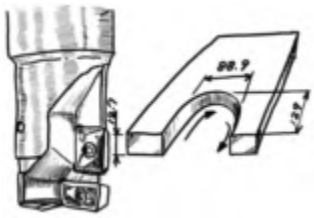


Result: Increased the productivity by 2.4 times against exsiting indexable end mill.

Work	Part name	Aluminium plate
	Material	Aluminium alloy
	Hardness	—
Tool	Tool No.	SECML3234S32
	Grade	JC5040
Cutting conditions	Vc, (n)	2,500 (min^{-1}), 251 (m/min)
	Vf, (f z)	762 (mm/min), 0.3 (mm/rev)
	ap (mm)	38.1 (mm)
	ae (mm)	12.7 (mm)
	Coolant	Wetcut
	Machine	Vertical MC

3. Slot milling

U groove milling

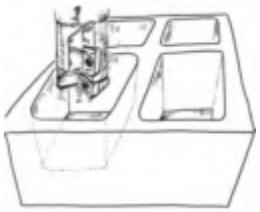


Result: Increased feed speed by 1.6 times andi mproved tool life by 2 times compared with competitor.

Work	Part name	Heat resistant plate
	Material	Heat resistant alloy
	Hardness	—
Tool	Tool No.	SECML2527S25
	Grade	JC5040
Cutting conditions	Vc, (n)	1,400 (min^{-1}), 110 (m/min)
	Vf, (f z)	635 (mm/min), 0.45 (mm/rev)
	ap (mm)	12.7 (mm)
	ae (mm)	25.4 (mm)
	Coolant	Water soluble
	Machine	Vertical MC

4. High efficient machining

Pocket milling



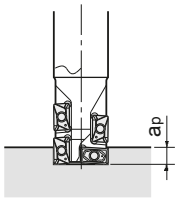
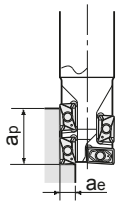
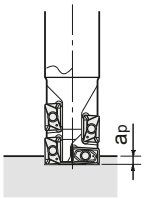
Result: Increased chip removal rate and tool life by 3 times. Q=8,000cm^3/corner.

Work	Part name	Cavity mold
	Material	S53C
	Hardness	—
Tool	Tool No.	SECM3334S32
	Grade	JC5040
Cutting conditions	Vc, (n)	1,200 (min^{-1}),124 (m/min)
	Vf, (f z)	320 (mm/min), 0.26 (mm/rev)
	ap (mm)	12 (mm)
	ae (mm)	23–33 (mm)
	Coolant	Dry cut
	Machine	Vertical MC

Super End Chipper SECTYPE

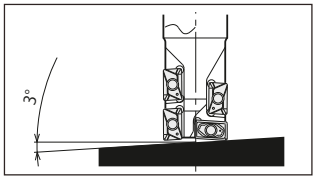
■ RECOMMENDED CUTTING CONDITIONS

● φ30, φ32, φ33mm

Type of Machining							
Work Materials	Insert Grades	Cutting conditions	Slotting		Shoulder milling		Drilling
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	1,490	1,390	1,590	1,590	1,490
		Vf (mm/min)	450	310	550	400	370
		ap (mm)	~6	6~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	1,490	1,390	1,590	1,590	1,490
		Vf (mm/min)	420	280	480	350	300
		ap (mm)	~6	6~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	1,290	1,190	1,290	1,290	1,290
		Vf (mm/min)	320	240	390	260	250
		ap (mm)	~5	5~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	1,190	1,100	1,290	1,290	1,190
		Vf (mm/min)	300	220	390	260	240
		ap (mm)	~5	5~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,100	1,000	1,190	1,190	1,100
		Vf (mm/min)	275	200	360	240	165
		ap (mm)	~5	5~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	1,690	1,590	1,790	1,790	1,690
		Vf (mm/min)	680	480	700	540	500
		ap (mm)	~8	8~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Nodular cas tiron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	1,490	1,390	1,590	1,590	1,490
		Vf (mm/min)	520	350	560	400	370
		ap (mm)	~8	8~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	3,000	3,000	3,000	3,000	3,000
		Vf (mm/min)	1,200	900	1,500	900	900
		ap (mm)	~8	8~16	~8	8~34	~5
		ae (mm)	—	—	~16	~6	—

n: Spindle speed, Vf: Feed speed, ap: Axial depth of cut, ae: Radial depth of cut

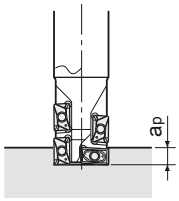
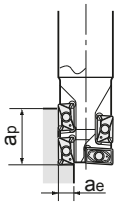
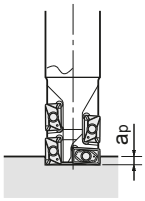
Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using medium long, long and extra long type, refer page C236 for instructions for use of SEC type.
3. In case of ramping, ramping angle up to 3° is recommended. (Refer right picture)



Super End Chipper SECTYPE

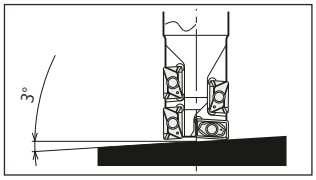
■ RECOMMENDED CUTTING CONDITIONS

● φ24, φ25, φ26mm

Type of Machining							
Work Materials	Insert Grades	Cutting conditions	Slotting		Shoulder milling		Drilling
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	1,910	1,780	2,040	2,040	1,910
		Vf (mm/min)	520	350	610	400	470
		ap (mm)	~5	5~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	1,910	1,780	2,040	2,040	1,910
		Vf (mm/min)	480	320	550	360	380
		ap (mm)	~5	5~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	1,530	1,400	1,650	1,650	1,530
		Vf (mm/min)	380	250	440	290	300
		ap (mm)	~4	4~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	1,530	1,400	1,650	1,650	1,530
		Vf (mm/min)	380	250	440	290	300
		ap (mm)	~4	4~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,400	1,270	1,530	1,530	1,400
		Vf (mm/min)	320	200	380	270	210
		ap (mm)	~4	4~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	2,040	1,910	2,160	2,160	2,040
		Vf (mm/min)	700	470	750	540	600
		ap (mm)	~5	5~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	1,910	1,780	2,040	2,040	1,910
		Vf (mm/min)	570	390	650	460	480
		ap (mm)	~5	5~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	3,820	3,820	3,820	3,820	3,820
		Vf (mm/min)	1,340	960	1,900	960	1,150
		ap (mm)	~5	5~12	~7	7~27	~4
		ae (mm)	—	—	~12	~5	—

n: Spindle speed, Vf: Feed speed, ap: Axial depth of cut, ae: Radial depth of cut

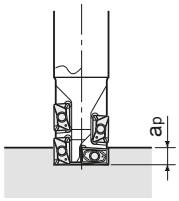
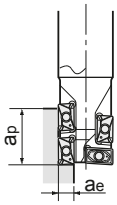
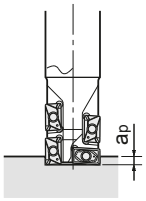
Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using medium long, long and extra long type, refer page C236 for instructions for use of SEC type.
3. In case of ramping, ramping angle up to 3° is recommended. (Refer right picture)



Super End Chipper SECTYPE

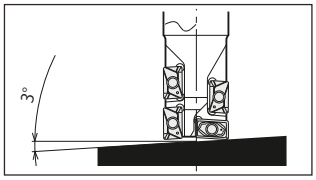
■ RECOMMENDED CUTTING CONDITIONS

● φ20, φ21mm

Type of Machining							
Work Materials	Insert Grades	Cutting conditions	Slotting		Shoulder milling		Drilling
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	2,390	2,230	2,550	2,550	2,390
		Vf (mm/min)	600	380	680	510	480
		ap (mm)	~4	4~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	2,390	2,230	2,550	2,550	2,390
		Vf (mm/min)	540	350	630	460	430
		ap (mm)	~4	4~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	1,910	1,750	2,070	2,070	1,910
		Vf (mm/min)	430	275	520	370	340
		ap (mm)	~3	3~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	1,910	1,750	2,070	2,070	1,910
		Vf (mm/min)	430	275	520	370	340
		ap (mm)	~3	3~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,750	1,590	1,910	1,910	1,750
		Vf (mm/min)	385	240	430	305	260
		ap (mm)	~3	3~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	2,500	2,390	2,700	2,700	2,500
		Vf (mm/min)	750	530	810	610	630
		ap (mm)	~4	4~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	2,390	2,230	2,550	2,550	2,390
		Vf (mm/min)	600	400	700	500	480
		ap (mm)	~4	4~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	4,780	4,780	4,780	4,780	4,780
		Vf (mm/min)	1,440	1,100	1,900	1,100	1,100
		ap (mm)	~4	4~10	~5	5~21	~3
		ae (mm)	—	—	~10	~4	—

n: Spindle speed, Vf: Feed speed, ap: Axial depth of cut, ae: Radial depth of cut

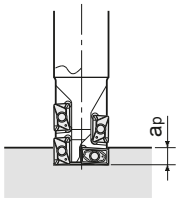
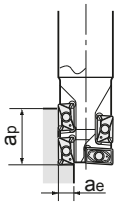
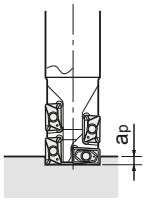
Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using medium long, long and extra long type, refer page C236 for instructions for use of SEC type.
3. In case of ramping, ramping angle up to 3° is recommended. (Refer right picture)



Super End Chipper SECTYPE

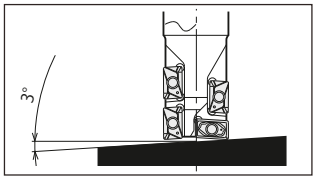
■ RECOMMENDED CUTTING CONDITIONS

● φ 16mm

Type of Machining							
Work Materials	Insert Grades	Cutting conditions	Slotting		Shoulder milling		Drilling
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	2,790	2,590	2,980	2,980	2,790
		Vf (mm/min)	560	310	630	450	420
		ap (mm)	~3	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	2,790	2,590	2,980	2,980	2,790
		Vf (mm/min)	500	280	570	410	380
		ap (mm)	~3	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	2,190	1,990	2,390	2,390	2,190
		Vf (mm/min)	390	250	480	330	260
		ap (mm)	~2.5	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	2,190	1,990	2,390	2,390	2,190
		Vf (mm/min)	390	250	480	330	260
		ap (mm)	~2.5	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,990	1,790	2,190	2,190	1,990
		Vf (mm/min)	350	220	430	280	240
		ap (mm)	~2.5	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	2,980	2,790	3,180	3,180	2,980
		Vf (mm/min)	720	500	760	570	520
		ap (mm)	~3	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	2,790	2,590	2,980	2,980	2,790
		Vf (mm/min)	560	310	630	450	420
		ap (mm)	~3	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	6,000	6,000	6,000	6,000	6,000
		Vf (mm/min)	1,440	1,100	1,800	1,100	1,100
		ap (mm)	~3	3~8	~5	5~16	~2
		ae (mm)	—	—	~8	~3	—

n: Spindle speed, Vf: Feed speed, ap: Axial depth of cut, ae: Radial depth of cut

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using medium long, long and extra long type, refer page C236 for instructions for use of SEC type.
3. In case of ramping, ramping angle up to 3° is recommended. (Refer right picture)



Super End Chipper SECTYPE

INSTRUCTIONS FOR USE OF SEC TYPE

1. The cutting parameters to be adjusted according the machine rigidity or work rigidity.
2. Apply below table figures for the use of Medium long, Long and Extralong type tools.

Type	Depth of cut ap	Spindle speed n	Feed speed Vf
Medium Long (ML)	80%	90%	80%
Long (L)	Up to 30%	70%	70%
Extra Long (EL, XL)	Up to 1mm	50%	60%

Tool dia. (mm)	A1 (mm) (Fig. 1)	Depth of cut: T (mm) (Fig. 2)
16	5.2	~5.2 or 11.8~15.5
20, 21	5.5	~5.5 or 14.0~17.5
24, 25, 26	7.0	~7.0 or 16.8~23.2
30, 32, 33	8.6	~8.6 or 20.3~28.1

Fig.1

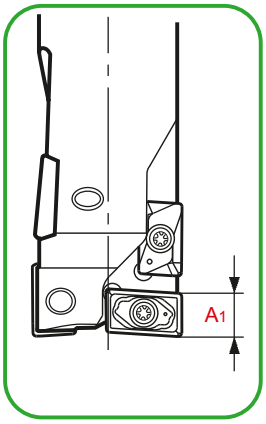
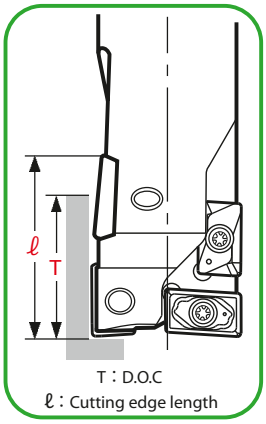
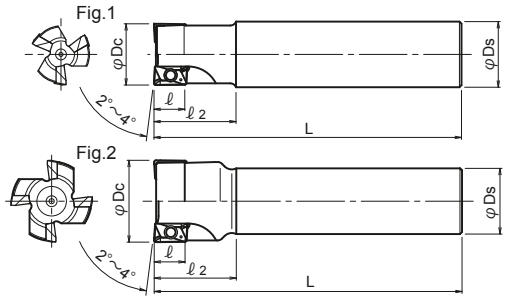


Fig.2



Side Chipper SICTYPE

1. The same insert of Super End Chipper can be used.
2. 3D insert geometry gives low cutting force and excellent chip ejection for high productivity.
3. Series expansion: Polished insert and PCD insert for Aluminium.



■ BODY / END MILL - MEDIUM TYPE

Cat. No.	Stock	No. of Inserts	Dimensions (mm) φDc	ℓ	ℓ2	L	φDs	Inserts	Fig.
SICM1610S16-2N	●	2	16	10	25	100	16	ZCMT1003○○R○	1
SICM2010S20-3N	●	3	20	10	25	110	20	JDA-ZCGT1003○○	1
SICM2510S25-4N	●	4	25	10	32	120	25		1
SICM2513S25-3N	●	3		13				ZPMT13T3○○R○	1
SICM3016S32-3N	●	3	30	15	40	150	32	ZPMT1604○○R○	1
SICM3210S32-5N	●	5	32	10	40	150	32	ZCMT1003○○R○ JDA-ZCGT1003○○	1
SICM3216S32-3N	●	3		15				ZPMT1604○○R○	1
SICM4010S32-6N	●	6	40	10	40	150	32	ZCMT1003○○R○ JDA-ZCGT1003○○	2
SICM4016S32-4N	●	4		15				ZPMT1604R	2
SICM5010S32-7N	□	7	50	10	40	150	32	ZCMT1003○○R○ JDA-ZCGT1003○○	2
SICM5016S32-5N	●	5		15				ZPMT1604○○R○	2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C240-C245 for recommended cutting conditions.
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.

Modular Head Type Please refer Page B135

■ BODY / END MILL - LONG TYPE

Cat. No.	Stock	No. of Inserts	Dimensions (mm) φDc	ℓ	ℓ2	L	φDs	Inserts	Fig.
SICL1610S16-2N	●	2	16	10	25	150	16	ZCMT1003○○R○	1
SICL2010S20-2N	●	2	20	10	40	180	20	JDA-ZCGT1003○○	1
SICL2010S20-3N	●	3							1
SICL2513S25-2N	●	2	25	13	35	210	25	ZPMT13T3○○R○	1
SICL2513S25-3N	●	3							1
SICL3016S25-3N	●	3	30	15	65	250	25	ZPMT1604○○R○	2
SICL3216S32-2N	□	2	32	15	65	250	32	ZPMT1604○○R○	1
SICL3216S32-3N	●	3							1
SICL4016S32-4N	●	4	40	15	65	250	32	ZPMT1604○○R○	2
SICL5016S42-5N	□	5	50	15	65	250	42	ZPMT1604○○R○	2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C240-C245 for recommended cutting conditions.
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.

Modular Head Type Please refer Page B135

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Side Chipper SICTYPE

Fig.1

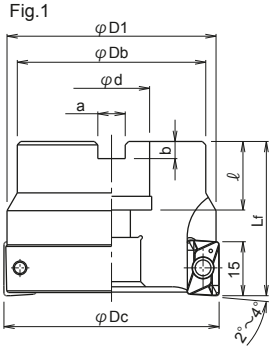
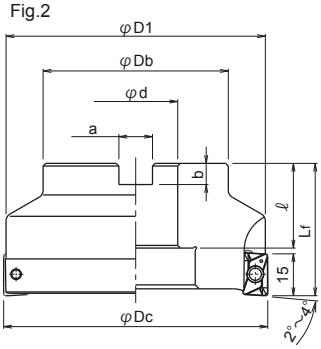


Fig.2



■ BODY / FACE MILL TYPE

Cat. No.	Stock	No. of Inserts	Dimensions (mm)								Weight (kg)	Inserts	Fig.
			φDc	φD1	φDb	Lf	φd	a	b	ℓ			
SIC-4050R-22	●	4	**50**	47.6	45	45	22	10.4	6.3	20	0.4	ZPMT1604○○R○	1
SIC-5063R-22	●	5	**63**	61	55	45	22	10.4	6.3	20	0.8		1
SIC-6080R-27	●	6	**80**	78	60	50	27	12.4	7	22	1.0		2
SIC-8100R-32	●	8	**100**	98	70	50	32	14.4	8	32	1.7		2
SIC-8125R-40	●	8	**125**	123	85	63	40	16.4	9	35	3.2		2

Note) 1. All cutters are supplied without inserts.
2. Please refer page C240-C245 for recommended cutting conditions.
3. Body must be modified to 1.5mm radius or 1.2mm chamfer at corner to use 3.0mm or 3.2mm corner radius insert.

Modular Head Type Please refer Page B135

● : Standard stock items ☐ : Stock in Japan ○ : Soon to be deleted

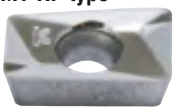
Side Chipper SICTYPE

■ INSERTS

SERIES EXPANSION: POLISHED INSERT FOR ALUMINIUM

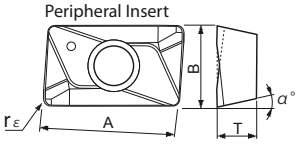
Z※MT-R type

Z※MT-RP type



Polished Insert

Peripheral Insert



Clamp Screw	Recommended torque (N・m)
ESW-206	0.9
DSW-307	1.4
TSW-408	3.1

Cat.No.	PVD coated			Un-coated	Dimensions (mm)					Parts	
	JC5015	JC5040	JC8050	FZ15	A	B	T	α°	rε	Clamp Screw	Wrench
ZCMT100304R	●	●			10.4	6.35	3.4	7	0.4	ESW-206	A-08SD
ZCMT100308R	●	●			10.4	6.35	3.4	7	0.8	ESW-206	A-08SD
ZCMT100308RP				●	10.4	6.35	3.4	7	0.8	ESW-206	A-08SD
ZPMT13T308R	●	●			13.3	7.938	3.97	11	0.8	DSW-307	A-10
ZPMT13T308RP				●	13.3	7.938	3.97	11	0.8	DSW-307	A-10
ZPMT13T316R	●	●			13.3	7.938	3.97	11	1.6	DSW-307	A-10
ZPMT13T316RP				□	13.3	7.938	3.97	11	1.6	DSW-307	A-10
ZPMT13T320R	●	●			13.3	7.938	3.97	11	2.0	DSW-307	A-10
ZPMT13T320RP				□	13.3	7.938	3.97	11	2.0	DSW-307	A-10
ZPMT160404R	●	●			16	9.525	4.76	11	0.4	TSW-408	
ZPMT160408R	●	●	●		16	9.525	4.76	11	0.8	TSW-408	
ZPMT160408RP				●	16	9.525	4.76	11	0.8	TSW-408	
ZPMT160416R	●	●			16	9.525	4.76	11	1.6	TSW-408	A-15 (End mill type)
ZPMT160416RP				□	16	9.525	4.76	11	1.6	TSW-408	
ZPMT160420R	●	●			16	9.525	4.76	11	2.0	TSW-408	
ZPMT160420RP				□	16	9.525	4.76	11	2.0	TSW-408	A-15T (Face mill type)
ZPMT160430R	●	●			16	9.525	4.76	11	3.0	TSW-408	
ZPMT160430RP				□	16	9.525	4.76	11	3.0	TSW-408	
ZPMT160432R	●	●			16	9.525	4.76	11	3.2	TSW-408	
ZPMT160432RP				□	16	9.525	4.76	11	3.2	TSW-408	

10 inserts per case

● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Side Chipper SICTYPE

■ RECOMMENDED CUTTING CONDITIONS / SHOULDER MILLING

● SICM○○10 TYPE (END MILL TYPE)

Work Materials	Insert Grades	Cutting conditions	φ16	φ20	φ25	φ32	φ40	φ50
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	2,990	2,390	1,910	1,500	1,200	960
		Vf (mm/min)	720	860	920	900	870	810
		ap (mm)	3	3	3	3	3	3
		ae (mm)	5	6	8	10	12	15
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	2,990	2,390	1,910	1,500	1,200	960
		Vf (mm/min)	600	720	770	750	720	680
		ap (mm)	3	3	3	3	3	3
		ae (mm)	5	6	8	10	12	15
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	2,390	1,910	1,530	1,200	960	770
		Vf (mm/min)	480	580	620	600	580	540
		ap (mm)	2	2	2	2	2	2
		ae (mm)	5	6	8	10	12	15
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	2,390	1,910	1,530	1,200	960	770
		Vf (mm/min)	480	580	620	600	580	540
		ap (mm)	2	2	2	2	2	2
		ae (mm)	5	6	8	10	12	15
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	2,190	1,750	1,400	1,100	880	700
		Vf (mm/min)	440	530	560	550	530	490
		ap (mm)	2	2	2	2	2	2
		ae (mm)	5	6	8	10	12	15
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	3,190	2,250	2,040	1,600	1,280	1,020
		Vf (mm/min)	900	1,070	1,140	1,120	1,080	1,000
		ap (mm)	3	3	3	3	3	3
		ae (mm)	5	6	8	10	12	15
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	2,990	2,390	1,910	1,500	1,200	960
		Vf (mm/min)	720	860	920	900	870	810
		ap (mm)	3	3	3	3	3	3
		ae (mm)	5	6	8	10	12	15
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	6,000	4,780	3,820	3,000	2,400	1,900
		Vf (mm/min)	1,800	2,150	2,300	2,250	2,000	1,900
		ap (mm)	3	3	3	3	3	3
		ae (mm)	5	6	8	10	12	15

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Width of cut

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using long type holder, reduce depth of cut by 60% to 40% or feed speed.

Side Chipper SICTYPE

■ RECOMMENDED CUTTING CONDITIONS / SLOTTING

● SICM○○10 TYPE (END MILL TYPE)

Work Materials	Insert Grades	Cutting conditions	φ16	φ20	φ25	φ32	φ40	φ50
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	2,790	2,230	1,790	1,400	1,120	900
		Vf (mm/min)	560	670	720	700	680	630
		ap (mm)	~3	~3	~3	~3	~3	~3
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	2,790	2,230	1,790	1,400	1,120	900
		Vf (mm/min)	450	540	580	560	540	510
		ap (mm)	~3	~3	~3	~3	~3	~3
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 (JC5015)	n (min⁻¹)	2,190	1,750	1,400	1,100	880	700
		Vf (mm/min)	350	420	450	440	430	400
		ap (mm)	~2	~2	~2	~2	~2	~2
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	2,190	1,750	1,400	1,100	880	700
		Vf (mm/min)	350	420	450	440	430	400
		ap (mm)	~2	~2	~2	~2	~2	~2
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,990	1,600	1,280	1,000	800	640
		Vf (mm/min)	320	390	410	400	390	360
		ap (mm)	~2	~2	~2	~2	~2	~2
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	2,990	2,390	1,910	1,500	1,200	960
		Vf (mm/min)	720	860	920	900	860	810
		ap (mm)	~3	~3	~3	~3	~3	~3
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	2,790	2,230	1,790	1,400	1,120	900
		Vf (mm/min)	560	670	720	700	680	630
		ap (mm)	~3	~3	~3	~3	~3	~3
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	6,000	4,780	3,820	3,000	2,400	1,900
		Vf (mm/min)	1,200	1,430	1,530	1,500	1,440	1,330
		ap (mm)	~3	~3	~3	~3	~3	~3

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Width of cut

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using long type holder, reduce depth of cut by 60% to 40% or feed speed.

Side Chipper SICTYPE

■ RECOMMENDED CUTTING CONDITIONS / SHOULDER MILLING

● SICM○○16 TYPE (END MILL TYPE)

Work Materials	Insert Grades	Cutting conditions	φ30	φ32	φ40	φ50
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	1,600	1,500	1,200	960
		Vf (mm/min)	870	810	870	870
		ap (mm)	5	5	5	5
		ae (mm)	9	10	12	15
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	1,600	1,500	1,200	960
		Vf (mm/min)	720	680	720	720
		ap (mm)	5	5	5	5
		ae (mm)	9	10	12	15
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	1,280	1,200	960	770
		Vf (mm/min)	580	540	580	580
		ap (mm)	3	3	3	3
		ae (mm)	9	10	12	15
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	1,280	1,200	960	770
		Vf (mm/min)	580	540	580	580
		ap (mm)	3	3	5	3
		ae (mm)	9	10	12	15
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,170	1,100	800	700
		Vf (mm/min)	530	500	480	530
		ap (mm)	3	3	3	3
		ae (mm)	9	10	12	15
Cas tiron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	1,700	1,600	1,280	1,020
		Vf (mm/min)	1,020	960	1,020	1,020
		ap (mm)	5	5	5	5
		ae (mm)	9	10	12	15
Nodular cas tiron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	1,600	1,500	1,200	960
		Vf (mm/min)	870	810	870	870
		ap (mm)	5	5	5	5
		ae (mm)	9	10	12	15
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	3,200	3,000	2,400	1,900
		Vf (mm/min)	1,920	1,800	1,920	1,900
		ap (mm)	5	5	5	5
		ae (mm)	9	10	12	15

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Width of cut

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using long type holder, reduce depth of cut by 60% to 40% or feed speed.

Side Chipper SICTYPE

■ RECOMMENDED CUTTING CONDITIONS / SLOTTING

● SICM○○16 TYPE (END MILL TYPE)

Work Materials	Insert Grades	Cutting conditions	φ30	φ32	φ40	φ50
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min⁻¹)	1,490	1,400	1,120	900
		Vf (mm/min)	670	630	680	680
		ap (mm)	~5	~5	~3	~5
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min⁻¹)	1,490	1,400	1,120	900
		Vf (mm/min)	540	510	540	540
		ap (mm)	~5	~5	~3	~3
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min⁻¹)	1,170	1,100	880	700
		Vf (mm/min)	430	400	430	420
		ap (mm)	~3	~3	~2	~3
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min⁻¹)	1,170	1,100	880	700
		Vf (mm/min)	430	400	430	420
		ap (mm)	~3	~3	~2	~3
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min⁻¹)	1,070	1,000	800	640
		Vf (mm/min)	390	360	390	390
		ap (mm)	~3	~3	~2	~3
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min⁻¹)	1,600	1,500	1,200	960
		Vf (mm/min)	820	770	820	820
		ap (mm)	~5	~5	~3	~5
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min⁻¹)	1,490	1,400	1,120	900
		Vf (mm/min)	670	630	680	680
		ap (mm)	~5	~5	~3	~5
Aluminium alloy 50-110HB	FZ15	n (min⁻¹)	3,200	3,000	2,400	1,900
		Vf (mm/min)	1,440	1,350	1,440	1,430
		ap (mm)	~5	~5	~5	~5

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Width of cut

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using long type holder, reduce depth of cut by 60% to 40% or feed speed.

Side Chipper SICTYPE

■ RECOMMENDED CUTTING CONDITIONS

● SICM2513 TYPE (END MILL TYPE)

Work Materials	Insert Grades	Cutting conditions	Shoulder Milling	Slotting
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	n (min^{-1})	1,910	1,790
		Vf (mm/min)	860	650
		ap (mm)	4	~4
		ae (mm)	8	—
Alloy steel SCM440 (1.7223) 150-280HB	JC5040	n (min^{-1})	1,910	1,790
		Vf (mm/min)	690	540
		ap (mm)	4	~4
		ae (mm)	8	—
Mold steel NAK, P20 (1.2311, P20) 280-400HB	JC5040 JC5015	n (min^{-1})	1,530	1,400
		Vf (mm/min)	560	420
		ap (mm)	2.5	~2.5
		ae (mm)	8	—
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	n (min^{-1})	1,530	1,400
		Vf (mm/min)	560	420
		ap (mm)	2.5	~2.5
		ae (mm)	8	—
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	n (min^{-1})	1,400	1,280
		Vf (mm/min)	510	390
		ap (mm)	2.5	~2.5
		ae (mm)	8	—
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5015 (JC5040)	n (min^{-1})	2,040	1,910
		Vf (mm/min)	1,040	580
		ap (mm)	4	~4
		ae (mm)	8	—
Nodular cast iron FCD600, FCD700 (GGG60, GGG70) 170-300HB	JC5015 (JC5040)	n (min^{-1})	1,910	1,790
		Vf (mm/min)	860	650
		ap (mm)	4	~4
		ae (mm)	8	—
Aluminium alloy 50-110HB	FZ15	n (min^{-1})	3,820	3,820
		Vf (mm/min)	2,000	1,380
		ap (mm)	4	~4
		ae (mm)	8	—

n: Spindle speed (min^{-1}), Vf: Feed speed (mm/min)

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using long type holder, reduce depth of cut by 60% to 40% or feed speed.

Side Chipper SICTYPE

■ RECOMMENDED CUTTING CONDITIONS

● FACE MILL TYPE

Work Materials	Insert Grades	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	Depth of cut ap (mm)	Pick feed ae (mm)
Carbon steel S50C, S55C (C50, C55) 150-280HB	JC5040	150 (80~200)	0.20 (0.1~0.25)	5	0.6Dc
Tool & Die steel SKD61, SKD11 (1.2344, 1.2379) 150-255HB	JC5040	120 (80~150)	0.15 (0.1~0.2)	3	0.6Dc
Cast iron FC250, FC300 (GG25, GG30) 160-260HB	JC5040 JC5015	150 (80~200)	0.20 (0.1~0.25)	5	0.6Dc
Stainless steel SUS304, SUS316 150-250HB	JC5015 (JC5040)	110 (80~200)	0.10 (0.05~0.15)	3	0.6Dc
Aluminium alloy 50-110HB	FZ15	300 (200~500)	0.20 (0.1~0.25)	5	0.6Dc

■ RECOMMENDED CUTTING CONDITIONS FOR PCD INSERT (JDA10)

NOTE
1) Max. depth of cut: ap=Up to 4mm
2) Max. cutting speed: Vc=Up to 1,000m/min

① SICM○○10 TYPE (END MILL TYPE) / SHOULDER MILLING

Work Materials	Insert Grades	Cutting Conditions	Dimensions (mm)					
			φ16	φ20	φ25	φ32	φ40	φ50
Aluminium alloy 50-110HB	JDA10	n (min⁻¹)	6,000	4,780	3,820	3,000	2,400	1,900
		Vf (mm/min)	1,800	2,150	2,300	2,250	2,000	1,900
		ap (mm)	3	3	3	3	3	3
		ae (mm)	5	6	8	10	12	15

② SICM○○10 TYPE (END MILL TYPE) / SLOTTING

Work Materials	Insert Grades	Cutting Conditions	Dimensions (mm)					
			φ16	φ20	φ25	φ32	φ40	φ50
Aluminium alloy 50-110HB	JDA10	n (min⁻¹)	6,000	4,780	3,820	3,000	2,400	1,900
		Vf (mm/min)	1,200	1,430	1,530	1,500	1,440	1,330
		ap (mm)	~2	~2	~2	~2	~2	~2

n: Spindle speed, Vf: Feed speed, ap: Depth of cut, ae: Width of cut

Note) 1. The cutting parameters to be adjusted according to the machine rigidity or work rigidity.
2. In case of using long type holder, reduce depth of cut by 60% to 40% or feed speed.

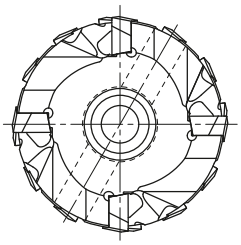
Roughing Chipper RFC TYPE

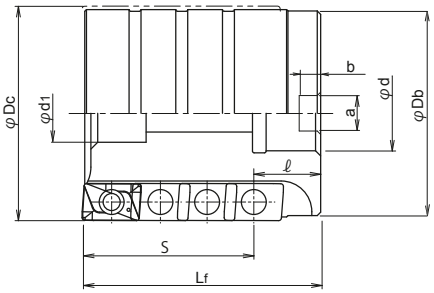
G-Body

- 3D insert geometry gives low cutting forces and excellent chip ejection for high productivity at high feed rate
- Adopted ultra rigid G Body

Shoulder Milling

■ BODY





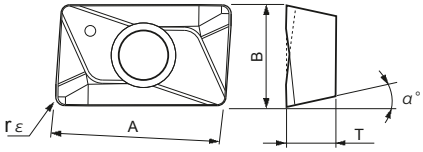
Cat. No.	Stock	No. of Inserts	No. of flutes	No. of Eff. Cutting edge	Dimensions (mm) φDc	φDb	φd1	S	Lf	φd	a	b	ℓ	Weight (kg)	Set bolt	Parts: Clamp screw	Parts: Wrench
RFC5050R-22	●	12	3	3	50	45	17	50	90	22	10.4	6.3	20	0.9	★ M10x1.5x55	DSW-4510H	A-20SD
RFC6350R-22	●	16	4	4	63	60	17	50	70	22	10.4	6.3	20	1.1		DSW-4510H	A-20SD
RFC8060R-27	□	25	5	5	80	60	20	60	80	27	12.4	7	22	2.2		DSW-4510H	A-20SD

Note) 1. All cutters are supplied without inserts

2. ★mark shows: these cutter bodies are equipped with theset bolt because of the specified bolt size.

Clamp Screw	Recommended torque (N・m)
DSW-4510H	6.0

■ INSERTS



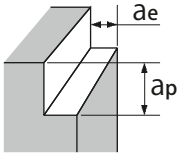
Cat. No.	PVD coated JC5015	PVD coated JC5040	Dimensions (mm) A	B	T	α°	rε
ZPMT170508R	●	●	17	11	5.56	11	0.8

10 inserts per case

Roughing Chipper RFC TYPE

■ RECOMMENDED CUTTING CONDITIONS

Type of Machining: Shoulder Milling



Work Materials	Hardness	Insert Grades	Max. D.O.C. (mm)	Tool dia. (mm) φ50 Vc (m/min)	φ50 n (min⁻¹)	φ50 Vf (mm/min)	φ63 Vc (m/min)	φ63 n (min⁻¹)	φ63 Vf (mm/min)	φ80 Vc (m/min)	φ80 n (min⁻¹)	φ80 Vf (mm/min)
Cast iron (FC)	150HB	JC5015 (JC5040)	ae = 0.5Dc(max) ap=1.0Dc(max)	140	890	610	140	710	650	140	560	640
			ae = 0.1Dc ap = Below flute length	140	890	880	140	710	940	140	560	920
Nodular cast iron (FCD)	Below 220HB	JC5015 (JC5040)	ae = 0.5Dc(max) ap =1.0Dc(max)	120	760	520	120	610	560	120	480	550
			ae = 0.1Dc ap = Below flute length	120	760	750	120	610	810	120	480	790
Carbon steel Alloy steel (S-C, SCM)	Below 250HB	JC5040	ae = 0.5Dc(max) ap =1.0Dc(max)	110	700	420	110	560	450	110	440	440
			ae = 0.1Dc ap = Below flute length	110	700	690	110	560	670	110	440	660
Tool & Die steel SKD	Below 255HB	JC5040	ae = 0.5Dc(max) ap = 1.0Dc(max)	100	640	230	100	510	250	100	400	240
			ae = 0.1Dc ap = Below flute length	100	640	350	100	510	370	100	400	360

Vc: Cutting speed, Vf: Feed speed, n: Spindle speed, ap: Depth of cut, ae: Width of cut

DIJET Mill 45/90 — SSE45 / SSD90TYPE

Ultra rigid | Longer tool life | Wide range of application from general steel to hardened steel

SSE45/SSD90 Series

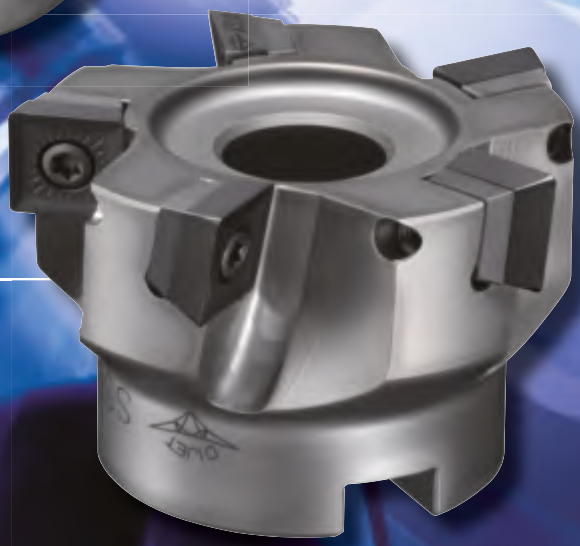
SSE45 type
- Entering angle: 45°
- For Face Milling (φ50 ~ φ125)

SSD90 type
- Entering angle: 90°
- For Shoulder Milling (φ50 ~ φ125)

- Carbide shim gives longer tool life of cutter body
- For SSE45 Ultra Fine Pitch type is available

SSE45 Type

- Entering angle: 45°
- For Face Milling



SSD90 Type

- Entering angle: 90°
- For Shoulder Milling

DIJET Mill 45 SSE45TYPE

SSE45 gives wide application for cast iron, general steel and hardened steel.

JC5040 for general steel, JC605W for cast iron, JC8015 for nodular cast iron and hardened steel, FZ05 for Aluminium alloy and tough grade JC8050 for unfavorable conditions.

Ultra-rigid body gives longer tool life.

1. Adopted Carbide shim prevents body damage and improves security when insert is broken.
2. Secure insert location maintains high precision face run out and improves surface roughness and tool life.
3. SSE45 achieves 1.3 times longer tool life than competitor.

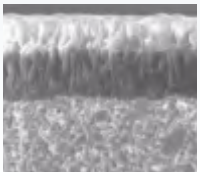
Excellent and smooth cutting is possible with 20 degree positive axial rake and high positive 3D geometry insert.

Wiper insert is available for excellent surface roughness.

NEWLY DEVELOPED COATING, "JC605W"

JC605W is new CVD coated grade for cast iron milling. JC605W is improved wear and thermal resistance by adopting new substrate having excellent wear and chipping resistance and thick α-A R 2O3 layer providing maximum thermal and chemical protection. By means of smooth surface treatment of coating layer prevents abnormal wear such as sudden weld chipping.

Structure of JC605W



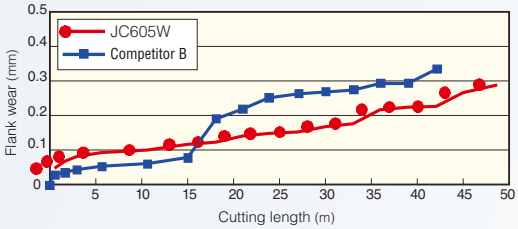
- α-AR2O3 layer with improved oxidation resistance and smooth surface treatment
- Ti (C, N) layer with improved chipping resistance
- Substrate gives excellent wear and chipping resistance

Applicable range of JC605W

Type	Finishing or light cutting		Medium cutting	Heavy cutting
ISO code	K01	K10	K20	K30
Wear-resistance ↑ / Chipping-resistance ↓	JC605W			

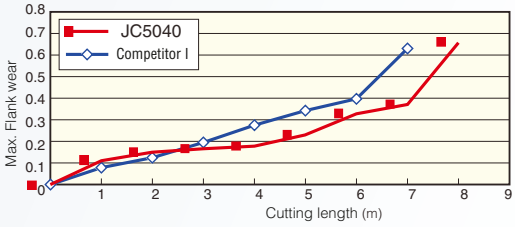
CUTTING PERFORMANCE

Tool life comparison (FC300, GG30)



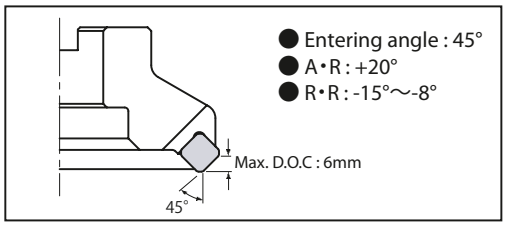
Material: FC300 (GG30),
Insert No.: SEMT13T3AGSN-KM (JC605W)
Cutting conditions: Vc=200m/min, fz=0.25mm/t,
ap=2.5mm, ae=68mm,Dry

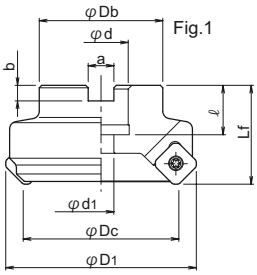
Tool life comparison (SKD11, 1.2379)

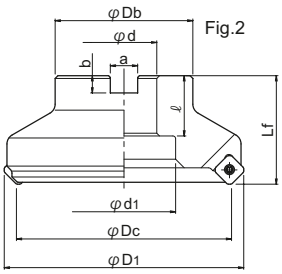


Material: SKD11 (1.2379),
Insert No.: SEMT13T3AGSN-PM (JC5040)
Tooldia.: φ100mm
Cutting conditions: Vc=120m/min, n=382min^{-1},
f=0.2mm/rev(1N), ap=2mm, ae=76mm,
Shoulder milling, Down cut, Airblow

DIJET Mill 45 SSE45TYPE







■ BODY

Bore	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	φD1	φDb	Lf	φd	φd1	a	b	ℓ	Weight kg	Fig.
Metric Bore	**SSE45-4050R-22**	●	4	50	63	45	40	22	10.4	10.4	6.3	20	0.4	1
	SSE45-5063R-22	●	5	63	76.1	50	40	22	10.4	10.4	6.3	20	0.6	1
	SSE45-6080R-27	●	6	80	93.1	56	50	27	13.5	12.4	7	22	1.1	1
	SSE45-7100R-32	●	7	100	113.3	70	50	32	17.5	14.4	8	25	1.6	1
	SSE45-8125R-40	●	8	125	138.3	80	63	40	60	16.4	9	32	2.6	2

Note)1. All cutters are supplied without inserts.
2. Please refer page C252 for recommended cutting conditions.

DIJET Mill 45 SSE45TYPE

■ INSERTS

Fig.1

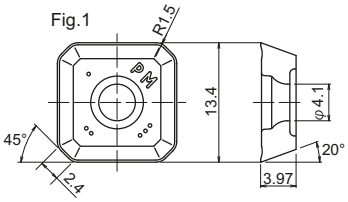


Fig.2

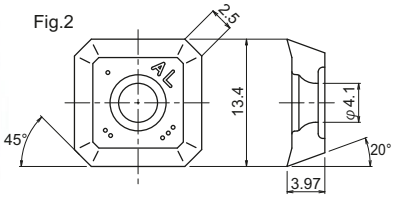
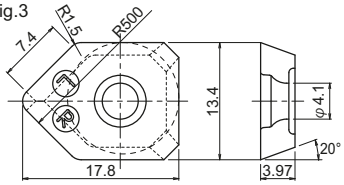


Fig.3

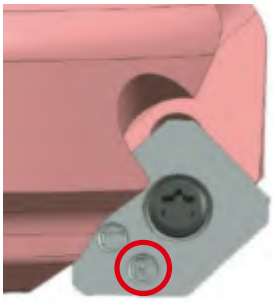


Cat. No.	Tole-rance	PVD coated				CVD coated	Uncoated	Fig.
		JC5040	DH103	JC8015	JC8050	JC605W	FZ05	
SEMT13T3AGSN-PM	M	●		●	●			1
SEMT13T3AGSN-KM	M					●		1
SEGT13T3AGFN-AL	G						●	2
XEHW13T3AGSN-W (Wiper insert)	H		●					3

10 inserts per case.

Clamp screw	Recommended torque (N・m)
TSW-3512H	2.1
SSW-535	6.5

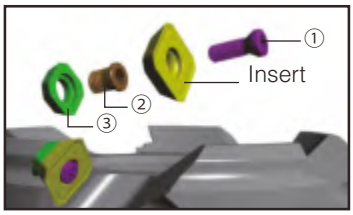
■ ATTENTION TO USING WIPER INSERT



- In case of feed per rev fz ≧ 2 mm/rev and surface roughness is required, were commend to use wiper insert.
- Wiper insert for SSE45 has single cutting edge.
- Please put insert as “R“ mark is shown to the front.

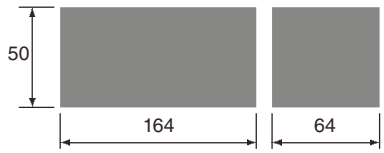
■ PARTS

Clamp screw	Shim screw	Shim	Wrench	Wrench for shim
① 	② 	③ 		
TSW-3512H	SSW-535	SM-SE13	A-15T	LW-035



DIJET Mill 45 SSE45TYPE

■ CASE STUDIES



Work	Part name	Block
	Material	FC250 GG25
	Hardness	–
Tool	Tool No.	SSE45-14250R-60(φ250 14N)
	Grade	SEMT13T3AGSN-KM (JC605W)
Cutting conditions	Vc, (n)	204 m/min, (260min^{-1})
	Vf, (fz)	728 mm/min, (0.2mm/t)
	ap (mm)	2.5×2mm
	ae (mm)	–
	Coolant	Dry
	Machine	Horizontal MC

Result: Combination of SSE45 and JC605W increased cutting speed 1.3 times and feed speed 3.25 times faster than competitor.

■ RECOMMENDED CUTTING CONDITIONS

ISO	Work Materials	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	Insert Grades	Insert No.
P	Low carbon steel (SS400, S10C) Below 180HB	250 (200–300)	0.2 (0.1–0.3)	JC5040 (JC8050)	SEMT13T3AGSN-PM
	Carbon steel (S50C, S55C) Below 250HB	220 (170–250)	0.2 (0.1–0.3)	JC5040 (JC8050)	SEMT13T3AGSN-PM
	Tool & Die steel (SKD61, SKD11) Below 255HB	120 (100–150)	0.2 (0.1–0.3)	JC5040	SEMT13T3AGSN-PM
M	Stainless steel (SUS304) Below 250HB	220 (170–250)	0.2 (0.1–0.3)	JC8050 (JC8015)	SEMT13T3AGSN-PM
K	Grey cast iron (FC300) Below 300HB	200 (150–250)	0.2 (0.1–0.3)	JC605W (JC8015)	SEMT13T3AGSN-KM (SEMT13T3AGSN-PM)
	Nodular cast iron (FCD400) Below 300HB	150 (120–180)	0.2 (0.1–0.3)	JC8015	SEMT13T3AGSN-PM
H	Hardened steel 40-55HRC	80 (60–100)	0.15 (0.1–0.2)	JC8015	SEMT13T3AGSN-PM
N	Aluminium alloy (A5052) 50-110HB	300–	0.2 (0.1–0.3)	FZ05	SEGT13T3AGFN-AL

Note) In case of unfavourable conditions, insert grade JC8050 is recommended.

DIJET Mill 90 SSD90TYPE

Economical shoulder milling cutter SSD90 uses four cutting edge insert.

1. Combination of M class insert with 3D geometry and high precision body achieves true 90 degree with no mismatch and excellent surface roughness.
2. Adopted carbide shim prevents body damage and improves security in case if insert is broken.

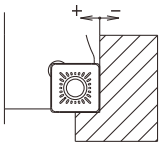
SSD90 gives wide application for cast iron, general steel and hardened steel.

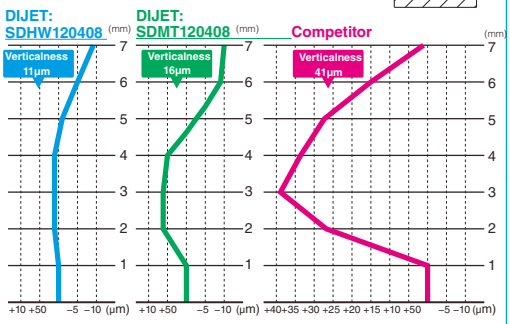
JC5040 is suitable for general steel, JC605W for cast iron, JC8015 for nodular cast iron and hardened steel and tough grade JC8050 for unfavourable conditions.

CUTTING PERFORMANCE

1. Verticalness comparison

Material: S50C (C50)
Cutting conditions:
ap=8mm, ae=2.5mm Vc=120m min,
fz=0.15mm/t, ap=8mm,ae=2,5mm

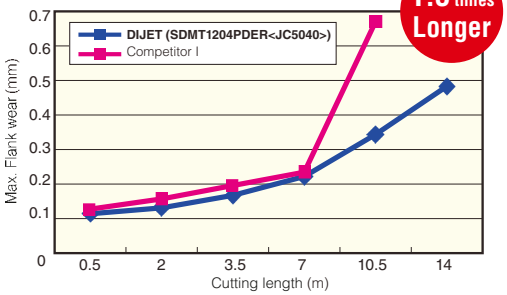




Theoretical verticalness of SSD90: 11μm (11mm width), 8μm (3mm width)

2. Tool life comparison (SKD61, Raw material)

Material: SKD61 (1.2344) Raw material
Cutting conditions: Vc=200m/min, fz=0.15mm/t,
ap=2mm, ae=43mm

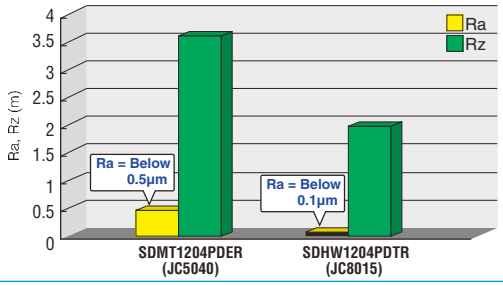


SSD90 tool achieved 1.3 times longer tool life.

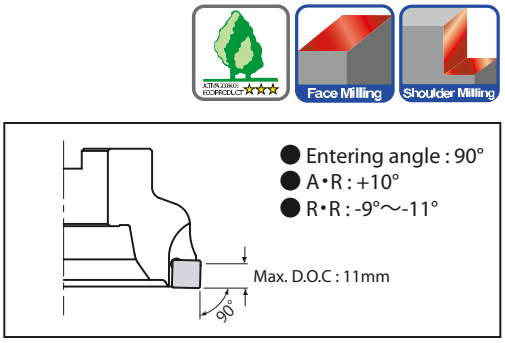
3. Surface roughness comparison

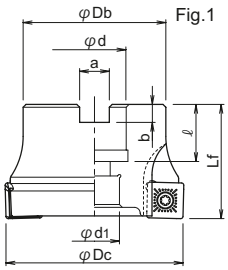
Material: SKD61 (1.2344) Raw material
Cutting conditions: Vc=200m/min, fz=0.15mm/t,
ap=2mm, ae=43mm

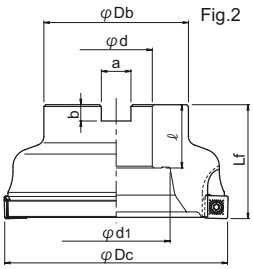
SDMT insert (M class) achieved below Ra=0.5μm.
SDH Winsert (H class) achieved better surface roughness below Ra=0.1mm.



DIJET Mill 90 SSD90TYPE







■ BODY

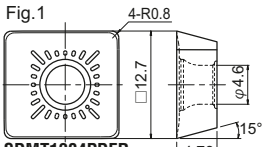
Bore	Cat. No.	Stock	No. of flutes	Dimensions (mm) φDc	φDb	Lf	φd	φd1	a	b	ℓ	Weight kg	Fig.
Metric Bore	**SSD90-4050R-22**	●	4	50	41	40	22	17	10.4	6.3	20	0.3	1
	SSD90-5063R-22	●	5	63	50	40	22	17	10.4	6.3	20	0.5	1
	SSD90-6080R-27	●	6	80	60	50	27	37	12.4	7	22	0.9	1
	SSD90-8100R-32	●	8	100	70	50	32	43	14.4	8	32	1.5	2
	SSD90-10125R-40	●	10	125	80	63	40	57	16.4	9	35	2.6	2

Note) All cutters are supplied without inserts.

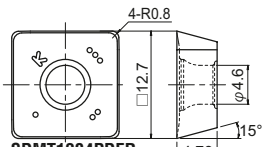
DIJET Mill 90 SSD90TYPE

■ INSERTS

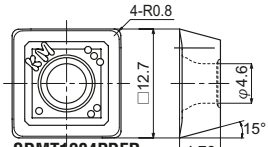
Fig.1



SDMT1204PDER
(With Chipbreaker)
(Grade：JC8050, JC5040)

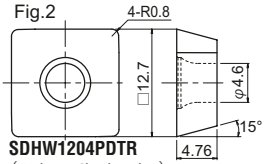


SDMT1204PDER
(With Chipbreaker)
(Grade：JC8015)



SDMT1204PDER
(With Chipbreaker)
(Grade： JC605W)

Fig.2



SDHW1204PDTR
(Without Chipbreaker)
(Grade：JC8015)

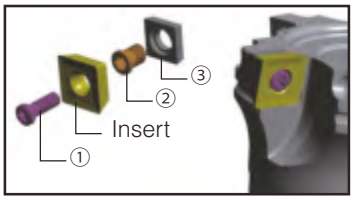
Clamp screw	Recommended torque (N•m)
TSW-3512H	2.1
SSW-535	6.5

Cat. No.	Tole-rance	PVD coated			CVD coated	Fig.
		JC8015	JC8050	JC5040	JC605W	
SDMT1204PDER	M	●	●	●	□	1
SDHW1204PDTR	H	●				2

10 inserts per case

■ PARTS

Clamp screw	Shim screw	Shim	Wrench	Wrench for shim
① 	② 	③ 		
TSW-3512H	SSW-535	SM-SD12	A-15T	LW-035



■ RECOMMENDED CUTTING CONDITIONS

ISO	Work Materials	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	Insert Grades	Insert No.
P	Low carbon steel (SS400, S10C) Below 180HB	250 (200–300)	0.2 (0.1–0.3)	JC5040 (JC8050)	SDMT1204PDER
	Carbon steel (S50C, S55C) Below 250HB	220 (170–250)	0.2 (0.1–0.3)	JC5040 (JC8050)	SDMT1204PDER
	Tool & Die steel (SKD61, SKD11) Below 255HB	120 (100–150)	0.15 (0.1–0.25)	JC5040	SDMT1204PDER
M	Stainless steel (SUS304) Below 250HB	220 (170–250)	0.15 (0.1–0.25)	JC8050 (JC8015)	SDMT1204PDER (SDMT1204PDER) (SDHW1204PDTR)
K	Grey cast iron (FC300) Below 300HB	200 (150–250)	0.2 (0.1–0.3	JC605W (JC8015)	SDMT1204PDER (SDMT1204PDER) (SDHW1204PDTR)
	Nodular cast iron (FCD400) Below 300HB	150 (120–180)	0.2 (0.1–0.3)	JC8015	SDMT1204PDER SDHW1204PDTR
H	Hardened steel 40-55HRC	80 (60–100)	0.1 (0.05–0.15)	JC8015	SDMT1204PDER SDHW1204PDTR

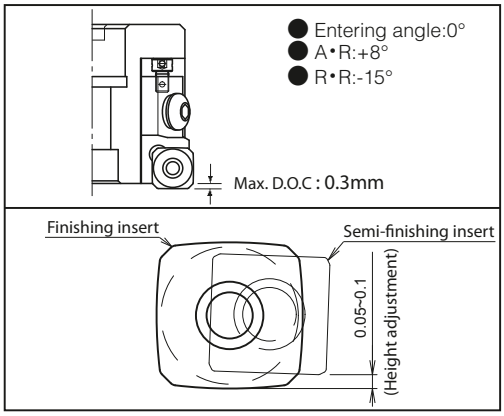
Note) In case of unfavourable conditions, insert grade JC8050 is recommended.

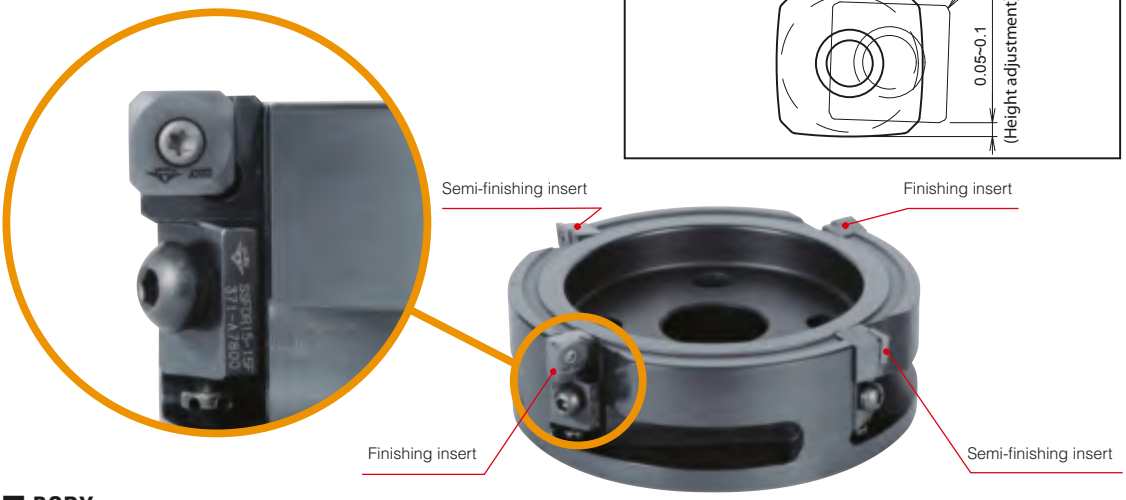
●：Standard stock items □：Stock in Japan ○：Soon to be deleted

Finish Jet Mill FJM TYPE

● Super Finishing Milling Application

1. The combination of 2 finishing cartridges and 2 semi-finishing cartridges gives stable finishing quality of unreliable removal stock on cast iron and cast steel.
2. Maximum ap=0.3mm (3 times larger than competitor's ap) Consolidate to one process of semi-finishing and super-finishing
3. Two semi-finishing inserts protect the finishing inserts and also achieve longer tool life with reducing cutting force.
4. Easy to adjust the face runout by adjusting the cartridges.
5. JC8003 for cast iron and stainless steel, Cermet grade CX75 for general steels.





■ BODY

Fig.1

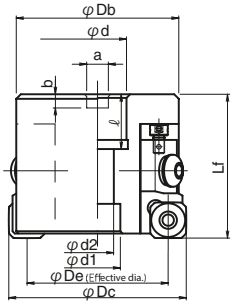


Fig.2

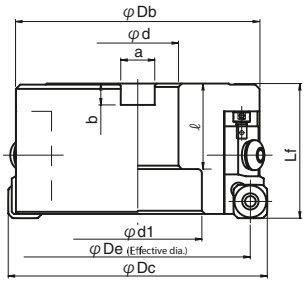
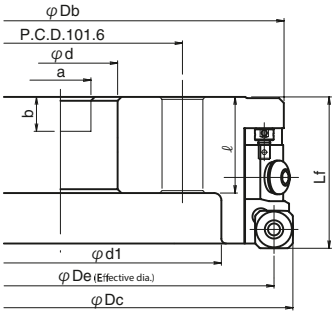


Fig.3



Cat. No.	Stock	No. of Inserts	Dimensions (mm)										Weight (kg)	Fig.
			φDc	φDe (Eff. dia)	Db	Lf	φd	φd1	φd2	a	b	ℓ		
FJM-4080R-27	●	2 Finishing & 2 Semi-finishing inserts	80	65	71	63	27	20	14.3	12.4	7	22	1.7	1
FJM-4100R-32	●		100	85	90	63	32	26	17	14.4	8	32	2.7	1
FJM-4125R-40	●		125	110	114	63	40	60	—	16.4	9	40	3.9	2
FJM-4160R-40	●		160	145	148	63	40	75	—	16.4	9	40	6.1	2
FJM-4200R-60	●		200	185	186	63	60	134	—	25.7	14	40	8.6	3
FJM-4250R-60	□		250	235	237	63	60	182	—	25.7	14	40	14.8	3

Note) 1. All cutter bodies are supplied without inserts.
2. Please refer page C258 for recommended cutting conditions.

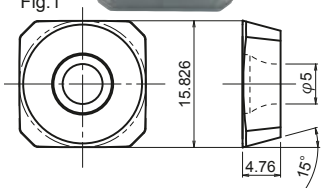
● : Standard stock items □ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted ※ : Production after order received

Finish Jet Mill FJMTYPE

■ INSERTS

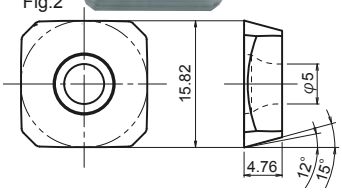
SDHW1504ADFN-W1

Fig.1



SDHW1 504ADE(F)N-W2

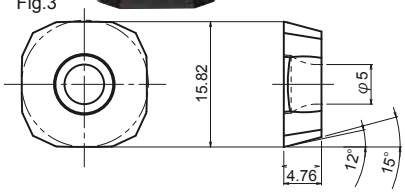
Fig.2



SDHW1504ADEN-F1

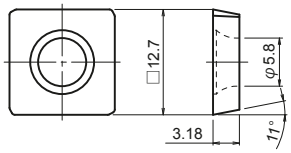
30% less cutting force

Fig.3



SPHW1203ZPTR

Fig.4

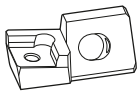
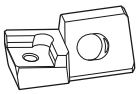
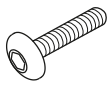


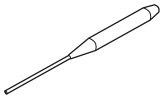
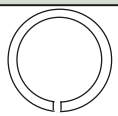
Cat. No.	PVD coated		Cermet	Tole-rance	Fig.	Application
	DH103	JC8015	CX75			
SDHW1504ADFN-W1 (finishing insert)	●			H	1	Cast iron・Cast steel
SDHW1504ADFN-W2 (finishing insert)			●	H	2	Carbon steel・Alloy steel
SDHW1504ADEN-W2 (finishing insert)	●			H	2	Mold steel・Die steel
SDHW1504ADEN-F1 (finishing insert for low rigid work)	●		●	H	3	DH103…(Cast iron・Cast steel) CX75…(Carbon steel・Alloy steel)
SPHW1203ZPTR (Semi-finishing insert)		●		H	4	

4 inserts per case, but in case of SPHW1203ZPTR: 10 piece per case.

Finish Jet Mill FJMTYPE

■ PARTS

Clamp screw	Wrench	Cartridge for finishing insert	Cartridge for semi-finishing insert	Set bolt for cartridge
 Recommendedtorque6.0N•m				
DSW-4510H	A-20 (φ80~φ200) A-20L (φ250)	SSFDR15-15F	SSFPR15-12R	BBH-825

Wrench for cartridge	Wrench for axial adjust screw	Axial adjust screw	Spring washer
			
LW-050	AD-2080	ADS-513	SBZ-8

■ RECOMMENDED CUTTING CONDITIONS

	Work Materials	Inserts	Insert Grades	Vc (m/min)	f (mm/rev)	ap (mm)	ae (mm)
P	Low carbon & Mild steel S20C, SS400 (C20) Below 255HB	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	CX75	250~300	4~5	up to 0.3mm	up to 0.8De
	Medium carbon steel S50C (C50) Below 255HB	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	CX75	200~250	4~5	up to 0.3mm	up to 0.8De
	Alloy & Die steel SCM440, SKD11 (1.7223, 1.2379) Below 255HB	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	CX75	100~150	4~5	up to 0.3mm	up to 0.8De
M	Stainless steel SUS304, 316 Below 250HB	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	JC8003	80~120	2~4	up to 0.2mm	up to 0.8De
K	Grey cast iron FC250, FC300 (GG25, GG30) Below 300HB	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	JC8003	130~200	4~6	up to 0.3mm	up to 0.8De
	Nodular cast iron FCD500, FCD700 (GGG50, GGG70) Below 300HB	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	JC8003	110~180	4~6	up to 0.3mm	up to 0.8De
H	Mold steel HPM7, PX5, NAK80, P20 (1.2311,P20) Below 30-40HRC	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	JC8003	100~140	2~4	up to 0.2mm	up to 0.8De
	Hardened die steel SKD61, DAC, DHA (1.2311,P20) Below 40-55HRC	SDHW1504ADFN-W2 (SDHW1504ADEN-F1)	JC8003	40~60	0.3~0.7	up to 0.1mm	up to 0.7De

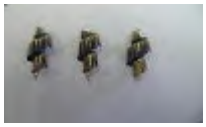
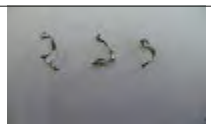
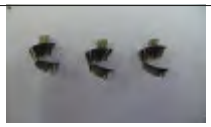
Vc: Cutting speed, f: Feedrate, ap: Depth of cut, ae: Width of cut

Note) 1. Incase of stainless steel, recommend wet cutting.
2. Recommend to use-F1 type insert for low rigid work.

Finish Jet Mill FJMTYPE

■ CHIP SHAPE COMPARISON

Work material: S15C, Tool dia.: φ200mm, Vc=300m/min, f=4mm/rev, ae=137mm

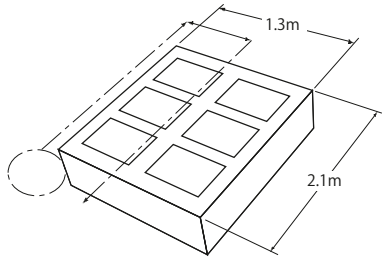
	DIJET		Competitor B
	Chips by finishing insert	Chips by semi-finishing insert	
ap=0.05mm			
ap=0.1mm			
ap=0.2mm			

- FJM obtains excellent surface roughness and longer tool life by stable cutting due to adopting the combination of 2 semi-finishing inserts and 2 finishing inserts. This combination divides the chips and cutting force. Competitor B got chipping problem by excessive cutting force due to increasing ap.
- There is no step on the surface which is machined by FJM.

Finish Jet Mill FJMTYPE

■ CASE STUDIES

Work size: 2.1m x 1.3m
Step between finishing insert and semi-finishing insert: 0.1mm

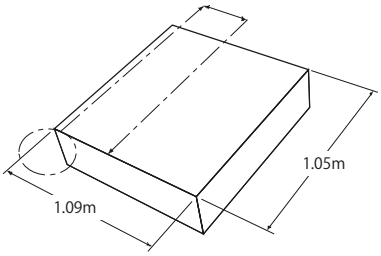


Competitor B: Vc=146m/min, Vf=800mm/min, ap=0.3mm
Step between finishing insert and semi-finishing insert: 0.1mm

Result: FJM obtained same surface roughness with 80% faster feed speed than competitorB.

Work	Part name	Stamping die
	Material	FC250
	Hardness	–
Tool	Tool No.	FJM-4200R
	Grade	SDHW1504ADFN-W1 (JC8003) (1N) + SPHW1203ZPTR (JC8015) (1N)
Cutting conditions	Vc, (n)	183m/min (292min^{-1})
	Vf, (f z)	1,460mm/min(5mm/rev)
	ap (mm)	0.3 (mm)
	ae (mm)	180 (mm)
	Coolant	Dry
	Machine	Double column MC

Worksize:1050mm x 1090mm x 60mm

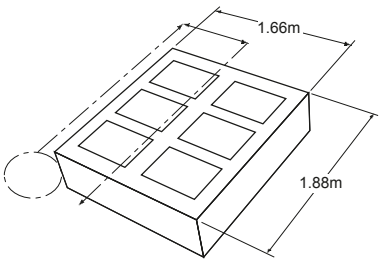


Competitor B: Vc=126m/min, Vf=400mm/min, ap=0.3mm

Result: FJM improved machining efficiency by 2.6 times and surface roughness compared with competitor B

Work	Part name	Injection mold
	Material	S45C
	Hardness	Non heat treatment
Tool	Tool No.	FJM-4200R
	Grade	SDHW1504ADFN–W2 (CX75) (2N) + SPHW1203ZPTR (JC8015) (2N)
Cutting conditions	Vc, (n)	207m/min (330min^{-1})
	Vf, (f z)	1,050mm/min (3.2mm/rev)
	ap (mm)	0.2 (mm)
	ae (mm)	180 (mm)
	Coolant	Dry
	Machine	Double column MC

Work size: 1668mm x 1880mm x 300mm



Result: F1 type insert for low rigid work achieved surface roughness Ra=0.8μm at feed speed 800mm/min under unstable clamping condition.

Work	Part name	-
	Material	SKT4
	Hardness	35 HRC
Tool	Tool No.	FJM-4160R
	Grade	SDHW1504ADEN–F1 (JC8003) (2N) + SPHW1203ZPTR (JC8015) (2N)
Cutting conditions	Vc, (n)	120m/min (240min^{-1})
	Vf, (f z)	800mm/min (1.67mm/rev)
	ap (mm)	0.2 (mm)
	ae (mm)	120 (mm)
	Coolant	Dry
	Machine	Double column MC

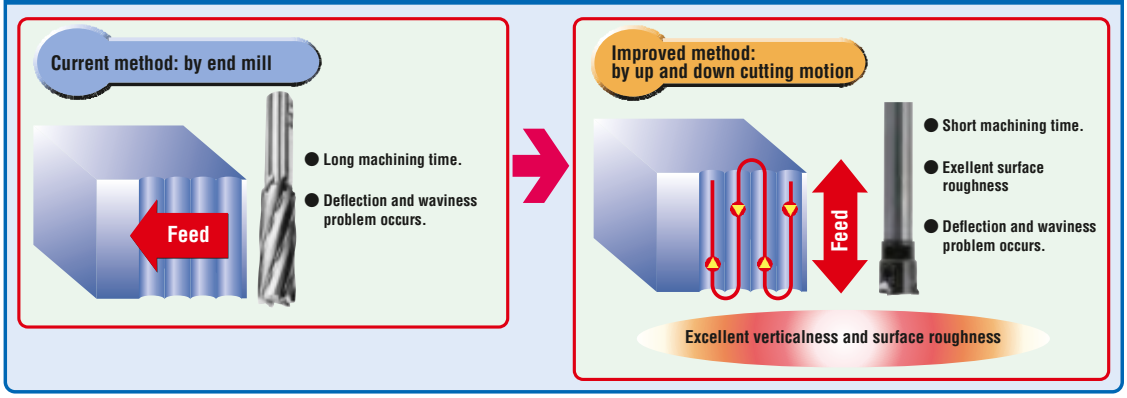
Back & Forth Cutter PFC TYPE

High speed up and down two way cutting can improve the efficiency and accuracy.

1 High speed & high accuracy can be achieved.

➡ Surface roughness and Parallelism/Perpendicularity: 0.01mm or less (feed & pick direction).

Improvement of machining method



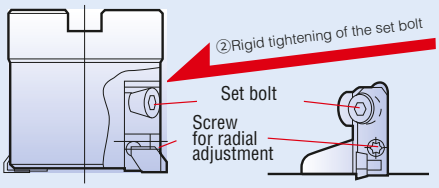
2 Suitable to use with extra overhung length

DSA arbor: total 43 items
Available maximum overhung length: 400mm

3 Easy to adjust the O.D.run out

Instructions for adjusting the O.D. run out

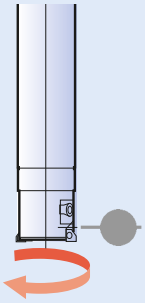
STEP1



① Loosen all the screws for radial adjustment.
② Tighten the set bolt as pushing the cartridge to axial direction. Tighten the set bolt firmly.
③ Set the cutter body to arbor.

STEP2 On the machine

④ Measure the O.D. run out on the machine.
⑤ Adjust the lower inserts to reach the same height as highest insert by tightening the screw for radial adjustment.
Never loosen set bolt while the adjustment.
● Adjust O.D. run out 0.01mm or less.Target 0.005mm



4 CBN insert and JC8003 DV-coated insert are available as standard stock.

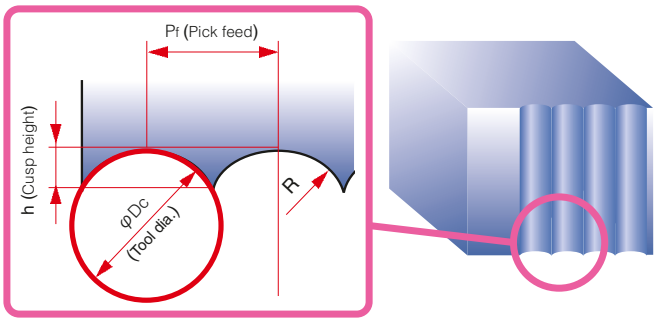
CBN: JBN500 is the best grade for high speed machining and accuracy finishing and longer tool life.
DV coated: JC8003 is suitable for semi-finishing to finishing.

5 Consolidating of parts.

Easy setting by using same wrench for insert clamp screw and screw for radial adjustments.
And the same parts are used from smallest diameter to biggest diameter.

Back & Forth Cutter PFC TYPE

■ SURFACE ROUGHNESS

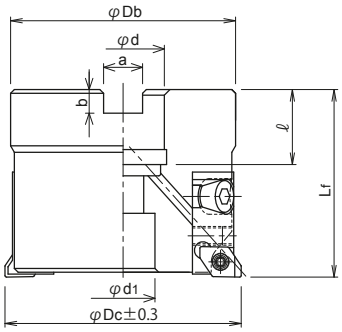


$$h\ (\text{Cusp height})\ \mu m = \frac{(Pf)^2}{8R} \times 1000$$

$$R: \frac{\varphi Dc\ (\text{Tool dia.})}{2}$$

It is efficient to use large diameter cutter to increase the pick feed. But large diameter cutter may cause interference problem in case of complex work, so to be considered.

■ BODY



Cat. No.	Stock	No. of flutes	Dimensions (mm)								Weight (kg)
			φDc	Lf	φDb	φd	φd1	a	b	ℓ	
PFC-4050R-22	●	4	**50**	50	47	22	17	10.4	6.3	20	0.6
PFC-4063R-22	□	4		50	60	22	17	10.4	6.3	20	1.0
PFC-6063R-22	●	6	**63**	50	60	22	17	10.4	6.3	20	0.9
PFC-6063R-27	●	6		50	60	27	20	12.4	7	22	0.9
PFC-4080R-27	□	4	**80**	50	76	27	20	12.4	7	22	1.8
PFC-8080R-27	●	8		50	76	27	20	12.4	7	22	1.8

Note)1. All cutters are supplied without inserts.
2. Please refer page C265 for recommended cutting conditions.

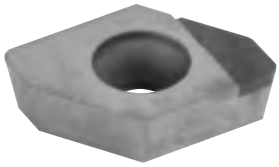
Modular Head Type Please refer Page B179

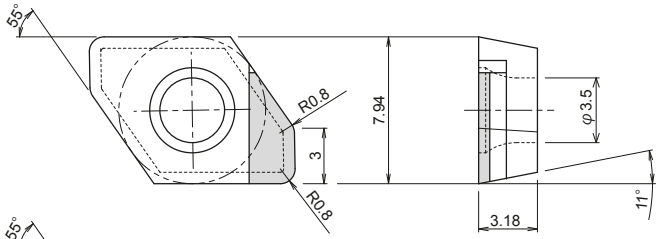
● : Standard stock items □ : Stock in Japan ○ : Soon to be deleted

Back & Forth Cutter PFCTYPE

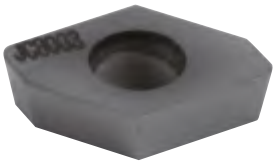
■INSERTS

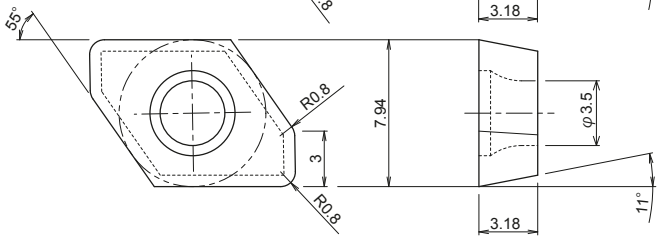
DPGT0903-W3
JBN500





DPGT0903-W3
JC8003

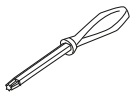


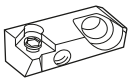


Cat. No.	Tole-rance	PVD coated	CBN
		JC8003 (Semi finishing・Finishing)	**JBN500** (Super finishing)
DPGT0903-W3	G	●	□

10 inserts per case, but grade JBN500 insert is packed in1 piece per case.

■PARTS

Clamp screw	Wrench	Set bolt for arbor
 Recommended torque:1.8N・m		 ※ for φd=27mm cutter
DSW-307H	A-10SD	M12x1.75x30

Cartridge	Screw for radial adjustments	Set bolt for cartridge	Wrench for cartridge
			
SDGPR09CA-PFC	RSW-05008	HCS5-10	LW-040

Back & Forth Cutter PFCTYPE

CASE STUDIES

Overhung length: 400mm

Result: After 3 hours machining, inserts did not show any chipping and wear. Excellent surface quality and tool life. Surface roughness and deflection was below 0.01mm

Work	Part name	Stamping die
	Material	FC250
	Hardness	–
Tool	Tool No.	PFC-6063R-22
	Grade	DPGT0903-W3 JBN500
Cutting conditions	Vc,(n)	6,000 (min^{-1}), 1,18 (m/min)
	Vf, (f z)	6,000 (mm/min)
	ae (mm)	0.05 (mm)
	ap (mm)	0.50 (mm)
	Coolant	Dry
	Machine	Double column MC

RECOMMENDED CUTTING CONDITIONS

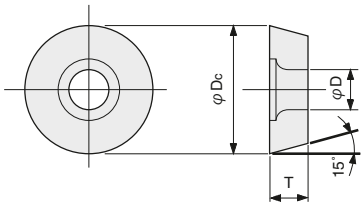
Work Materials	Insert Grades	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)	Depth of cut ap (mm)
Cast iron FC250 160-260HB	JBN500	1,200 (800~2,000)	0.1 (0.05~0.15)	0.05~0.1
	JC8003	400 (300~500)	0.1 (0.05~0.15)	0.05~0.5
Nodular cast iron FCD600 170-200HB	JBN500	1,000 (600~1,500)	0.1 (0.05~0.15)	0.05~0.1
	JC8003	300 (200~400)	0.1 (0.05~0.15)	0.05~0.5
Carbon & Alloy steel S50C, SCM440	JC8003	200 (100~300)	0.1 (0.05~0.15)	0.05~0.2

NOTE

1) In case chatter occurrs and unsatisfactory surface quality due to machine and work rigidity, recommend to reduce spindle speed or feed per tooth.
2) In case of using as face mill, recommend to reduce feed per tooth up to 0.05mm.

Milling Inserts

■ INSERTS



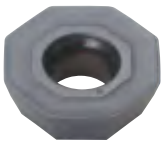
Cat. No.	Tole-rance	PVD coated					Dimensions (mm)		
		DH103	JC8015	JC5040	JC5118	JC8118	φDc	T	φD
RDHX0501MOT	H	●	○				**5.0**	1.5	2.0
RDHX0701MOT	H	●		○		●	**7.0**	1.99	2.8
RDHX0702MOT	H	●		○	○		**7.0**	2.38	2.8
RDHX1003MOT	H	●		○		●	**10.0**	3.18	3.9
RDHX12T3MOT	H	●	○	○		●	**12.0**	3.97	3.9
RDMX12T3MOT	M			●					
RDHX1604MOT	H	●	○	○	○	●	**16.0**	4.76	5.0
RDMX1604MOT	M		●	●					

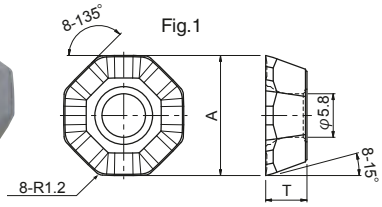
10 Inserts per case

Milling Inserts

■ INSERTS

ODMT TYPE





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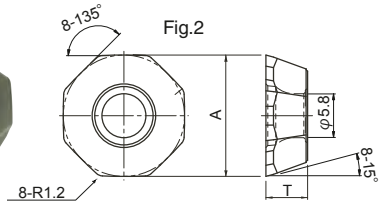
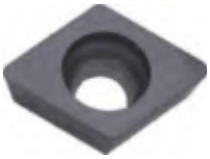
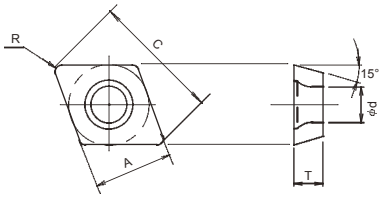


Cat. No.	PVD coated		Dimensions (mm)		Tole-rance	Fig.
	JC8015	JC5040	A	T		
ODMT0606AEN	●	●	16	5.5	M	1
ODMW0606AEN	●		16	5.5	M	2

10 Inserts per case

XDHW TYPE





■ SPECIFICATIONS

Cat. No.	PVD Coated			Dimensions (mm)				
	JC8015	JC5040	DH103	A	T	C	R	d
XDHW0206-05	●		●	6.5	2.38	10.589	0.5	2.8
XDHW0206-10	●	●	●	6.5	2.38	9.846	1.0	2.9
XDHW0310-10	●	●	●	10	3.97	15.948	1.0	4

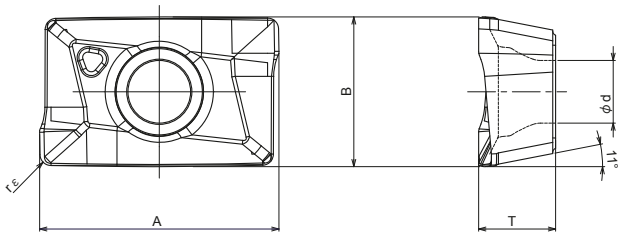
10 Inserts per case

● : Standard stock items □ : Stock in Japan ◎ : Soon to be stocked ○ : Soon to be deleted

Milling Inserts

■ INSERTS

APKT1003PDER-05

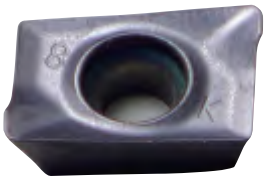


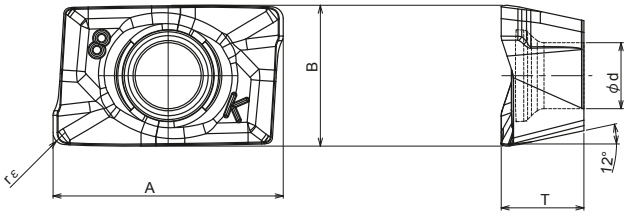
Cat. No.	PVD Coated		Dimensions (mm)				
	JC5118	JC8050	A	B	T	rε	d
APKT1003PDER-05	●	●	10.4	6.703	3.5	0.5	2.85
APKT1604PDR-08	●	●	16.7	9.55	5.7	0.8	4.5

10 Inserts per case

■ INSERTS

ADKT1505PDER-08





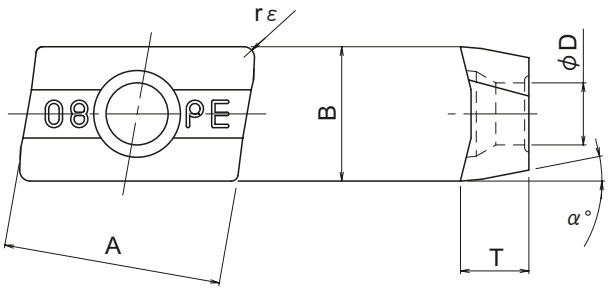
Cat. No.	PVD Coated		Dimensions (mm)				
	JC5118	JC8050	A	B	T	rε	d
ADKT1505PDER-08	●	●	15.837	9.605	5.64	0.8	4.5

10 Inserts per case

Milling Inserts

■ INSERTS

APMT



Cat. No.	PVD Coated		Dimensions (mm)				
	JC5118	JC8050	A	B	T	r ε	d
ADMT100308PDER	●	●	10.23	6.43	3.32	0.8	2.8
APMT160408PDER	●	●	15.645	9.525	4.85	0.8	5.4
APMT160416PDER	●	●	15.577	9.525	4.85	1.6	5.4

10 Inserts per case

● : Standard stock items　□ : Stock in Japan　◎ : Soon to be stocked　○ : Soon to be deleted