

ASR MULTI-FLUTES type

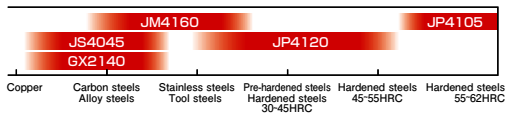
Radius Mill ASR Multi-flutes type



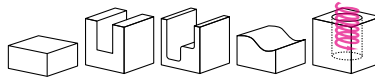
MOLDINO Tool Engineering, Ltd.

New Product News | No.1207E-14 | 2022-11

Technology



Applications



AJ Coating series

JP4120 JM4160 JP4105

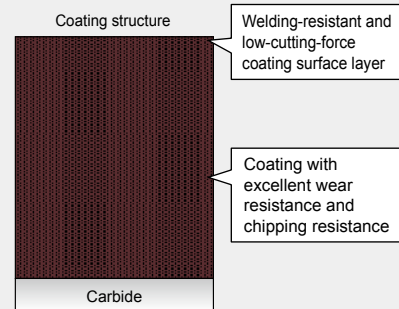
Features of AJ Coating series

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

New technology!!

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

Layer structure AJ Coating



PVD Technology

Grade for machining pre-hardened or hardened materials JP4120

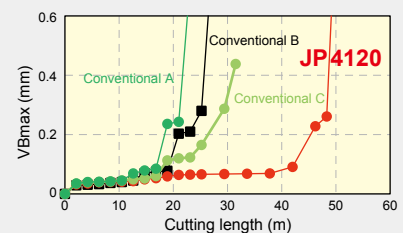
Features

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

Strong fields

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

Cutting performance



Work material : P21(40HRC)
 Tool : ASRT5063R-4
 Insert : WDNW140520
 Cutting conditions :
 $V_c=90\text{m/min}$ $f_z=0.8\text{mm/t}$ $a_p \times a_e=1 \times 44\text{mm}$
 Dry ※Single-flute cutting

PVD Technology

Grade for machining stainless-steel materials JM4160

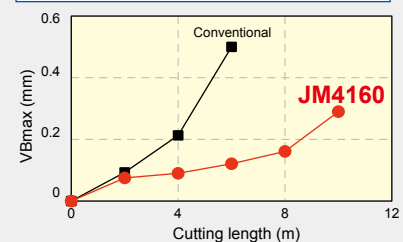
Features

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

Strong fields

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

Cutting performance



Work material : SUS304
 Tool : ASRS2032R-5
 Insert : EPMT0603EN-8LF
 Cutting conditions :
 $V_c=180\text{m/min}$ $f_z=0.5\text{mm/t}$ $a_p \times a_e=0.8 \times 21\text{mm}$
 Wet ※Single-flute cutting

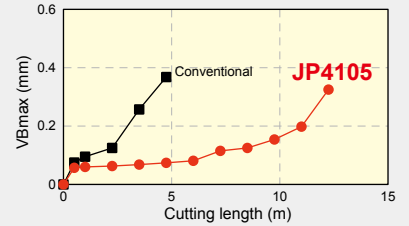
Features

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

Strong fields

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

Cutting performance



Work material : SKD11(61HRC) Tool : ASRS2032-5
 Insert : EPNW0603TN-8
 Cutting conditions :
 $V_c=80\text{m/min}$ $f_z=0.2\text{mm/t}$ $a_p \times a_e=0.5 \times 21\text{mm}$
 Dry ※Single-flute cutting

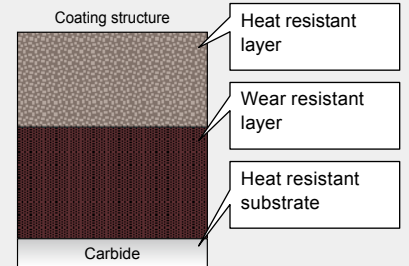
Features

- JS4045 adopts heat resistant layer, reduces the crater wear by high-efficiency cutting.
- JS4045 adopts heat resistant substrate, reduces the wear and improves tool life.
- Especially improves tool life on dry cutting.

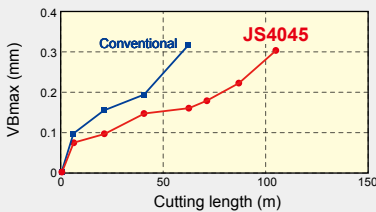
Strong fields

- Continuous and light interrupted cutting of less than 35HRC dry cutting.

Layer structure **JS Coating**

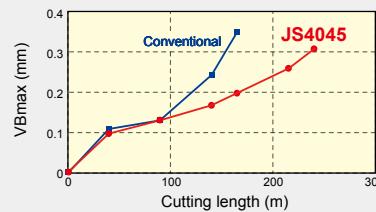


Wear graph after cutting SCM440 (32HRC)



Cutting Conditions
 Work Material SCM440 (32HRC)
 Tool ASR5063-4
 Insert Model EDNW15T4TN-15
 Cutting Speed $V_c = 180\text{m/min}$
 Speed per flute $f_z = 1.5\text{mm/t}$
 Cutting depth $a_p \times a_e = 1.0 \times 42\text{mm}$
 Coolant Dry cutting
 Single-flute cutting

Wear graph after cutting P20 (32HRC)



Cutting Conditions
 Work Material P20 (32HRC)
 Tool ASRS2016R-2
 Insert Model EPNW0603TN-8
 Cutting Speed $V_c = 180\text{m/min}$
 Speed per flute $f_z = 1.5\text{mm/t}$
 Cutting depth $a_p \times a_e = 0.5 \times 13\text{mm}$
 Coolant Dry cutting
 Single-flute cutting

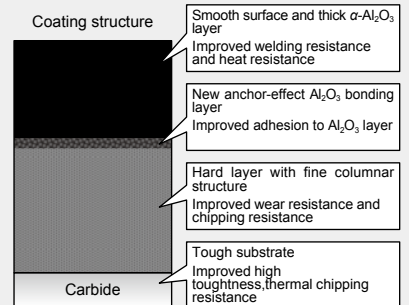
Features

- Smooth surfaced $\alpha\text{-Al}_2\text{O}_3$ coating with improved chipping / welding resistance brings less sudden-tool-edge-chipping.
- Machining efficiency is improved for high-speed, high-feed-rate rough machining by using the hard-layer with fine columnar structure.

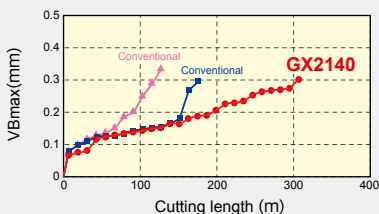
Strong fields

- Exhibits superior wear resistance when cutting mild steel, carbon steels, alloy steels and tool steel use with hardnesses of less than 35HRC.

Layer structure **GX Coating**

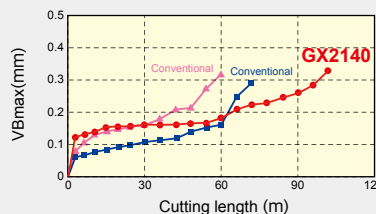


Wear graph after cutting S50C (220HB)



Cutting Conditions
 Work Material S50C(220HB)
 Holder used ASRT5063R-4
 Insert Model WDNW140520
 Cutting Speed $V_c = 180\text{m/min}$
 Speed per flute $f_z = 2.0\text{mm/t}$
 Cutting depth $a_p \times a_e = 1 \times 44\text{mm}$
 Coolant Dry cutting
 Single-flute cutting

Wear graph after cutting P20 (30HRC)



Cutting Conditions
 Work Material P20(30HRC)
 Holder used ASRT5063R-4
 Insert Model WDNW140520
 Cutting Speed $V_c = 140\text{m/min}$
 Speed per flute $f_z = 1.4\text{mm/t}$
 Cutting depth $a_p \times a_e = 1 \times 43\text{mm}$
 Coolant Dry cutting
 Single-flute cutting

Line Up

Straight Shank Type

ASR \square 20 \circ \circ (\square \circ \circ) R- \circ

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

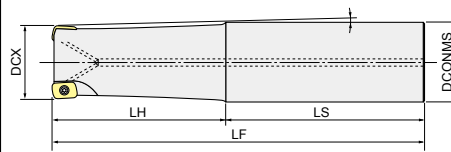


Fig.1 (Standard type)

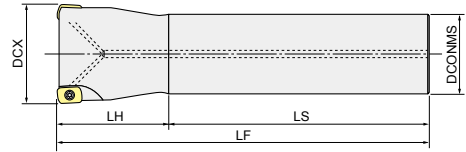


Fig.2 (Undercut type)

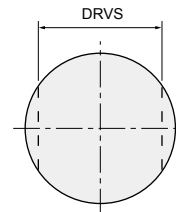
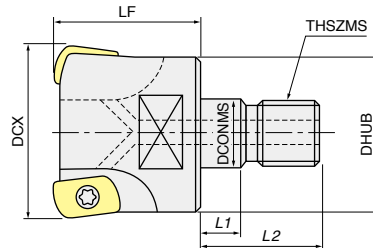
With air hole

Shank type	Item code	Stock	No. of flutes	Size (mm)						Shape	Inserts
				DCX	LF	DCONMS	LH	LS	θ_k		
Regular	ASRS2016R-2	●	2	16	100	16	30	70	—	Fig.1	EPNW0603TN-8 EPMT0603TN-8 EPMT0603EN-8LF
	ASRS2020R-3	●	3	20	130	20	50	80	—		
	ASRS2025R-4	●	4	25	140	25	60	80	—		
	ASRS2030R-4	●	4	30	150	32	70	80	0.9°		
	ASRS2032R-5	●	5	32	150	32	70	80	—		
	ASRS2040R-6	●	6	40	150	32	45	105	—		
	ASRL2016R-2	●	2	16	150	16	50	100	—	Fig.1	
	ASRL2016S15R-2	●	2	16	150	15	25	125	—	Fig.2	
	ASRL2018R-2	●	2	18	150	16	25	125	—	Fig.2	
	ASRL2020R-3	●	3	20	160	20	80	80	—	Fig.1	
	ASRL2020S18R-3	●	3	20	160	18	30	130	—	Fig.2	
	ASRL2022R-3	●	3	22	160	20	30	130	—	Fig.2	
	ASRL2025R-4	●	4	25	180	25	100	80	—	Fig.1	
	ASRL2025S23R-4	●	4	25	180	23	35	145	—	Fig.2	
	ASRL2028R-4	●	4	28	180	25	35	145	—	Fig.2	
	ASRL2030R-4	●	4	30	200	32	120	80	0.6°	Fig.1	
	ASRL2030S28R-4	●	4	30	200	28	40	160	—	Fig.2	
	ASRL2032R-5	●	5	32	200	32	120	80	—	Fig.1	
ASRL2032S30R-5	●	5	32	200	30	40	160	—	Fig.2		
ASRL2040R-6	●	6	40	220	32	45	175	—	Fig.2		

Modular Type

ASRM20 \circ \circ R- \circ

Numeric figure in a circle \circ .



With air hole

Item code	Stock	No. of flutes	Size (mm)								Inserts
			DCX	LF	DCONMS	THSZMS	DHUB	L1	L2	DRVS	
ASRM2016R-2	●	2	16	25	8.5	M8	12.8	5.5	17	10	EPNW0603TN-8 EPMT0603TN-8 EPMT0603EN-8LF
※1 ASRM2018R-2	●	2	18	25	8.5	M8	14.5	5.5	17	10	
ASRM2020R-3	●	3	20	30	10.5	M10	17.8	5.5	19	15	
※1 ASRM2022R-3	●	3	22	30	10.5	M10	17.8	5.5	19	15	
ASRM2025R-4	●	4	25	35	12.5	M12	20.8	5.5	22	17	
※1 ASRM2028R-4	●	4	28	35	12.5	M12	23	5.5	22	17	
ASRM2030R-4	●	4	30	40	17	M16	28.8	6	23	22	
ASRM2032R-5	●	5	32	40	17	M16	28.8	6	23	22	
※1 ASRM2040R-6	●	6	40	40	17	M16	28.8	6	23	22	

[Note] When ※1 and ※2 (p7) are used together as a set, there is no interference.

Do not apply lubricants such as grease, etc. to the "contact faces" and "modular screws" of the "modular mill", "dedicated shanks" and "dedicated arbor".

Parts

Numeric figure in a circle \circ .

Parts	Clamp screw	Clamp piece set	Screw driver / Wrench	Screw anti-seizure agent
Shape				
Cutter body	Fastening torque (N·m)		Shape	
ASR S/L/M20 \circ \circ (S \circ \circ)R- \circ ASR 20 \circ \circ R(M)- \circ	250 - 141	1.1	104 - T8	A
ASR 30 \circ \circ R(M)- \circ	412 - 141	2.9	105 - T15	B

[Note] The clamp screw is a consumable part. Since replacement life depends on the use environment, it is recommended that it be replaced at an early stage. Includes two spare clamp screws.

● : Stocked Items.

Bore Type

ASR○○○○R(M)-○

Numeric figure in a circle ○

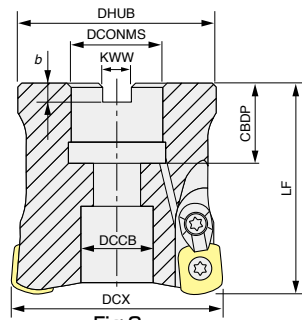


Fig.3

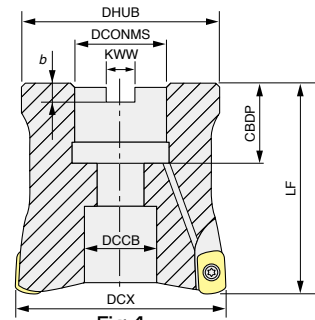


Fig.4

With air hole

Item code		Stock	No. of flutes	Size (mm)								Shape	Inserts	
				DCX	DHUB	LF	CDBP	KWW	b	DCONMS	DCCB			
Bore type	Internal diameter inch size	ASR3050R-5	●	5	50	47	50	19	8.4	5	22.225	17	Fig.3	EDNW12T3TN-10 EDMT12T3TN-10
		ASR3063R-6	●	6	63	60	50	19	8.4	5	22.225	17		
		ASR2052R-7	●	7	52	47	50	19	8.4	5	22.225	17	Fig.4	EPNW0603TN-8 EPMT0603TN-8 EPMT0603EN-8LF
		ASR2066R-8	●	8	66	60	50	19	8.4	5	22.225	17		
	Internal diameter mm size	ASR3050RM-5	●	5	50	47	50	20	10.4	6.3	22	17	Fig.3	EDNW12T3TN-10 EDMT12T3TN-10
		ASR3063RM-6	●	6	63	60	50	20	10.4	6.3	22	17		
		ASR2052RM-7	●	7	52	47	50	20	10.4	6.3	22	17	Fig.4	EPNW0603TN-8 EPMT0603TN-8 EPMT0603EN-8LF
		ASR2066RM-8	●	8	66	60	50	20	10.4	6.3	22	17		

[Note] Arbor screw is not included.

Inserts

Standard shape

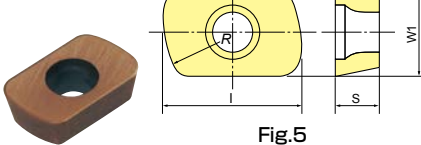


Fig.5

With breaker

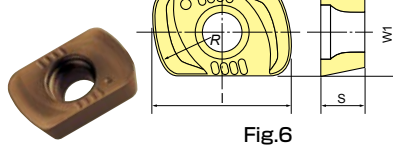


Fig.6

Spiral shape (low cutting force)

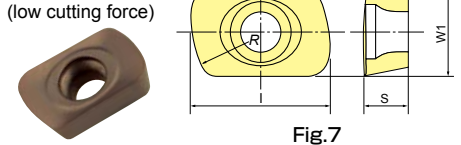


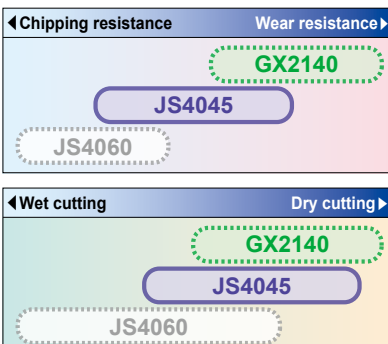
Fig.7

Item code	Tolerance class	AJ Coating			GX Coating	JS Coating		Size(mm)				Shape
		JP4105	JP4120	JM4160	GX2140	JS4045	JS4060	R	INSL	S	W1	
EPNW0603TN-8	N	●	●	●	●	●	●	8	10	3.18	6.35	Fig.5
EDNW12T3TN-10		●	●	●	●	●	●	10	12	3.97	10	
EPMT0603TN-8	M	●	●	●	●	●	●	8	10	3.18	6.35	Fig.6
EDMT12T3TN-10		●	●	●	●	●	●	10	12	3.97	10	
EPMT0603EN-8LF		●	●	●	●	●	●	8	10	3.18	6.35	

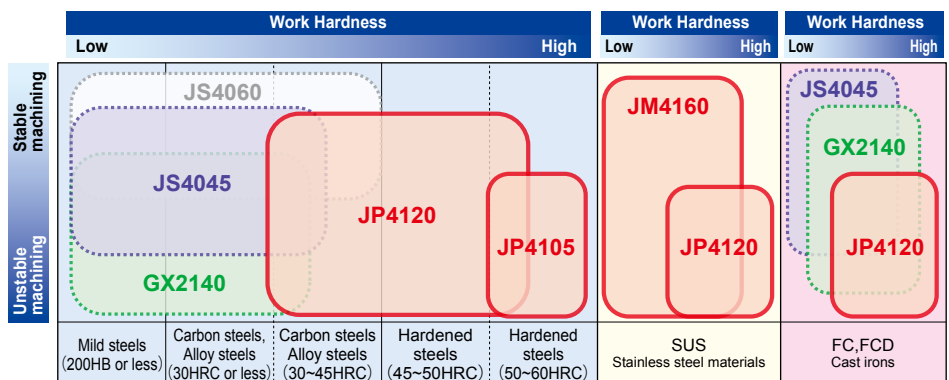
■ : General cutting, First recommended
 □ : General cutting, Second recommended

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

Grade map for less than 35HRC



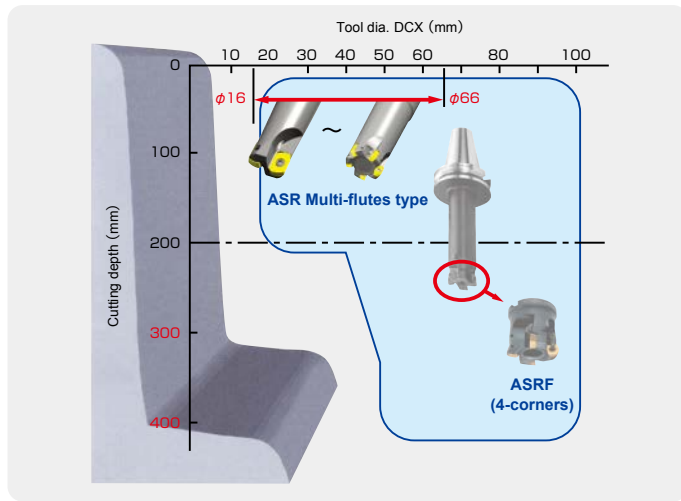
Grade map for work materials



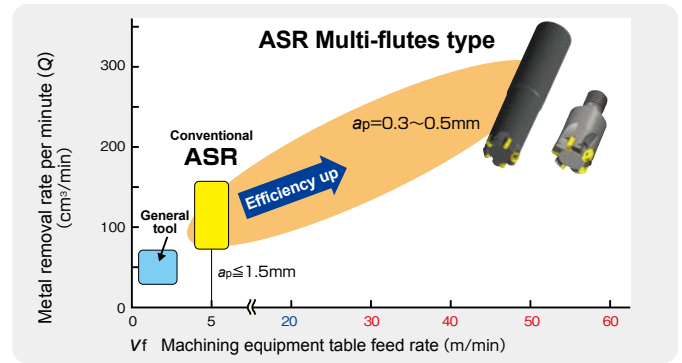
● : Stocked Items. No Mark : Manufactured upon request only.

ASR Multi-flutes type position

















In order to provide even higher performance compared to conventional tools, holders from the small-diameter side of $\phi 16\text{mm}$ to $\phi 66\text{mm}$ were made multi-flutes.



Even for small inserts, chipping resistance has been greatly improved, enabling use at $fz \geq 1.5\text{mm/t}$, so that use at the maximum machining feed rate of the latest machining equipment ($V_f \geq 20\text{m/min.}$) is recommended. As a result, processing performance can be drastically improved.



High-feed tools lineup

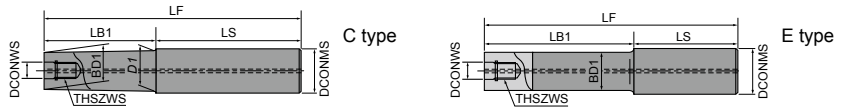
Type	Features				Holders	Inserts			Programming R (mm)	APMX (mm)
	Economical (No. of corners)	High accuracy (Less uncut remnants)	Supports for high-hardened steel	Efficiency (No. of Flutes)		Tool dia. (mm)	No. of corners	Shape		
TD4N 	◎	◎	○ ~62HRC	◎ High Efficiency multiflutes	$\phi 16 \sim 40$	4		06	2.0	1.0
ASR Multi-Flutes 		○	○ ~62HRC	◎ High Efficiency multiflutes	$\phi 16 \sim 66$	2		06	2.0	1.5
								12	3.0	2.0
ASRF-mini 	◎		○ ~62HRC	○ General	$\phi 20 \sim 63$	4		07	2.0	1.2
ASR 		○	○ ~60HRC	○ General	$\phi 20 \sim 100$	2		08~15	3.0	2.0
ASRT 	○	○	○ ~62HRC	○ General	$\phi 25 \sim 100$	3		09~14		
ASRF 	◎		○ ~60HRC	○ General	$\phi 32 \sim 100$	4		12		
TD6N 	◎	○	○ ~50HRC	○ General	$\phi 50 \sim 125$	6		14	3.0	1.5
								14		3.0
TR4F 	◎		○ ~60HRC	○ General	$\phi 32 \sim 125$	4		12	3.0	1.2
								15		2.0

※ Various other tools for roughing are also available.

For more information on tool specifications, please refer to our general catalog or visit our website. (<http://www.moldino.com>)

Special Shanks for Modular Mills

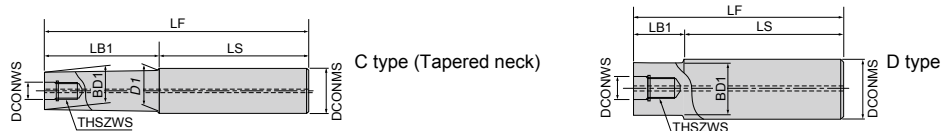
Carbide Shank



Item code	Stock	Size(mm)								Type	Cutter body	With/ without air hole
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	D1			
ASC16-8.5-95-30Z	●	8.5	M8	95	30	65	14.5	16	15.5	C	φ16※ ₃ φ18	○
ASC16-8.5-120-55Z	●			120	55	65						
ASC16-8.5-140-75Z	●			140	75	65						
ASC16-8.5-160-95Z	●			160	95	65						
ASC16-8.5-160-30Z	●			160	30	130						
ASC20-10.5-120-50Z	●	10.5	M10	120	50	70	18.5	20	19.5	C	φ20※ ₃ φ22	○
ASC20-10.5-170-90Z	●			170	90	80						
ASC20-10.5-220-120Z	●			220	120	100						
ASC20-10.5-270-150Z	●			270	150	120						
ASC20-10.5-220-50Z	●	10.5	M10	220	50	170	18.5	20	19.5	C	φ20※ ₃ φ22	○
ASC20-10.5-270-50Z	●			270		220						
ASC25-12.5-145-65	●	12.5	M12	145	65	80	23	25	—	E	φ25※ ₃ φ28	○
ASC25-12.5-215-115	●			215	115	100						
ASC25-12.5-265-145	●			265	145	120						
ASC25-12.5-315-195	●			315	195	120						
ASC25-12.5-265-65	●	12.5	M12	265	65	200	23	25	—	E	φ25※ ₃ φ28	○
ASC25-12.5-315-65	●			315		250						
ASC32-17-160-80	●			17		M16						
ASC32-17-210-110	●	210	110		100							
ASC32-17-260-140	●	260	140		120							
ASC32-17-310-190	●	310	190		120							
ASC32-17-360-240	●	360	240		120							
ASC32-17-260-80	●	17	M16	260	80	180	28	32	—	E	φ30※ ₃ φ32※ ₃ (φ40)	○
ASC32-17-310-80	●			310		230						
ASC32-17-360-80	●			360		280						

- [Note]**
- When※₂ and※₁ (P4) are used together as a set, there is no interference.
 - Commercial milling chucks or shrink-fit holders can be used.
 - For the φ40 size, it is recommended that the overhang be 200mm or less.
 - For※₃, since the cutter diameter is smaller than the shank diameter, interference occurs at the shank.

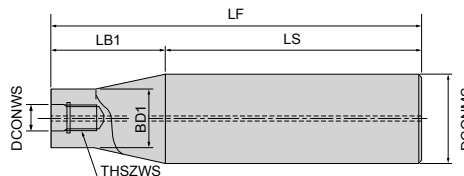
Steel Shank



Item code	Stock	Size (mm)								Type	Cutter body	With/ without air hole
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	D1			
AS16-8.5-95-15	●	8.5	M8	95	15	80	14.5	16	15.5	C	φ16※ ₃ φ18	○
AS20-10.5-100-20	●	10.5	M10	100	20	80	18	20	—	D	φ20※ ₃ φ22	○
AS25-12.5-115-35	●	12.5	M12	115	35	80	23	25	—	D	φ25※ ₃ φ28	○
AS32-17-110-30	●	17	M16	110	30	80	28	32	—	D	φ30※ ₃ φ32※ ₃ φ40	○

- [Note]**
- Commercial milling chucks can be used.
 - For※₃, since the cutter diameter is smaller than the shank diameter, interference occurs at the shank.

Steel Shank

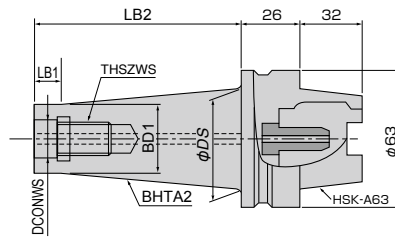


Item code	Stock	Size (mm)							Cutter body	With/ without air hole
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS		
AS42-17-360-90	●	17	M16	360	90	270	28	42	φ30 φ32 φ35 φ40	○

- [Note]**
- Commercial milling chucks can be used.

Modular Mill Arbor

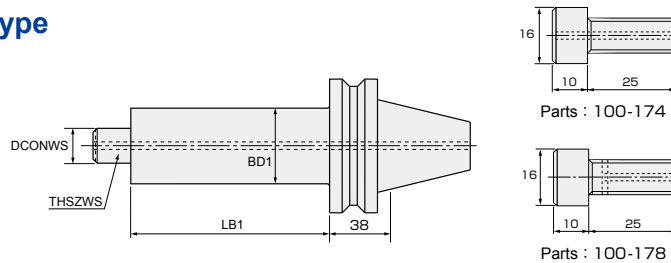
HSK Arbor Modular Mill Type



Item code	Stock	Size (mm)							Cutter body	With/ without air hole
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2		
HSK-A63-10.5-30-18	●	10.5	M10×1.5	18	20.8	30	—	3°	$\phi 20$ $\phi 22$	○
HSK-A63-10.5-70-18	●				25	70	10	3°		
HSK-A63-10.5-70-18S					48	70	10	12°		
HSK-A63-10.5-120-18	●				30.2	120	10	3°		
HSK-A63-12.5-35-21	●	12.5	M12×1.75	21	24.3	35	—	3°	$\phi 25$ $\phi 28$	○
HSK-A63-12.5-65-21	●				27.5	65	10	3°		
HSK-A63-12.5-65-21S					48	65	10	12°		
HSK-A63-12.5-115-21	●				32.7	115	10	3°		
HSK-A63-17-40-28	●	17	M16×2	28	31.8	40	—	3°	$\phi 30$ $\phi 32$ $\phi 40$	○
HSK-A63-17-60-28	●				33.9	60	10	3°		
HSK-A63-17-60-28S					48	60	10	9.5°		
HSK-A63-17-110-28	●				39.2	110	10	3°		

Bore Type Arbor

BT50 Arbor Bore Type

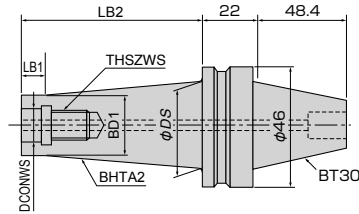


Optional: for air jet to cutting point

Item code	Stock	Size (mm)				Weight	Arbor screw	Cutter body
		DCONWS	THSZWS	LB1	BD1			
BT50-22.225-50-50	●	22.225	M10	50	47	4.3	Included screw 100-174 Optional 100-178	ASR3050R-5 ASR2052R-7
BT50-22.225-100-50	●			100		5.0		
BT50-22.225-150-50	●			150		5.7		
BT50-22.225-200-50	●			200		6.4		
BT50-22.225-250-50	●			250		7.1		
BT50-22.225-50-63	●	22.225	M10	50	60	4.8	Included screw 100-174 Optional 100-178	ASR3063R-6 ASR2066R-8
BT50-22.225-100-63	●			100		5.9		
BT50-22.225-150-63	●			150		7.0		
BT50-22.225-200-63	●			200		8.1		
BT50-22.225-250-63	●			250		9.3		
BT50-22.225-350-63	●			350		11.5		

Modular Mill Arbor

BT30

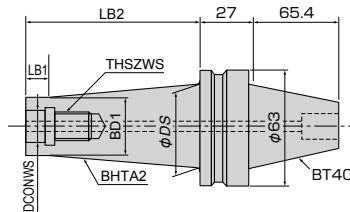


※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm)							With/ without air hole
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	
BT30-8.5-25-15		8.5	M8	15	30	25	5	20.6°	○
BT30-8.5-50-15	50					10	10.6°		
BT30-8.5-75-15	75					10	6.6°		
BT30-10.5-20-18		10.5	M10	18	35	20	5	29.5°	○
BT30-10.5-45-18	45					10	13.7°		
BT30-10.5-70-18	70					10	8.1°		
BT30-12.5-15-21		12.5	M12	21	40	15	5	32.3°	○
BT30-12.5-40-21	40					10	17.6°		
BT30-12.5-65-21	65					10	9.8°		
BT30-12.5-85-21	85					10	7.2°		
BT30-17-10-28		17	M16	28	40	10	5	31°	○
BT30-17-35-28	35					10	13.5°		
BT30-17-60-28	60					10	6.8°		

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

BT40

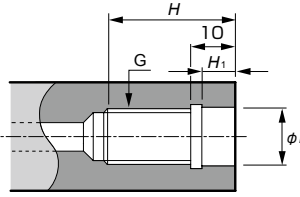
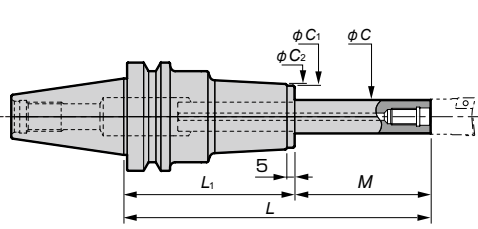


※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size (mm)							With/ without air hole
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	
BT40-8.5-25-15		8.5	M8	15	30	25	5	20.6°	○
BT40-8.5-50-15	50					10	10.6°		
BT40-8.5-75-15	75					10	6.6°		
BT40-8.5-125-15	125					10	3.7°		
BT40-10.5-20-18		10.5	M10	18	35	20	5	29.5°	○
BT40-10.5-45-18	45					10	13.7°		
BT40-10.5-70-18	70					10	8.1°		
BT40-10.5-120-18		12.5	M12	21	40	120	10	4.4°	○
BT40-12.5-15-21	15					5	32.3°		
BT40-12.5-40-21	40					10	17.6°		
BT40-12.5-65-21	65					10	9.8°		
BT40-12.5-115-21	115	10	5.2°						
BT40-17-10-28		17	M16	28	48	10	5	45°	○
BT40-17-35-28	35					10	21.8°		
BT40-17-60-28	60					10	11.3°		
BT40-17-110-28	110					10	5.7°		

Line Up

Red screw arbor



Dimensions for the Modular Mill mounting

Caution

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

Item code	Stock	Size(mm)										Weight (kg)	Rigidity value (μm) δ↓			
		G	φD	H	H ₁	φC	L	M	L ₁	φC ₁	φC ₂					
BT40-RSG8-105-M25							105				80				1.4	0.6
BT40-RSG8-135-M25							135	25		110					1.8	0.7
BT40-RSG8-165-M25							165			140					2.1	0.8
BT40-RSG8-130-M50							130			80					1.4	1.5
BT40-RSG8-160-M50							160	50		110					1.8	1.7
BT40-RSG8-190-M50							190			140					2.1	1.8
BT40-RSG8-155-M75							155			80					1.5	3.1
BT40-RSG8-185-M75		M8	8.5	18	6.5	15	185	75		110		30	32		1.9	3.4
BT40-RSG8-215-M75							215			140					2.2	3.5
BT40-RSG8-170-M90							170			140					1.5	4.5
BT40-RSG8-200-M90							200	90		110					1.9	4.8
BT40-RSG8-230-M90							230			140					2.2	4.9
BT40-RSG8-185-M105							185			80					1.6	6.2
BT40-RSG8-215-M105							215	105		110					2.0	6.7
BT40-RSG8-245-M105							245			140					2.3	6.8
BT40-RSG10-125-M25							125			100					1.8	0.4
BT40-RSG10-155-M25							155	25		130					2.2	0.5
BT40-RSG10-185-M25							185			160					2.4	0.7
BT40-RSG10-150-M50							150			100					1.9	0.8
BT40-RSG10-180-M50							180	50		130					2.3	1.0
BT40-RSG10-210-M50							210			160					2.5	1.2
BT40-RSG10-175-M75							175			100					2.0	1.6
BT40-RSG10-205-M75		M10	10.5	22	6.5	19	205	75		130		36	38		2.4	1.8
BT40-RSG10-235-M75							235			160					2.6	2.0
BT40-RSG10-200-M100							200			100					2.0	2.7
BT40-RSG10-230-M100							230	100		130					2.4	3.0
BT40-RSG10-260-M100							260			160					2.6	3.3
BT40-RSG10-220-M120							220			100					2.1	4.0
BT40-RSG10-250-M120							250	120		130					2.5	4.3
BT40-RSG10-280-M120							280			160					2.7	4.6
BT40-RSG12-125-M25							125			100					2.0	0.3
BT40-RSG12-155-M25							155	25		130					2.4	0.4
BT40-RSG12-185-M25							185			160					2.7	0.5
BT40-RSG12-150-M50							150			100					2.1	0.5
BT40-RSG12-180-M50							180	50		130					2.5	0.7
BT40-RSG12-210-M50							210			160					2.8	0.9
BT40-RSG12-175-M75							175			100					2.3	0.9
BT40-RSG12-205-M75		M12	12.5	22	6	24	205	75		130		43	45		2.7	1.1
BT40-RSG12-235-M75							235			160					3.0	1.3
BT40-RSG12-200-M100							200			100					2.4	1.4
BT40-RSG12-230-M100							230	100		130					2.8	1.6
BT40-RSG12-260-M100							260			160					3.1	1.9
BT40-RSG12-225-M125							225			100					2.6	2.1
BT40-RSG12-255-M125							255	125		130					3.0	2.4
BT40-RSG12-285-M125							285			160					3.3	2.8
BT40-RSG16-125-M25							125	25							2.6	0.2
BT40-RSG16-150-M50							150	50							2.8	0.3
BT40-RSG16-175-M75		M16	17	25	6	29	175	75		100		52	54		3.0	0.5
BT40-RSG16-200-M100							200			100					3.2	0.8
BT40-RSG16-225-M125 ※							225	125							3.4	1.2
BT50-RSG8-120-M25							120			95					4.0	0.6
BT50-RSG8-150-M25							150	25		125					4.3	0.7
BT50-RSG8-180-M25							180			155					4.8	0.7
BT50-RSG8-145-M50							145			95					4.0	1.5
BT50-RSG8-175-M50							175	50		125					4.3	1.7
BT50-RSG8-205-M50							205			155					4.8	1.7
BT50-RSG8-170-M75							170			95					4.1	3.1
BT50-RSG8-200-M75		M8	8.5	18	6.5	15	200	75		125		30	32		4.4	3.4
BT50-RSG8-230-M75							230			155					4.9	3.4
BT50-RSG8-185-M90							185			155					4.9	4.4
BT50-RSG8-215-M90							215	90		125					4.4	4.8
BT50-RSG8-245-M90							245			155					4.9	4.8
BT50-RSG8-200-M105							200			95					4.2	6.2
BT50-RSG8-230-M105							230			125					4.5	6.6
BT50-RSG8-260-M105							260			155					5.0	6.6
BT50-RSG10-140-M25							140			115					4.3	0.4
BT50-RSG10-170-M25		M10	10.5	22	6.5	19	170	25		145		36	38		4.6	0.5

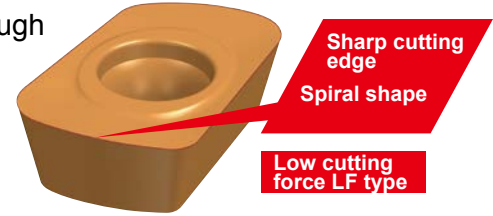
Item code	Stock	Size(mm)										Weight (kg)	Rigidity value (μm) δ↓			
		G	φD	H	H ₁	φC	L	M	L ₁	φC ₁	φC ₂					
BT50-RSG10-200-M25							200	25		175					5.6	0.5
BT50-RSG10-165-M50							165			115					4.4	0.8
BT50-RSG10-195-M50							195	50		145					4.7	0.9
BT50-RSG10-225-M50							225			175					5.7	1.0
BT50-RSG10-190-M75							190			115					4.5	1.6
BT50-RSG10-220-M75							220	75		145					4.8	1.7
BT50-RSG10-250-M75							250			175					5.8	1.8
BT50-RSG10-215-M100		M10	10.5	22	6.5	19	215			115					4.5	2.7
BT50-RSG10-245-M100							245	100		145		36	38		4.8	2.9
BT50-RSG10-275-M100							275			175					5.8	2.9
BT50-RSG10-235-M120							235			115					4.6	3.9
BT50-RSG10-265-M120							265	120		145					4.9	4.2
BT50-RSG10-295-M120							295			175					5.9	4.2
BT50-RSG10-255-M140							255			115					4.7	5.5
BT50-RSG10-285-M140							285	140		145					5.0	5.8
BT50-RSG10-315-M140							315			175					6.0	5.8
BT50-RSG12-140-M25							140			115					4.6	0.2
BT50-RSG12-170-M25							170	25		145					5.0	0.3
BT50-RSG12-200-M25							200			175					5.8	0.4
BT50-RSG12-165-M50							165			115					4.7	0.5
BT50-RSG12-195-M50							195	50		145					5.1	0.6
BT50-RSG12-225-M50							225			175					5.9	0.6
BT50-RSG12-190-M75							190			115					4.9	0.8
BT50-RSG12-235-M75							235	75		145					5.3	1.0
BT50-RSG12-250-M75							250			175					6.1	1.0
BT50-RSG12-215-M100							215			115					5.0	1.3
BT50-RSG12-245-M100		M12	12.5	22	6	24	245	100		145		43	45		5.4	1.5
BT50-RSG12-275-M100							275			175					6.2	1.6
BT50-RSG12-240-M125							240			115					5.2	2.1
BT50-RSG12-270-M125							270	125		145					5.6	2.3
BT50-RSG12-300-M125							300			175					6.4	2.4
BT50-RSG12-265-M150							265			115					5.3	3.0
BT50-RSG12-295-M150							295	150		145					5.7	3.3
BT50-RSG12-325-M150							325			175					6.5	3.4
BT50-RSG12-290-M175							290			115					5.5	4.2
BT50-RSG12-320-M175							320	175		145					5.9	4.6
BT50-RSG12-350-M175							350			175					6.7	4.6
BT50-RSG16-140-M25							140			115					4.8	0.2
BT50-RSG16-170-M25							170	25		145					5.4	0.2
BT50-RSG16-200-M25							200			175					6.6	0.2
BT50-RSG16-165-M50							165									

Cutting performance

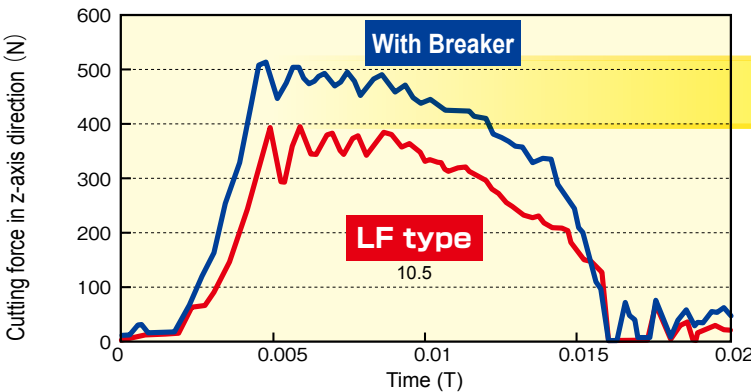
Low cutting force inserts LF Type

01 Features

- Shows its power on low-rigidity work materials or when doing rough machining with BT30 to BT40 small M/Cs.
- Sharp and twisted cutting edge provides low cutting force.
 - Cutting force in z-axis direction reduced by 25%! Enables high-feed-rate machining even on low-rigidity work materials.
 - Optimum for cutting stainless steels such as SUS304.



25% reduction

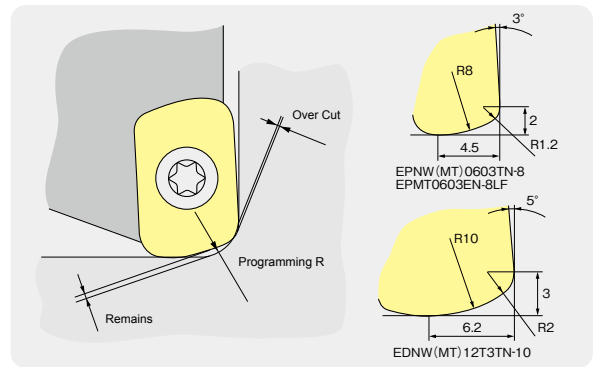


Cutting Conditions

Work : S50C (220HB)
 Tools : ASRS2025R-4 ($\phi 25$)
 $v_c = 120\text{m/min}$
 $f_z = 0.8\text{mm/t}$ (Single-flute cutting)
 $a_p \times a_e = 0.5 \times 12.5\text{mm}$

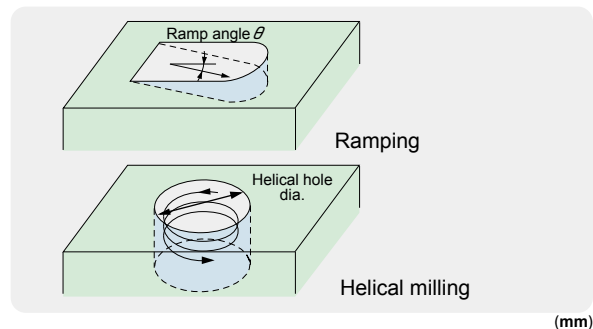
02 When setting the definition of insert shape for programming, please refer to the Programming R in the diagram below.

Item code	Programming R	Over cut	Remains
Insert : EPNW (MT)0603TN-8 EPMT0603EN-8LF Body : ASRS/L/M20(S)R- ASR20R(M)-	R2.0	0	0.497
	R2.5	0.076	0.349
	R3.0	0.218	0.236
	R3.5	0.419	0.108
	R4.0	0.612	0.03
Insert : EDNW (MT)12T3TN-10 Body : ASR30R(M)-	R3.0	0	0.700
	R3.5	0.03	0.542
	R4.0	0.155	0.394
	R4.5	0.319	0.259
	R5.0	0.5	0.144



03 Processing by direct milling is also possible.

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

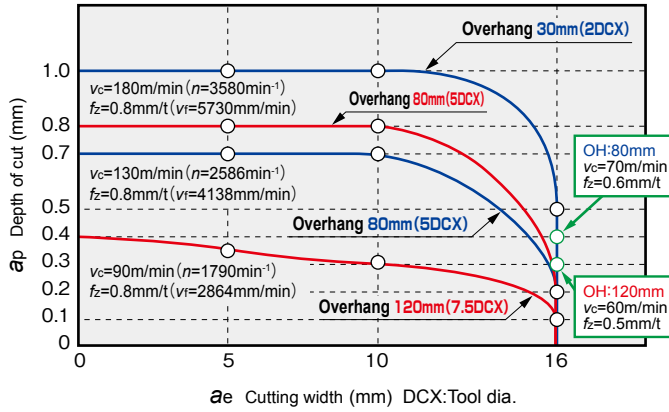


Inserts	EPNW (MT) 0603TN-8, EPMT0603EN-8LF											EPNW (MT) 12T3TN-10	
	$\phi 16$	$\phi 18$	$\phi 20$	$\phi 22$	$\phi 25$	$\phi 28$	$\phi 30$	$\phi 32$	$\phi 40$	$\phi 52$	$\phi 66$	$\phi 50$	$\phi 63$
Maximum ramp angle θ	4°	3.5°	3°	2.5°	2°	2°	2°	2°	1.5°	1°	0.5°	1.5°	1°
Helical hole dia.	22~30	26~34	30~38	34~42	40~48	46~54	50~58	54~62	70~78	94~102	122~130	83~98	109~124

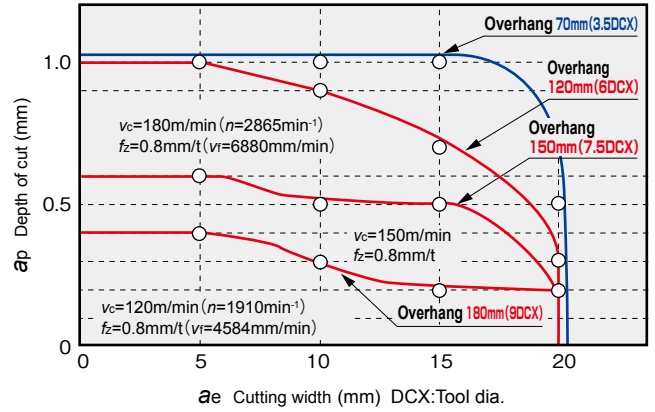
[Note] ① The ramp angle θ should be set within the ranges listed above. Use at ramp angles of 0.5° or less is recommended.
 ② For helical hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Overhang and Application Area 1 (for BT40)

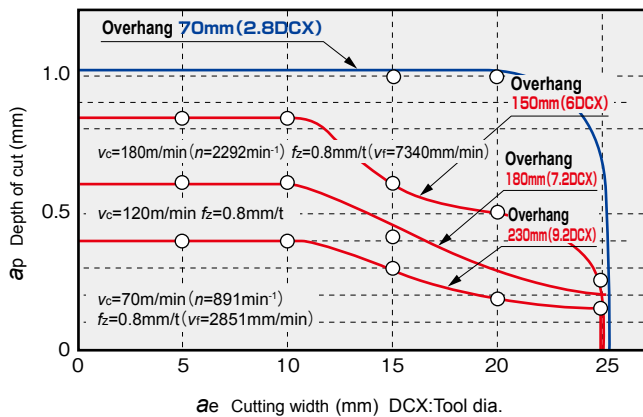
1 $\phi 16$ (2 Flutes)



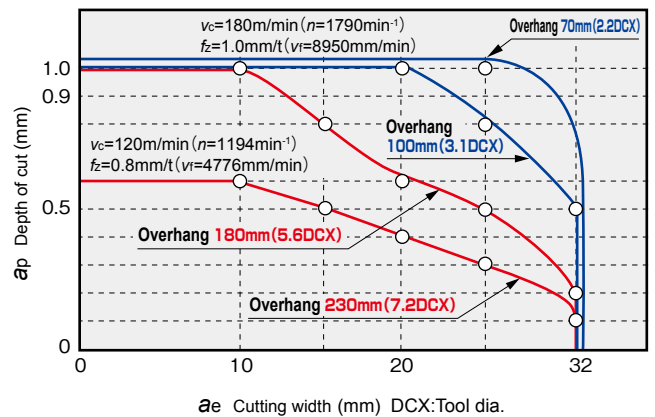
2 $\phi 20$ (3 Flutes)



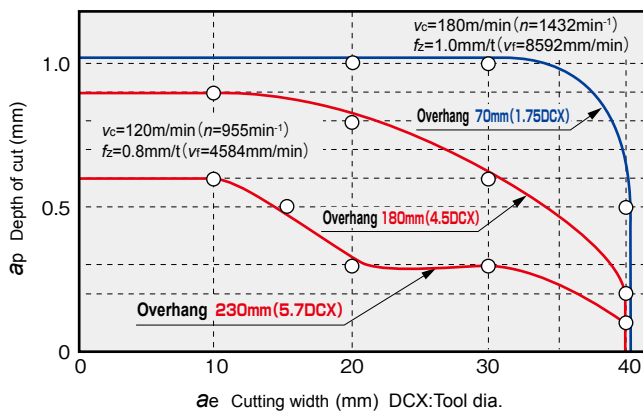
3 $\phi 25$ (4 Flutes)



4 $\phi 32$ (5 Flutes)



5 $\phi 40$ (6 Flutes)



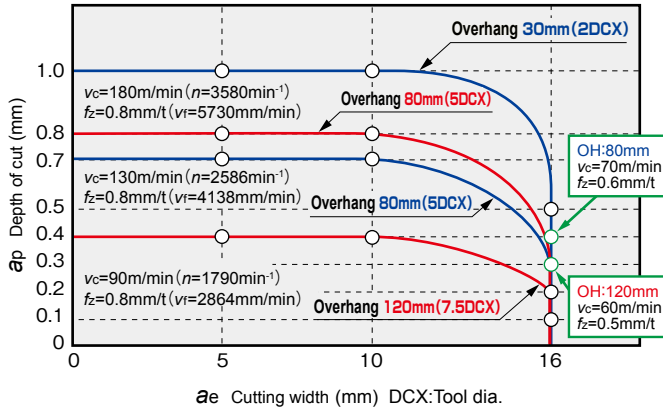
Machine: BT40 11/7.5kw
 Work material: S50C(220HB)
 1.1213(Cf35)

— : Steel Shank
 — : Carbide Shank

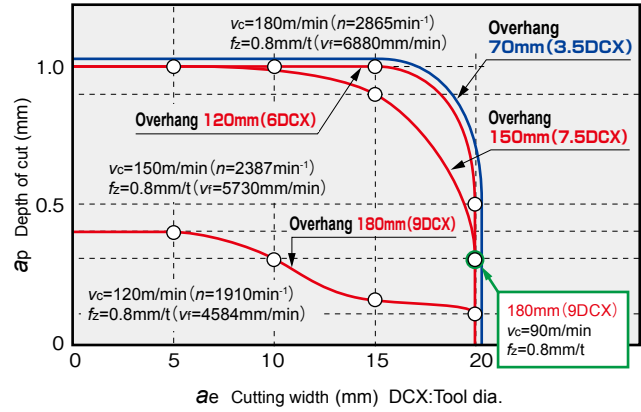
Cutting performance

Overhang and Application Area 2 (for BT50)

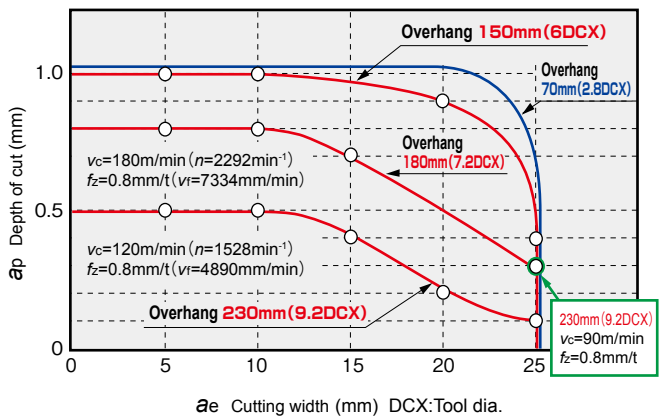
1 $\phi 16$ (2 Flutes)



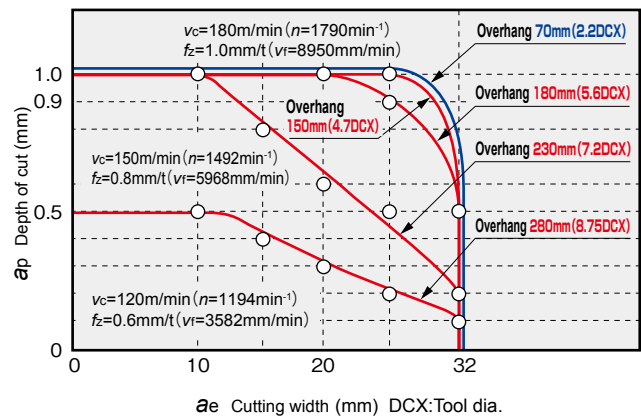
2 $\phi 20$ (3 Flutes)



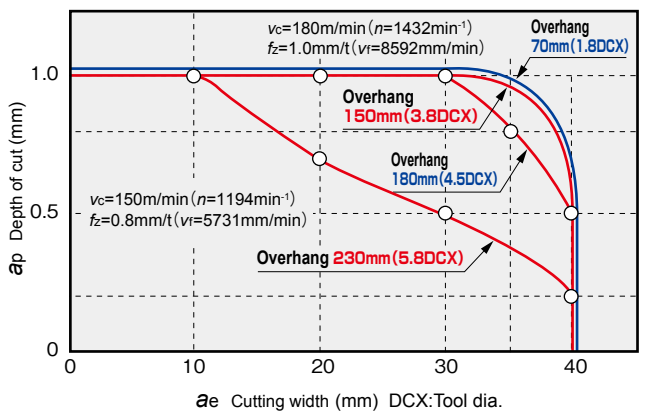
3 $\phi 25$ (4 Flutes)



4 $\phi 32$ (5 Flutes)



5 $\phi 40$ (6 Flutes)



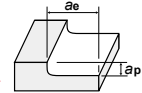
Machine: BT50 22/18.5kw
 Work material: S50C(220HB)
 1.1213 (Cf35)

— : Steel Shank
 — : Carbide Shank

Recommended Cutting Conditions

① For Straight Shank Type

※Red indicates primary recommended grade.



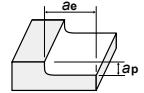
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Work material	Recommended grade	Tool dia. DCX	φ16(2 Flutes)		φ20(3 Flutes)		φ25(4 Flutes)		φ32(5 Flutes)		φ40(6 Flutes)	
			<3DCX		<3DCX		<3DCX		<3DCX		<3DCX	
			Overhang		General purpose	High-speed processing	General purpose	High-speed processing	General purpose	High-speed processing	General purpose	High-speed processing
Carbon steels Alloy steels <30HRC	※ GX2140 JS4060 JS4045	n (min ⁻¹)	1,800	3,590	1,440	2,870	1,150	2,300	900	1,800	720	1,440
		v_c (m/min)	90	180	90	180	90	180	90	180	90	180
		v_f (mm/min)	2,880	10,060	3,460	12,060	4,600	14,720	4,500	14,400	4,320	13,830
		f_z (mm/t)	0.8	1.4	0.8	1.4	1.0	1.6	1.0	1.6	1.0	1.6
		a_p (mm)	0.8	0.6	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	30	78	55	96	92	147	113	180	138	221
Pre-Hardened steels Alloy steels 30~40HRC	JP4120 JS4045 JS4060	n (min ⁻¹)	1,800	3,590	1,440	2,870	1,150	2,300	900	1,800	720	1,440
		v_c (m/min)	90	180	90	180	90	180	90	180	90	180
		v_f (mm/min)	2,880	10,060	3,460	12,060	4,600	14,720	4,500	14,400	4,320	13,830
		f_z (mm/t)	0.8	1.4	0.8	1.4	1.0	1.6	1.0	1.6	1.0	1.6
		a_p (mm)	0.8	0.6	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	30	78	55	96	92	147	113	180	138	221
Pre-hardened steels Alloy steels 40~50HRC	JP4120 JS4045	n (min ⁻¹)	1,800	2,590	1,440	2,080	1,150	1,660	900	1,300	720	1,040
		v_c (m/min)	90	130	90	130	90	130	90	130	90	130
		v_f (mm/min)	2,160	6,220	2,600	7,490	2,760	7,970	2,700	7,800	2,600	7,490
		f_z (mm/t)	0.6	1.2	0.6	1.2	0.6	1.2	0.6	1.2	0.6	1.2
		a_p (mm)	0.5	0.35	0.6	0.35	0.6	0.35	0.6	0.35	0.6	0.35
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	14	28	25	42	33	56	41	68	50	84
Stainless steels SUS	JM4160	n (min ⁻¹)	1,800	3,590	1,440	2,870	1,150	2,300	900	1,800	720	1,440
		v_c (m/min)	90	180	90	180	90	180	90	180	90	180
		v_f (mm/min)	1,800	7,180	2,160	8,610	2,300	9,200	2,250	9,000	2,160	8,640
		f_z (mm/t)	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
		a_p (mm)	0.8	0.6	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	19	56	35	69	46	92	56	113	69	138
Cast irons FC FCD	JS4045 GX2140 JP4120	n (min ⁻¹)	1,800	3,590	1,440	2,870	1,150	2,300	900	1,800	720	1,440
		v_c (m/min)	90	180	90	180	90	180	90	180	90	180
		v_f (mm/min)	4,320	11,490	6,050	15,500	6,440	16,560	6,300	16,200	6,050	15,560
		f_z (mm/t)	1.2	1.6	1.4	1.8	1.4	1.8	1.4	1.8	1.4	1.8
		a_p (mm)	1.0	0.8	1.25	1.0	1.25	1.0	1.25	1.0	1.25	1.0
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	56	119	121	248	161	331	197	405	242	498
Hardened steels Pre-hardened steels 50-55HRC	JP4120 JP4105	n (min ⁻¹)	1,600	2,390	1,280	1,920	1,020	1,530	800	1,200	640	960
		v_c (m/min)	80	120	80	120	80	120	80	120	80	120
		v_f (mm/min)	640	960	770	1,160	820	1,230	800	1,200	770	1,160
		f_z (mm/t)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		a_p (mm)	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25	0.4	0.25
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	3	3	5	5	7	6	8	8	10	9
Hardened steels 55-62HRC	JP4105	n (min ⁻¹)	1,200	2,000	960	1,600	770	1,280	600	1,000	480	800
		v_c (m/min)	60	100	60	100	60	100	60	100	60	100
		v_f (mm/min)	120	200	150	240	160	260	150	250	150	240
		f_z (mm/t)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		a_p (mm)	0.5	0.3	0.5	0.3	0.5	0.3	0.5	0.3	0.5	0.3
		a_e (mm)	13	13	16	16	20	20	25	25	32	32
		Q (cm ³ /min)	0.8	0.8	1.2	1.2	1.6	1.6	1.9	1.9	2.4	2.3
Maximum f_z (mm/t)		<1.8 (General purpose f_z :<1.0)		<1.8 (General purpose f_z :<1.0)		<1.8 (General purpose f_z :<1.0)		<1.8 (General purpose f_z :<1.0)		<1.8 (General purpose f_z :<1.0)		
Maximum a_p (mm)		<1.25 (General purpose a_p :<1.0)		<1.25 (General purpose a_p :<1.0)		<1.5 (General purpose a_p :<1.0)		<1.5 (General purpose a_p :<1.0)		<1.5 (General purpose a_p :<1.0)		

Recommended Cutting Conditions

② For Modular Carbide Shank Type

※Red indicates primary recommended grade.



Work material	Recommended grade	Tool dia. DCX	φ16(2 Flutes)			φ20(3 Flutes)			φ25(4 Flutes)			φ32(5 Flutes)			φ40(6 Flutes)		
			Modular carbide shank			Modular carbide shank			Modular carbide shank			Modular carbide shank			Modular carbide shank		
			Overhang	3DCX-5DCX	5DCX-7DCX	>7DCX	3DCX-5DCX	5DCX-7DCX	>7DCX	3DCX-5DCX	5DCX-7DCX	>7DCX	3DCX-5DCX	5DCX-7DCX	>7DCX	3DCX-5DCX	5DCX-7DCX
Carbon steels Alloy steels <30HRC	※ GX2140 JS4060 JS4045	n (min ⁻¹)	2,590	2,590	1,800	2,080	2,080	1,440	1,660	1,660	1,150	1,300	1,300	900	1,040	1,040	720
		v_c (m/min)	130	130	90	130	130	90	130	130	90	130	130	90	130	130	90
		v_f (mm/min)	4,150	4,150	2,880	5,000	5,000	3,460	6,640	6,640	4,600	6,500	6,500	4,500	6,240	6,240	4,320
		f_z (mm/t)	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		a_p (mm)	0.6	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	32	27	15	64	40	22	106	66	37	130	81	45	160	100	55
Pre-hardened steels Alloy steels 30~40HRC	JP4120 JS4045 JS4060	n (min ⁻¹)	2,590	2,590	1,800	2,080	2,080	1,440	1,660	1,660	1,150	1,300	1,300	900	1,040	1,040	720
		v_c (m/min)	130	130	90	130	130	90	130	130	90	130	130	90	130	130	90
		v_f (mm/min)	4,150	4,150	2,880	5,000	5,000	3,460	6,640	6,640	4,600	6,500	6,500	4,500	6,240	6,240	4,320
		f_z (mm/t)	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		a_p (mm)	0.6	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	32	27	15	64	40	22	106	66	37	130	81	45	160	100	55
Pre-hardened steels Alloy steels 40~50HRC	JP4120 JS4045	n (min ⁻¹)	1,800	1,800	1,800	1,440	1,440	1,440	1,150	1,150	1,150	900	900	900	720	720	720
		v_c (m/min)	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
		v_f (mm/min)	2,160	2,160	2,160	2,600	2,600	2,600	2,760	2,760	2,760	2,700	2,700	2,700	2,600	2,600	2,600
		f_z (mm/t)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		a_p (mm)	0.5	0.4	0.3	0.5	0.4	0.3	0.5	0.4	0.3	0.5	0.4	0.3	0.5	0.4	0.3
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	14	11	8	21	17	12	28	22	17	34	27	20	42	33	25
Stainless steels SUS	JM4160	n (min ⁻¹)	2,990	1,800	1,800	2,390	1,440	1,440	1,920	1,150	1,150	1,500	900	900	1,200	720	720
		v_c (m/min)	150	90	90	150	90	90	150	90	90	150	90	90	150	90	90
		v_f (mm/min)	2,990	1,800	1,800	3,590	2,160	2,160	3,840	2,300	2,300	3,750	2,250	2,250	3,600	2,160	2,160
		f_z (mm/t)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		a_p (mm)	0.6	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4	0.8	0.5	0.4
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	23	12	9	46	17	14	61	23	18	75	28	23	92	35	28
Cast irons FC FCD	JS4045 GX2140 JP4120	n (min ⁻¹)	2,590	2,590	1,800	2,080	2,080	1,440	1,660	1,660	1,150	1,300	1,300	900	1,040	1,040	720
		v_c (m/min)	130	130	90	130	130	90	130	130	90	130	130	90	130	130	90
		v_f (mm/min)	6,220	6,220	4,320	8,740	8,740	6,050	9,300	9,300	6,440	9,100	9,100	6,300	8,740	8,740	6,050
		f_z (mm/t)	1.2	1.2	1.2	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
		a_p (mm)	0.8	0.6	0.5	0.8	0.6	0.4	0.8	0.6	0.4	0.8	0.6	0.4	0.8	0.6	0.4
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	65	49	28	112	84	39	149	112	52	182	137	63	224	168	77
Hardened steels Pre-hardened steels 50~55HRC	JP4120 JP4105	n (min ⁻¹)	1,600	1,600	1,600	1,280	1,280	1,280	1,020	1,020	1,020	800	800	800	640	640	640
		v_c (m/min)	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
		v_f (mm/min)	640	640	640	770	770	770	820	820	820	800	800	800	770	770	770
		f_z (mm/t)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		a_p (mm)	0.35	0.25	0.15	0.35	0.25	0.15	0.35	0.25	0.15	0.35	0.25	0.15	0.35	0.25	0.15
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	3	2	1	4	3	2	6	4	2	7	5	3	9	6	4
Hardened steels 55~62HRC	JP4105	n (min ⁻¹)	1,200	1,200	1,200	960	960	960	770	770	770	600	600	600	480	480	480
		v_c (m/min)	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
		v_f (mm/min)	120	120	120	150	150	150	160	160	160	150	150	150	150	150	150
		f_z (mm/t)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		a_p (mm)	0.5	0.3	0.2	0.5	0.3	0.2	0.5	0.3	0.2	0.5	0.3	0.2	0.5	0.3	0.2
		a_e (mm)	13	13	13	16	16	16	20	20	20	25	25	25	32	32	32
		Q (cm ³ /min)	0.8	0.5	0.3	1.2	0.7	0.5	1.6	1.0	0.6	1.9	1.1	0.8	2.4	1.4	1.0
Maximum f_z (mm/t)		<1.8 (General purpose f_z :<1.0)			<1.8 (General purpose f_z :<1.0)			<1.8 (General purpose f_z :<1.0)			<1.8 (General purpose f_z :<1.0)			<1.8 (General purpose f_z :<1.0)			
Maximum a_p (mm)		<1.25 (General purpose a_p :<1.0)			<1.25 (General purpose a_p :<1.0)			<1.5 (General purpose a_p :<1.0)			<1.5 (General purpose a_p :<1.0)			<1.5 (General purpose a_p :<1.0)			

[Note]

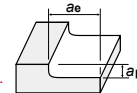
- Use the appropriate coolant for the work material and machining shape.
- These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
- This table shows the general conditions for shoulder milling. The conditions should be adjusted according to the machine rigidity, tooling, condition of object to be milled, etc. In particular, when performing shoulder milling in combination with slotting or machining of cutting widths close to slots, etc., chattering vibrations may occur, which can lead to trouble. Therefore, please consider the following when adjusting the conditions:
-When performing shoulder milling in combination with slotting, please refer to the cutting region on pp. 13 - 14.
-Use inserts equipped with breakers.
-Reduce rotation speed and table feed rate by 50 to 70%.
-Reduce cutting depth a_p by 50 to 70%.
- Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
- JP4105 and JP4005 are a hardened steel, and is not suitable for Non-heat-treated steel material.
- For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 and JM4060 are recommended.
- As a measure to prevent tool damage due to chip jamming, always use an air blower, etc. to remove chips.
- Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.
- Perform insert replacement at an early stage to prevent chipping due to excessive use.
- The following equation expresses the metal removal rate per unit time:
 $Q(\text{cm}^3/\text{min}) = a_p(\text{mm}) \times a_e(\text{mm}) \times v_f(\text{mm}/\text{min}) / 1000$
- The maximum value of cut depth is shown in the table below. Be sure to use settings that do not exceed the maximum value.

EPNW(MT)0603TN-8
(Programming R:R2.0)
EPMT0603EN-8LF

Applicable cutter
ASR S/L/M200(S)R

③ For Bore Type

※Red indicates primary recommended grade.



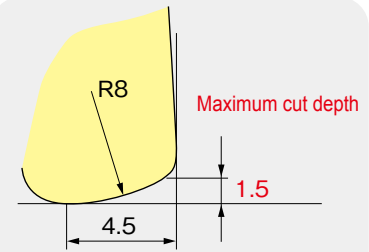
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Work material	Recommended grade	Tool dia. DCX	φ50 (6 Flutes) ASR3050R (M)-5					φ52 (7 Flutes) ASR2052R (M)-7					φ63 (6 Flutes) ASR3063R (M)-5					φ66 (8 Flutes) ASR2066R (M)-8				
			Overhang		3DCX-5DCX	5DCX-7DCX	7DCX	Overhang		3DCX-5DCX	5DCX-7DCX	7DCX	Overhang		3DCX-5DCX	5DCX-7DCX	7DCX	Overhang		3DCX-5DCX	5DCX-7DCX	7DCX
			General purpose	High-speed processing				General purpose	High-speed processing				General purpose	High-speed processing				General purpose	High-speed processing			
Carbon steels Alloy steels <30HRC	※ GX2140 JS4060 JS4045	n (min ⁻¹)	580	1,150	830	830	580	560	1,110	800	800	560	460	910	660	660	460	440	870	630	630	440
		v_c (m/min)	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90
		v_f (mm/min)	3,770	9,200	4,150	4,150	2,900	3,920	12,440	5,600	5,600	3,920	3,590	8,740	3,960	3,960	2,760	3,520	11,140	5,040	5,040	3,520
		f_z (mm/t)	1.3	1.6	1.0	1.0	1.0	1.0	1.6	1.0	1.0	1.0	1.3	1.6	1.0	1.0	1.0	1.0	1.6	1.0	1.0	1.0
		a_p (mm)	1.0	0.8	1.0	0.7	0.5	1.0	0.5	0.8	0.5	0.4	1.0	0.8	1.0	0.7	0.5	1.0	0.5	0.8	0.5	0.4
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	151	294	166	116	58	157	249	179	112	63	180	350	198	139	69	176	279	202	126	70
Pre-hardened steels Alloy steels 30~40HRC	JP4120 JS4045 JS4060	n (min ⁻¹)	580	1,150	830	830	580	560	1,110	800	800	560	460	910	660	660	460	440	870	630	630	440
		v_c (m/min)	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90
		v_f (mm/min)	3,770	9,200	4,150	4,150	2,900	3,920	12,440	5,600	5,600	3,920	3,590	8,740	3,960	3,960	2,760	3,520	11,140	5,040	5,040	3,520
		f_z (mm/t)	1.3	1.6	1.0	1.0	1.0	1.0	1.6	1.0	1.0	1.0	1.3	1.6	1.0	1.0	1.0	1.0	1.6	1.0	1.0	1.0
		a_p (mm)	1.0	0.8	1.0	0.7	0.5	1.0	0.5	0.8	0.5	0.4	1.0	0.8	1.0	0.7	0.5	1.0	0.5	0.8	0.5	0.4
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	151	294	166	116	58	157	249	179	112	63	180	350	198	139	69	176	279	202	126	70
Pre-hardened steels Alloy steels 40~50HRC	JP4120 JS4045	n (min ⁻¹)	580	830	580	580	580	560	800	560	560	560	460	660	460	460	460	440	630	440	440	440
		v_c (m/min)	90	130	90	90	90	90	130	90	90	90	90	130	90	90	90	90	130	90	90	90
		v_f (mm/min)	2,320	3,320	2,320	2,320	2,320	2,360	6,720	2,360	2,360	2,360	2,210	3,170	2,210	2,210	2,210	2,120	6,050	2,120	2,120	2,120
		f_z (mm/t)	0.8	0.8	0.8	0.8	0.8	0.6	1.2	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.6	1.2	0.6	0.6	0.6
		a_p (mm)	1.0	1.0	1.0	0.7	0.5	0.6	0.35	0.5	0.4	0.3	1.0	1.0	1.0	0.7	0.5	0.6	0.35	0.5	0.4	0.3
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	93	133	93	65	46	57	94	47	38	28	111	159	111	77	55	64	106	53	42	32
Stainless steels SUS	JM4160	n (min ⁻¹)	580	1,150	960	580	580	560	1,110	920	560	560	460	910	760	460	460	440	870	730	440	440
		v_c (m/min)	90	180	150	90	90	90	180	150	90	90	90	180	150	90	90	90	180	150	90	90
		v_f (mm/min)	1,450	5,750	2,400	1,450	1,450	1,960	7,770	3,220	1,960	1,960	1,380	5,460	2,280	1,380	1,380	1,760	6,960	2,920	1,760	1,760
		f_z (mm/t)	0.5	1.0	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5
		a_p (mm)	1.0	0.8	1.0	0.7	0.5	1.0	0.5	0.8	0.5	0.4	1.0	0.8	1.0	0.7	0.5	1.0	0.5	0.8	0.5	0.4
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	58.0	184.0	96.0	40.6	29.0	78.4	155.4	103.0	39.2	31.4	69.0	218.4	114.0	48.3	34.5	88.0	174.0	116.8	44.0	35.2
Cast irons FC FCD	JS4045 GX2140 JP4120	n (min ⁻¹)	580	1,150	830	830	580	560	1,110	800	800	560	460	910	660	660	460	440	870	630	630	440
		v_c (m/min)	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90	90	180	130	130	90
		v_f (mm/min)	4,350	10,350	6,230	6,230	4,350	5,490	13,990	7,840	7,840	5,490	4,140	9,830	5,940	5,940	4,140	4,930	12,530	7,060	7,060	4,930
		f_z (mm/t)	1.5	1.8	1.5	1.5	1.5	1.4	1.8	1.4	1.4	1.4	1.5	1.8	1.5	1.5	1.5	1.4	1.8	1.4	1.4	1.4
		a_p (mm)	1.5	1.5	1.5	1.0	0.7	1.25	1.0	0.8	0.6	0.4	1.5	1.5	1.5	1.0	0.7	1.25	1.0	0.8	0.6	0.4
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	261	621	374	249	122	275	560	251	188	88	311	737	446	297	145	308	627	282	212	99
Hardened steels Pre-hardened steels 50-55HRC	JP4120 JP4105	n (min ⁻¹)	510	770	510	510	510	490	740	490	490	490	410	610	410	410	410	390	580	390	390	390
		v_c (m/min)	80	120	80	80	80	80	120	80	80	80	80	120	80	80	80	80	120	80	80	80
		v_f (mm/min)	510	770	510	510	510	690	1,040	690	690	690	500	740	500	500	500	630	930	630	630	630
		f_z (mm/t)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		a_p (mm)	1.0	1.0	1.0	0.7	0.5	0.4	0.25	0.35	0.25	0.15	1.0	1.0	1.0	0.7	0.5	0.4	0.25	0.35	0.25	0.15
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	20	31	20	14	10	11	10	10	7	4	25	37	25	18	13	13	12	11	8	5
Hardened steels 55-62HRC	JP4105	n (min ⁻¹)	390	640	390	390	390	370	620	370	370	370	310	510	310	310	310	290	490	290	290	290
		v_c (m/min)	60	100	60	60	60	60	100	60	60	60	60	100	60	60	60	60	100	60	60	60
		v_f (mm/min)	100	160	100	100	100	130	220	130	130	130	100	160	100	100	100	120	200	120	120	120
		f_z (mm/t)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		a_p (mm)	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.5	0.3	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.5	0.3	0.2
		a_e (mm)	40	40	40	40	40	40	40	40	40	40	50	50	50	50	50	50	50	50	50	50
		Q (cm ³ /min)	2.0	3.2	2.0	2.0	2.0	2.6	2.6	2.6	1.6	1.0	2.5	4.0	2.5	2.5	2.5	3.0	3.0	3.0	1.8	1.2
Maximum f_z (mm/t)		<2.0 (General purpose f_z : <1.0)					<1.8 (General purpose f_z : <1.0)					<2.0 (General purpose f_z : <1.0)					<1.8 (General purpose f_z : <1.0)					
Maximum a_p (mm)		<2.0 (General purpose a_p : <1.5)					<1.5 (General purpose a_p : <1.0)					<2.0 (General purpose a_p : <1.5)					<1.5 (General purpose a_p : <1.0)					

Recommended Cutting Conditions

For LF type inserts (BT30 modular type)

Work material	Recommended grade	Coolant	Tool dia. DCX Overhang (mm)	φ16(2 Flutes)			φ20(3 Flutes)			φ25(4 Flutes)		
				50	75	100	50	75	100	50	75	100
Carbon steels Alloy steels <30HRC Cast irons	JM4160	Air	n (min ⁻¹)	3,580	2,586	1,790	2,865	2,865	2,070	2,291	2,291	1,655
			v_c (m/min)	180	130	90	180	180	130	180	180	130
			v_f (mm/min)	5,728	4,138	2,864	6,876	6,876	4,970	7,331	7,331	5,296
			f_z (mm/t)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
			a_p (mm)	0.5	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.5
			a_e (mm)	11	11	11	14	14	14	18	18	18
			Q (cm ³ /min)	32	23	13	58	48	28	79	66	48
Stainless steels	JM4160	Air	n (min ⁻¹)	3,580	2,586	1,790	2,865	2,865	2,070	2,291	2,291	1,655
			v_c (m/min)	180	130	90	180	180	130	180	180	130
			v_f (mm/min)	5,728	4,138	2,864	6,876	6,876	4,970	7,331	7,331	5,296
			f_z (mm/t)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
			a_p (mm)	0.5	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.5
			a_e (mm)	11	11	11	14	14	14	18	18	18
			Q (cm ³ /min)	32	23	13	58	48	28	79	66	48
	JM4160	Wet	n (min ⁻¹)	2,586	2,586	1,790	2,070	2,070	1,432	1,655	1,655	1,273
			v_c (m/min)	130	130	90	130	130	90	130	130	100
			v_f (mm/min)	4,136	4,136	2,864	4,970	4,970	3,437	5,296	5,296	3,055
			f_z (mm/t)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
			a_p (mm)	0.6	0.5	0.4	0.6	0.5	0.4	0.6	0.5	0.5
			a_e (mm)	11	11	11	14	14	14	18	18	18
			Q (cm ³ /min)	27	23	13	42	35	19	57	48	27
Titanium alloys	JM4160	Wet	n (min ⁻¹)	1,193	1,193	1,193	955	955	955	764	764	764
			v_c (m/min)	60	60	60	60	60	60	60	60	60
			v_f (mm/min)	954	954	954	1,146	1,146	1,146	1,222	1,222	1,222
			f_z (mm/t)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
			a_p (mm)	0.6	0.5	0.4	0.8	0.6	0.5	1.0	0.8	0.6
			a_e (mm)	11	11	11	14	14	14	18	18	18
			Q (cm ³ /min)	6	5	4	13	10	8	22	18	13



EPMT0603EN-8LF
(Programming R:R2.0)

Applicable cutter
ASR S/L/M20 ~
ASR 20 R(M)-

For LF type inserts (BT40 modular type)

Work material	Recommended grade	Coolant	Tool dia. DCX Overhang (mm)	φ16(2 Flutes)			φ20(3 Flutes)			φ25(4 Flutes)			φ32(5 Flutes)			φ40(6 Flutes)		
				50	75	100	50	75	100	50	75	100	50	75	100	50	75	100
Carbon steels Alloy steels <30HRC Cast irons	JM4160	Air	n (min ⁻¹)	3,580	2,586	1,790	2,865	2,865	2,070	2,291	2,291	1,655	1,790	1,790	1,790	1,432	1,432	1,432
			v_c (m/min)	180	130	90	180	180	130	180	180	130	180	180	180	180	180	180
			v_f (mm/min)	7,160	5,170	3,580	8,595	8,595	6,210	9,164	9,164	6,620	8,950	8,950	8,950	8,592	8,592	8,592
			f_z (mm/t)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
			a_p (mm)	0.5	0.5	0.4	0.6	0.5	0.5	0.8	0.6	0.5	1.0	1.0	0.8	1.0	1.0	0.8
			a_e (mm)	11	11	11	14	14	14	18	18	18	22	22	22	28	28	28
			Q (cm ³ /min)	39	28	16	72	60	43	132	99	60	197	197	158	241	241	192
Stainless steels	JM4160	Air	n (min ⁻¹)	3,580	2,586	1,790	2,865	2,865	2,070	2,291	2,291	1,655	1,790	1,790	1,790	1,432	1,432	1,432
			v_c (m/min)	180	130	90	180	180	130	180	180	130	180	180	180	180	180	
			v_f (mm/min)	7,160	5,170	3,580	8,595	8,595	6,210	9,164	9,164	6,620	8,950	8,950	8,950	8,592	8,592	8,592
			f_z (mm/t)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
			a_p (mm)	0.5	0.5	0.4	0.6	0.5	0.5	0.8	0.6	0.5	1.0	1.0	0.8	1.0	1.0	0.8
			a_e (mm)	11	11	11	14	14	14	18	18	18	22	22	22	28	28	28
			Q (cm ³ /min)	39	28	16	72	60	43	132	99	60	197	197	158	241	241	192
	JM4160	Wet	n (min ⁻¹)	2,586	2,586	1,790	2,070	2,070	1,432	1,655	1,655	1,273	1,193	1,193	1,193	955	955	955
			v_c (m/min)	130	130	90	130	130	90	130	130	100	120	120	120	120	120	
			v_f (mm/min)	5,172	5,172	3,580	6,210	6,210	4,296	6,620	6,620	5,092	5,965	5,965	4,772	5,730	5,730	4,584
			f_z (mm/t)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
			a_p (mm)	0.6	0.5	0.4	0.6	0.5	0.4	0.8	0.6	0.5	1.0	1.0	0.8	1.0	1.0	0.8
			a_e (mm)	11	11	11	14	14	14	18	18	18	22	22	22	28	28	28
			Q (cm ³ /min)	34	28	16	52	43	24	95	74	46	131	131	84	160	160	103
Titanium alloys	JM4160	Wet	n (min ⁻¹)	1,193	1,193	1,193	955	955	955	764	764	764	597	597	597	477	477	477
			v_c (m/min)	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
			v_f (mm/min)	1,193	1,193	1,193	1,432	1,432	1,432	1,528	1,528	1,528	1,194	1,194	1,194	1,431	1,431	1,431
			f_z (mm/t)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
			a_p (mm)	0.6	0.5	0.4	0.8	0.6	0.5	1.0	0.8	0.6	1.0	1.0	0.8	1.0	1.0	0.8
			a_e (mm)	11	11	11	14	14	14	18	18	18	22	22	22	28	28	28
			Q (cm ³ /min)	8	7	5	16	12	10	28	22	17	26	26	21	40	40	32

For LF type inserts

Shank type / Modular Carbide Shank / Bore Type

• Refer to the standard cutting conditions ①, ②, ③ for "Carbon steels/alloy steels <30HRC", "Cast irons", and "Stainless steels". The applicable insert material is JM4160.

- [Note] ① Use the appropriate coolant for the work material and machining shape.
 ② These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
 ③ These tables show general conditions for shoulder cutting. Please make adjustments according to the machine rigidity and work material conditions. In particular, for inclined cutting such as pocket machining or groove cutting, reduce cutting depth a_p by 50 to 60%.
 ④ LF type breakers are not suitable for strong interrupted cutting.
 ⑤ Since there is a danger of discharged chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses to enable work to be performed in a safe environment.
 ⑥ Perform insert replacement at an early stage to prevent chipping due to excessive use.

Field Data

No	Tool dia. DCX (mm)	Cutter	Grade	Work material	Cutting conditions			Result
					Vc m/min (n min ⁻¹)	Vf mm/min (fz mm/t)	ap × ae mm	
1	20	ASRM2020R-3	P01	X38CrMoV5-1 54HRC	230 (3700)	7000 (0.63)	0.35 × 10	2.7 times the performance of conventional tool for OH80mm, HSK63A.
2			JP4105 equivalent	X45NiCrMo4 52HRC	175 (2400)	6400 (0.88)	0.35 × 12	1.7 times the performance of conventional products for OH60mm, HSK40.
3			P10 JP4120 equivalent	SKD11 (42HRC)	120 (1900)	2800 (0.5)	0.3 × 12	Long tool life with less chipping than conventional products.
4	25	ASRM2025R-4	P40 JS4060 equivalent	S55C	180 (2300)	7300 (0.8)	0.3 × 20	1.5× the tool life of conventional products.
5	32	ASRM2032R-5	P10 JP4120 equivalent	SKD61 (43HRC)	90 (900)	2700 (0.6)	0.3 × 20	1.5× the tool life of conventional products.
6	40	ASRM2040R-6	P40 JS4060 equivalent	SKD61	190 (1500)	4500 (0.5)	0.4 × 30	1.5× the tool life of conventional products.
7	32	ASRS2032R-5	P01 JP4105 equivalent	SKD6 (52HRC)	90 (895)	1340 (0.3)	0.15 × 15	2× the tool life of conventional products.
8	25	ASRS2025R-4	M40 JM4160 equivalent	SUS630 (40HRC)	135 (1719)	6870 (1.1)	0.6 × 17	Wet cutting. 1.5× the machining efficiency of conventional products.



The diagrams and table data are examples of test results, and are not guaranteed values.
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Attentions on Safety

1. Attentions regarding handling

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

2. Attentions regarding mounting

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

3. Attentions during use

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

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