

ASR type

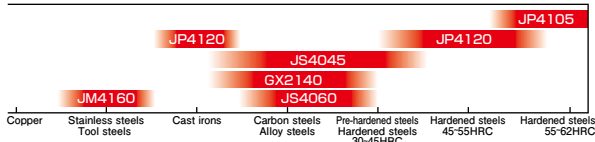
Radius mill ASR



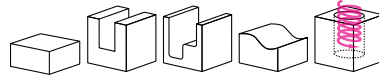
MOLDINO Tool Engineering, Ltd.

New Product News | No.1204E-11 | 2022-11

Technology



Applications



AJ Coating series

JP4120 JM4160 JP4105

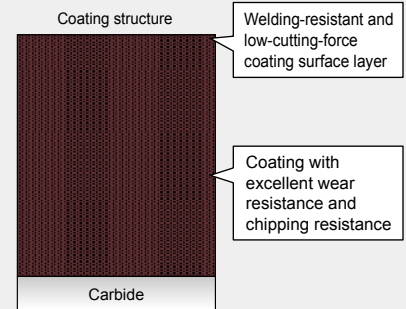
Features of AJ Coating series

- 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

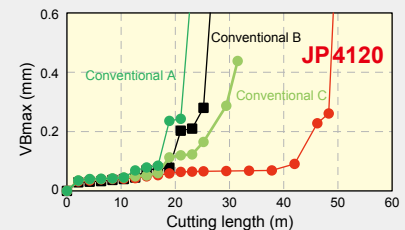
Features

- 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

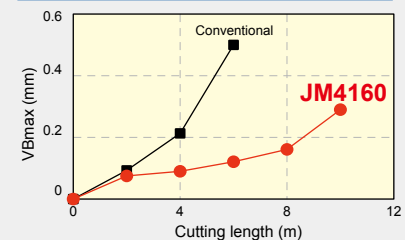
Features

- 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

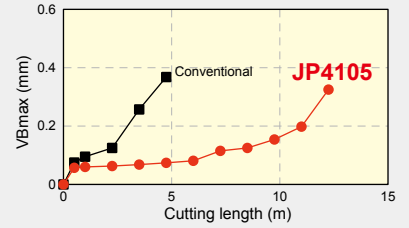
Features

- 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

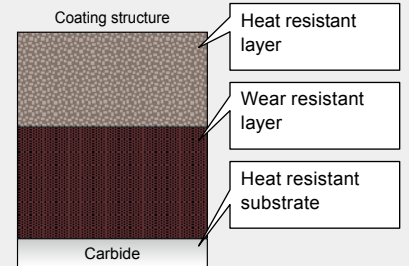
Features

- 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.

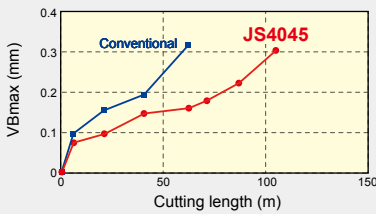
Strong fields

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

Layer structure **JS Coating**

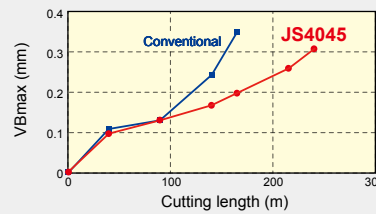


Wear graph after cutting SCM440 (32HRC)



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

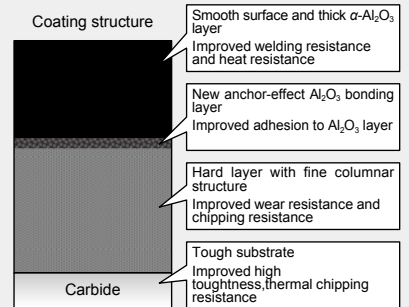
Features

- 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.

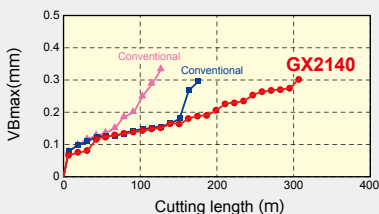
Strong fields

- 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**

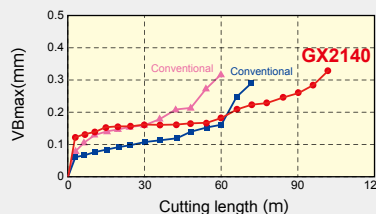


Wear graph after cutting S50C (220HB)



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)





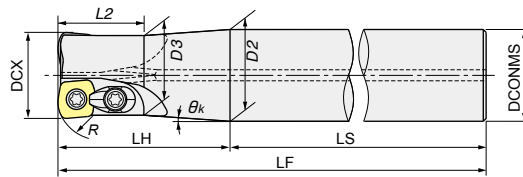
Cutting Conditions	
Work Material	P20(30HRC)
Holder used	ASRT5063R-4
Insert Model	WDNW140520
Cutting Speed	$V_c = 140\text{m/min}$
Speed per flute	$f_z = 1.4\text{mm/t}$
Cutting depth	$a_p \times a_e = 1 \times 43\text{mm}$
Coolant	Dry cutting Single-flute cutting

Line Up











Shank type

ASR (-42)

Numeric figure in a circle  and alphabetical character comes in a square .




With air hole

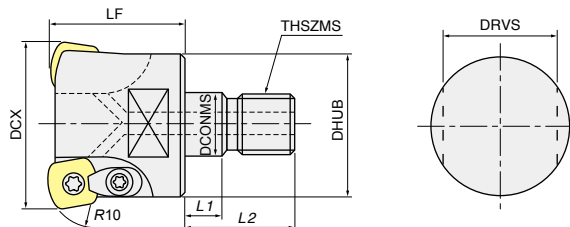
Shank type	Item code	Stock	No. of flutes	Size(mm)										Inserts
				DCX	LF	DCONMS	R	LH	LS	L2	θ_k	D2	D3	
Regular	ASRS0020	●	2	20	130	20	10	50	80	20	1°	20	18	EPNW0803TN-10
	ASRS0025	●	2	25	140	25		60	80	25	1.2°	25	22.3	EDNW10T3TN-10
	ASRS4030	●	2	30	150	32		70	80	29	2.8°	32	27.8	ED  13T4TN-15(Z) ED  W13T4TN-10
	ASRS4032	●	2	32	150	32	70	80	29	1.5°	32	29.6		
	ASRS4040	●	3	40	150	42	15 (10)	50	100	40	18°	42	35	ED  15T4TN-15(Z) ED  W15T4TN-10
	ASRS5050	●	3	50	110	25*		50	60	50	-	47	47	
	ASRS5050-42		3	50	150	42		50	100	50	-	43	43	
	ASRS5063	●	4	63	120	32*		50	70	50	-	60	60	
	ASRS5063-42		4	63	150	42	50	100	50	-	52	52		
Long	ASRL0020	●	2	20	180	20	10	100	80	20	0.6°	20	18	EPNW0803TN-10
	ASRL0025	●	2	25	200	25		120	80	25	0.7°	25	22.3	EDNW10T3TN-10
	ASRL4030	●	2	30	200	32		120	80	30	1.3°	32	27.8	ED  13T4TN-15(Z) ED  W13T4TN-10
	ASRL4032	●	2	32	200	32	120	80	30	0.7°	32	29.6		
	ASRL4040	●	3	40	250	42	15 (10)	50	200	40	18°	42	35	ED  15T4TN-15(Z) ED  W15T4TN-10
	ASRL5050	●	3	50	250	42		50	200	50	-	47	47	
	ASRL5063	●	4	63	250	42		50	200	50	-	60	60	
Extra Long	ASRE0020	●	2	20	250	20	10	130	120	20	0.5°	20	18	EPNW0803TN-10
	ASRE0025	●	2	25	300	25		180	120	25	0.4°	25	22.3	EDNW10T3TN-10
	ASRE4030	●	2	30	300	32	15 (10)	180	120	30	0.8°	32	27.8	ED  13T4TN-15(Z) ED  W13T4TN-10
	ASRE4032	●	2	32	300	32		180	120	30	0.4°	32	29.6	
	ASRE4040	●	2	40	300	42		50	250	40	18°	42	35	

[Note] *Marked Shanks are available for both milling chucks of BT40 & BT50.

Modular Type

ASRM00 -

Numeric figure in a circle .



With air hole

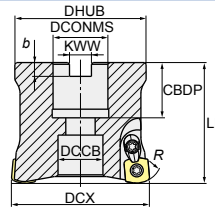
Item code	Stock	No. of flutes	Size(mm)								Inserts
			DCX	LF	DCONMS	THSZMS	DHUB	L1	L2	DRVS	
ASRM0020-2	●	2	20	30	10.5	M10	17.8	5.5	19	15	EPNW0803TN-10 EDNW10T3TN-10
ASRM0025-2	●	2	25	35	12.5	M12	20.8	5.5	22	17	
ASRM0030-3	●	3	30	40	17	M16	28.8	6	23	22	
ASRM0032-3	●	3	32	40	17	M16	28.8	6	23	22	
*1 ASRM0035-3	●	3	35	40	17	M16	28.8	6	23	22	
*1 ASRM0040-4	●	4	40	40	17	M16	28.8	6	23	22	

[Note] When *1 and carbide shank are used together as a set, there is no interference.
Do not apply lubricants such as grease, etc. to the "contact faces" and "modular screws" of the "modular mill", "dedicated shanks" and "dedicated arbor".

Bore type

ASR ○○○○(M)-○

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



Bore type	Item code	Stock	No. of flutes	Size(mm)								Inserts	
				DCX	DHUB	LF	CBDP	R	KWW	b	DCONMS		DCCB
Internal diameter inch size	ASR4050-3	●	3	50	47	50	19	15 (10)	8.4	5	22.225	17	ED □ 13T4TN-15(Z)
	ASR4050-4	●	4	50	47	50	19		8.4	5	22.225	17	ED □ W13T4TN-10
	ASR5060-3	●	3	60	57	50	19		8.4	5	22.225	17	ED □ 15T4TN-15(Z) ED □ W15T4TN-10
	ASR5060-4	●	4	60	57	50	19		8.4	5	22.225	17	
	ASR5063-3	●	3	63	60	50	19		8.4	5	22.225	17	
	ASR5063-4	●	4	63	60	50	19		8.4	5	22.225	17	
	ASR5080-4	●	4	80	76	70	32		12.7	8	31.75	26	
	ASR5080-5	●	5	80	76	70	32		12.7	8	31.75	26	
	ASR5100-5	●	5	100	96	70	32		12.7	8	31.75	26	
	ASR5100-6	●	6	100	96	70	32		12.7	8	31.75	26	
Internal diameter mm size	ASR4050M-4	●	4	50	47	50	20	10.4	6.3	22	17	ED □ 13T4TN-15(Z) ED □ W13T4TN-10	
	ASR5060M-4	●	4	60	57	50	20	10.4	6.3	22	17	ED □ 15T4TN-15(Z) ED □ W15T4TN-10	
	ASR5063M-4	●	4	63	60	50	20	10.4	6.3	22	17		
	ASR5080M-5	●	5	80	76	70	22	12.4	7	27	20		
	ASR5100M-6	●	6	100	96	70	25	14.4	8	32	26		

[Note] Arbor screw is not included.

Parts

Numeric figure in a circle ○

Parts	Clamp screw	Clamp piece set	Screw driver / Wrench	Screw anti-seizure agent	
Shape					
Cutter body	Fastening torque (N·m)		Shape		
ASR S/L/E0020	242-141	—	104-T15	A	
ASRM0020-2	412-141	CM3.5-141			P-37
ASR S/L/E0025					
ASRM ○○○○-○	555-141	CM5-147	105-T20	B	
ASR S/L/E4 ASR S/L5 ASR ○○○○-○ ASR ○○○○M-○					

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

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)		No. of corners	Shape	Inscribed circle code		
TD4N	○	○	○ ~62HRC	○ High Efficiency multiflutes	φ16~40	4		06	2.0	1.0
ASR Multi-Flutes		○	○ ~62HRC	○ High Efficiency multiflutes	φ16~66	2		06 12	2.0 3.0	1.5 2.0
ASRF-mini	○		○ ~62HRC	○ General	φ20~63	4		07	2.0	1.2
ASR		○	○ ~60HRC	○ General	φ20~100	2		08~15	3.0	2.0
ASRT	○	○	○ ~62HRC	○ General	φ25~100	3		09~14		
ASRF	○		○ ~60HRC	○ General	φ32~100	4		12		
TD6N	○	○	○ ~50HRC	○ General	φ50~125	6		14 14	3.0	1.5 3.0
TRF	○		○ ~60HRC	○ General	φ32~125	4		12 15		1.2 2.0

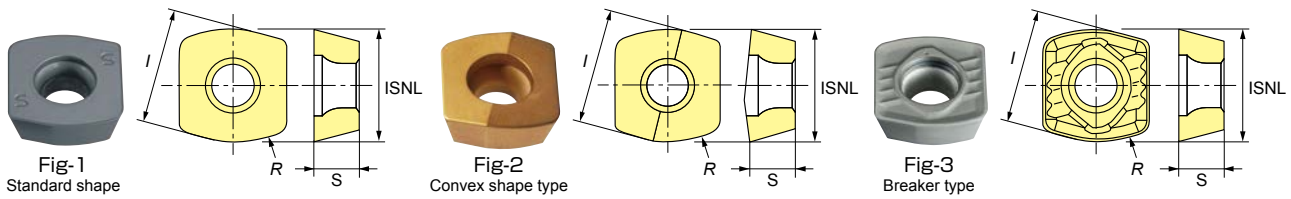
※ Various other tools for roughing are also available.

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

Line Up

Inserts

Numeric figure in a circle ○



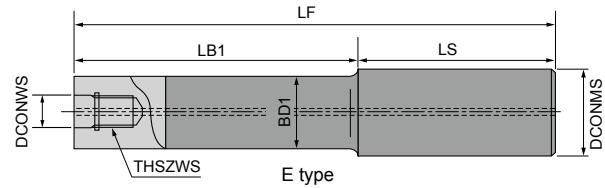
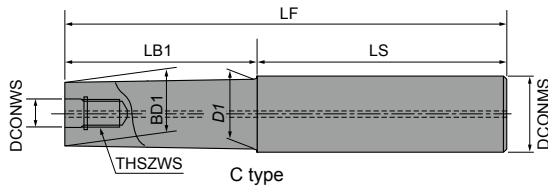
Item code	Tolerance class	Coating						Size(mm)				Shape	Cutter body		
		AJ Coating			GX Coating	JS Coating		C Coating	G Coating	R	I			S	INSL
		JP4105	JP4120	JM4160	GX2140	JS4045	JS4060	CY250	GF30						
EPNW0803TN-10	N	●	●	●	●	●	●	●		10	8.1	3.18	7.94	Fig-1	ASR S/L/E 0020 ASRM0020-2
EDNW10T3TN-10		●	●	●	●	●	●	●	●	10	10	3.97	10		ASR S/L/E 0025 ASRM○○○○-○
EDNW13T4TN-10		●	●		●	●	●	●		10	13.5	5.56	12.7		ASR S/L/E 4○○○○(-○○) ASR4050M-4
EDNW13T4TN-15		●	●	●	●	●	●	●	●	15	13.5	5.56	12.7		
EDNW15T4TN-10		●	●		●	●	●	●		10	15	5.56	14		ASR S/L 5○○○○(-○○) ASR5○○○○M-○
EDNW15T4TN-15		●	●	●	●	●	●	●	●	15	15	5.56	14		
EDEW13T4TN-10	E					●		●		10	13.5	5.56	12.7	Fig-1	ASR S/L/E 4○○○○(-○○) ASR4050M-4
EDEW13T4TN-15						●		●		15	13.5	5.56	12.7		
EDEW15T4TN-10						●		●		10	15	5.56	14		ASR S/L 5○○○○(-○○) ASR5000M-○
EDEW15T4TN-15						●		●		15	15	5.56	14		
EDNW13T4TN-15Z	N		●	●		●	●			15	13.5	5.56	12.7	Fig-2	ASR S/L/E 4○○○○(-○○) ASR4050M-4
EDNW15T4TN-15Z			●	●		●	●			15	15	5.56	14		ASR S/L 5○○○○(-○○) ASR5○○○○M-○
EDMT13T4TN-15	M			●	●	●	●	●		15	13.5	5.56	12.7	Fig-3	ASR S/L/E 4○○○○(-○○) ASR4050M-4
EDMT15T4TN-15				●	●	●	●	●		15	15	5.56	14		ASR S/L 5○○○○(-○○) ASR5○○○○M-○

[Note] We recommend, R15 for overhang 5D or less; R10 for overhang 4~5D or more.

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

The Shanks for Modular Mill

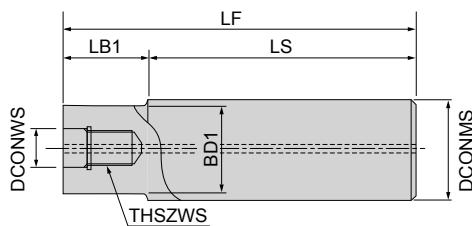
Carbide Shank



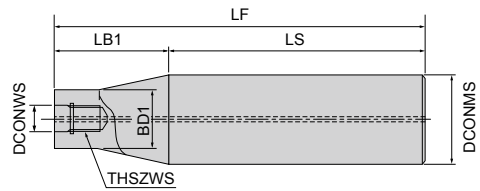
Item code	Stock	Size(mm)								Type	Cutter body	Note
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS	D1			
ASC20-10.5-120-50Z	●	10.5	M10	120	50	70	18.5	20	19.5	C	φ20※3	With Air hole
ASC20-10.5-170-90Z	●			170	90	80						
ASC20-10.5-220-120Z	●			220	120	100						
ASC20-10.5-270-150Z	●			270	150	120						
※2 ASC20-10.5-220-50Z	●	10.5	M10	220	50	170	18.5	20	19.5	C	φ20※3	
※2 ASC20-10.5-270-50Z	●					270						
ASC25-12.5-145-65	●	12.5	M12	145	65	80	23	25	—	E	φ25※3	
ASC25-12.5-215-115	●			215	115	100						
ASC25-12.5-265-145	●			265	145	120						
ASC25-12.5-315-195	●			315	195	120						
※2 ASC25-12.5-265-65	●	12.5	M12	265	65	200	23	25	—	E	φ25※3	
※2 ASC25-12.5-315-65	●					315						
ASC32-17-160-80	●	17	M16	160	80	80	28	32	—	E	φ30※3 φ32※3 φ35 <φ40>	
ASC32-17-210-110	●			210	110	100						
ASC32-17-260-140	●			260	140	120						
ASC32-17-310-190	●			310	190	120						
ASC32-17-360-240	●			360	240	120						
※2 ASC32-17-260-80	●	17	M16	260	80	180	28	32	—	E	φ30※3 φ32※3 φ35 <φ40>	
※2 ASC32-17-310-80	●					230						
※2 ASC32-17-360-80	●					280						

- [Note] ①When※2 and※1 (p.4) are used together as a set, there is no interference.
 ②Commercial milling chucks or shrink-fit holders can be used.
 ③For the φ40 size, it is recommended that the overhang be 200mm or less.
 ④For ※3, since the cutter diameter is smaller than the shank diameter, interference occurs at the shank.

Steel Shank



Steel Shank



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

Item code	Stock	Size (mm)							Cutter body	With/without air hole
		DCONWS	THSZWS	LF	LB1	LS	BD1	DCONMS		
AS20-10.5-100-20	●	10.5	M10	100	20	80	18	20	φ20※3	○
AS25-12.5-115-35	●	12.5	M12	115	35	80	23	25	φ25※3	○
AS32-17-110-30	●	17	M16	110	30	80	28	32	φ30※3 φ32※3 φ35 φ40	○

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	○

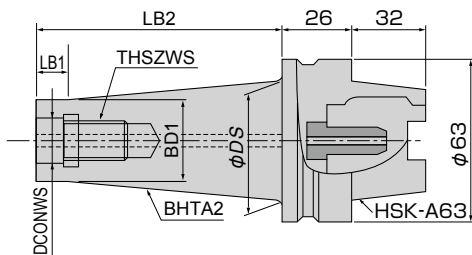
[Note] Commercial milling chucks can be used.

- [Note] ①Commercial milling chucks can be used.
 ②For ※3, since the cutter diameter is smaller than the shank diameter, interference occurs at the shank.

Line Up

Modular Mill Arbor

HSK-A63

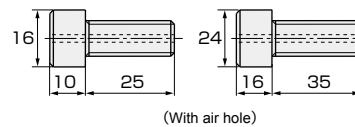
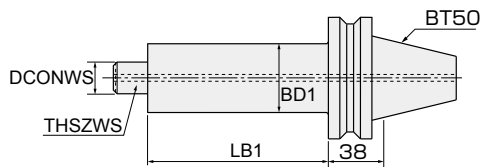


Item code	Stock	Size(mm)						Note
		DCONWS	THSZWS	BD1	φDS	LB2	LB1	
HSK-A63-10.5-30-18	●	10.5	M10	18	20.8	30	—	3°
HSK-A63-10.5-70-18	●				25	70	10	3°
HSK-A63-10.5-70-18S	●				48	70	10	12°
HSK-A63-10.5-120-18	●	12.5	M12	21	30.2	120	10	3°
HSK-A63-12.5-35-21	●				24.3	35	—	3°
HSK-A63-12.5-65-21	●				27.5	65	10	3°
HSK-A63-12.5-65-21S	●	12.5	M12	21	48	65	10	12°
HSK-A63-12.5-115-21	●				32.7	115	10	3°
HSK-A63-17-40-28	●				31.8	40	—	3°
HSK-A63-17-60-28	●	17	M16	28	33.9	60	10	3°
HSK-A63-17-60-28S	●				48	60	10	9.5°
HSK-A63-17-110-28	●				39.2	110	10	3°

With Air hole

Arbor

Numeric figure in a circle ○



Parts: 100-174

Parts: 100-213

Item code	Stock	Size(mm)				Weight (kgf)	Arbor screw	Cutter body
		DCONWS	THSZWS	LB1	BD1			
BT50-22.225-50-50	●	22.225	M10	50	47	4.3	100-174	ASR4050-○
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	100-174	ASR5060-○ ASR5063-○
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		
BT50-31.75-7-80	●	31.75	M16	7	76	4.2	100-213	ASR5080-○
BT50-31.75-80-80	●			80		6.8		
BT50-31.75-130-80	●			130		8.5		
BT50-31.75-180-80	●			180		10.2		
BT50-31.75-260-80	●			260		12.9		
BT50-31.75-330-80	●			330		15.4		
BT50-31.75-7-100	●	31.75	M16	7	96	4.2	100-213	ASR5100-○
BT50-31.75-80-100	●			80		8.3		
BT50-31.75-130-100	●			130		11.1		
BT50-31.75-180-100	●			180		13.9		
BT50-31.75-260-100	●			260		18.4		
BT50-31.75-330-100	●			330		22.4		

[Note] Arbor screw is attached on an arbor.

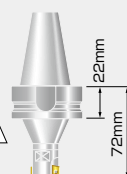
Arbor (BT, HSK) Features

Point

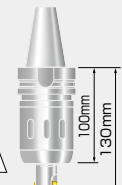
Reduce the chattering vibration by BT, HSK arbor due to the reduction in the "actual" overhang.

Example: Overhang and Application Area

Cutter :
ASRM0020-2
Arbor :
BT30-10.5-20-18

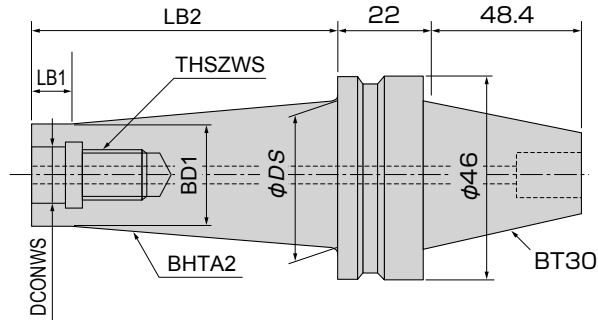


Cutter :
ASRM0020-2
Arbor :
Commercial milling
chuck (BT30 type)



Modular Mill Arbor

BT30

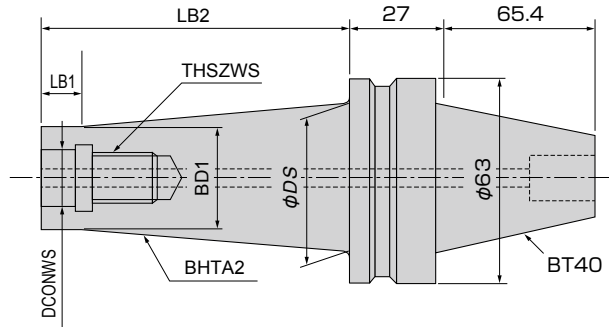


※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size(mm)							Note
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	
BT30-10.5-20-18		10.5	M10	18	35	20	5	29.5°	With Air hole
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] ①When 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 (a_p) or 2.reducing per-flute feed rate (f_z).

BT40

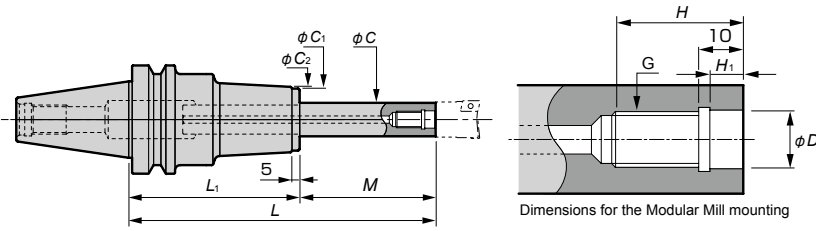


※For neck section, additional machining to user specifications is possible.

Item code	Stock	Size(mm)							Note
		DCONWS	THSZWS	BD1	ϕDS	LB2	LB1	BHTA2	
BT40-10.5-20-18		10.5	M10	18	35	20	5	29.5°	With Air hole
BT40-10.5-45-18						45	10	13.7°	
BT40-10.5-70-18						70	10	8.1°	
BT40-10.5-120-18					120	10	4.4°		
BT40-12.5-15-21		12.5	M12	21	40	15	5	32.3°	
BT40-12.5-40-21						40	10	17.6°	
BT40-12.5-65-21						65	10	9.8°	
BT40-12.5-115-21						115	10	5.2°	
BT40-17-10-28		17	M16	28	48	10	5	45°	
BT40-17-35-28						35	10	21.8°	
BT40-17-60-28						60	10	11.3°	
BT40-17-110-28						110	10	5.7°	

Line Up

Red screw arbor



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) ⚡			
		G	φD	H	H ₁	φC	L	M	L ₁	φC ₁	φC ₂					
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-RSG10-140-M25							140		115						4.3	0.4
BT50-RSG10-170-M25							170	25	145						4.6	0.5
BT50-RSG10-200-M25							200		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		M10	10.5	22	6.5	19	220	75	145	36	38				4.8	1.7
BT50-RSG10-250-M75							250		175						5.8	1.8
BT50-RSG10-215-M100							215		115						4.5	2.7
BT50-RSG10-245-M100							245	100	145						4.8	2.9
BT50-RSG10-275-M100							275		175						5.8	2.9
BT50-RSG10-235-M120							235		115						4.6	3.9
BT50-RSG10-265-M120							265	120	145						4.9	4.2
BT50-RSG10-295-M120							295		175						5.9	4.2
BT50-RSG10-255-M140							255	140	115						4.7	5.5

Item code	Stock	Size(mm)										Weight (kg)	Rigidity value (μm) ⚡			
		G	φD	H	H ₁	φC	L	M	L ₁	φC ₁	φC ₂					
BT50-RSG10-285-M140							285		145						5.0	5.8
BT50-RSG10-315-M140		M10	10.5	22	6.5	19	315	140	175	36	38				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-RSG12-220-M75							220	75	145						5.3	1.0
BT50-RSG12-250-M75							250		175						6.1	1.0
BT50-RSG12-215-M100							215		115						5.0	1.3
BT50-RSG12-245-M100		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		115						5.0	0.3
BT50-RSG16-195-M50							195	50	145						5.6	0.4
BT50-RSG16-225-M50							225		175						6.8	0.4
BT50-RSG16-190-M75							190		115						5.3	0.5
BT50-RSG16-220-M75							220	75	145						5.9	0.6
BT50-RSG16-250-M75							250		175						7.0	0.6
BT50-RSG16-215-M100							215		115						5.5	0.7
BT50-RSG16-245-M100							245	100	145						6.1	0.9
BT50-RSG16-275-M100							275		175						7.2	0.9
BT50-RSG16-240-M125							240		115						5.7	1.1
BT50-RSG16-270-M125		M16	17	25	6	29	270	125	145	52	54				6.3	1.3
BT50-RSG16-300-M125							300		175						7.4	1.3
BT50-RSG16-265-M150							265		115						5.9	1.6
BT50-RSG16-295-M150							295	150	145						6.5	1.8
BT50-RSG16-325-M150							325		175						7.7	1.8
BT50-RSG16-290-M175							290		115						6.1	2.2
BT50-RSG16-320-M175							320	175	145						6.7	2.4
BT50-RSG16-350-M175							350		175						7.9	2.5
BT50-RSG16-315-M200							315		115						6.3	3.0
BT50-RSG16-345-M200							345	200	145						6.9	3.2
BT50-RSG16-375-M200							375		175						8.1	3.3
BT50-RSG16-340-M225							340		115						6.5	3.9
BT50-RSG16-370-M225							370	225	145						7.1	4.1
BT50-RSG16-400-M225							400		175						8.3	4.2

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					
A63-RSG10-125-M25							125		100						1.6	0.4
A63-RSG10-155-M25							155	25	130						1.9	0.5
A63-RSG10-185-M25							185		160						2.3	0.6
A63-RSG10-150-M50							150		100						1.7	0.8
A63-RSG10-180-M50							180	50	130						2.0	1.0
A63-RSG10-210-M50							210		160						2.4	1.2
A63-RSG10-175-M75							175		100						1.8	1.6
A63-RSG10-205-M75							205	75	130						2.1	1.8
A63-RSG10-235-M75							235		160						2.5	2.0
A63-RSG10-200-M100		M10	10.5	22	6.5	19	200		100		36	38			1.8	2.7
A63-RSG10-230-M100							230	100	130						2.1	2.9
A63-RSG10-260-M100							260		160						2.5	3.2
A63-RSG10-220-M120							220		100						1.9	4.0
A63-RSG10-250-M120							250	120	130						2.2	4.2
A63-RSG10-280-M120							280		160						2.6	4.5
A63-RSG10-240-M140							240		100						2.0	5.6
A63-RSG10-270-M140							270	140	130						2.3	5.9
A63-RSG10-300-M140							300		160						2.7	6.2
A63-RSG12-125-M25							125		100						1.9	0.3
A63-RSG12-155-M25							155	25	130						2.3	0.4
A63-RSG12-185-M25							185		160						2.7	0.5
A63-RSG12-150-M50							150		100						2.0	0.5
A63-RSG12-180-M50							180	50	130						2.4	0.6
A63-RSG12-210-M50							210		160						2.8	0.8
A63-RSG12-175-M75							175		100						2.2	0.9
A63-RSG12-205-M75							205	75	130						2.6	1.0
A63-RSG12-235-M75							235		160						3.0	1.3
A63-RSG12-200-M100		M12	12.5	22	6	24	200		100		43	45			2.3	1.4
A63-RSG12-230-M100							230	100	130						2.7	1.6
A63-RSG12-260-M100							260		160						3.1	1.9
A63-RSG12-225-M125							225		100						2.5	2.1
A63-RSG12-255-M125							255	125	130						2.9	2.4
A63-RSG12-285-M125							285		160						3.3	2.7
A63-RSG12-250-M150							250		100						2.6	3.1
A63-RSG12-280-M150							280	150	130						3.0	3.4
A63-RSG12-310-M150							310		160						3.4	3.8
A63-RSG16-140-M25							140	25							2.8	0.2
A63-RSG16-165-M50							165	50							3.2	0.4
A63-RSG16-190-M75							190	75							3.6	0.6
A63-RSG16-215-M100		M16	17	25	6	29	215	100	115		52	54			2.8	0.9
A63-RSG16-240-M125							240	125							2.8	1.3
A63-RSG16-265-M150							265	150							3.2	1.9
A63-RSG16-290-M175							290	175							3.6	2.5
A100-RSG10-140-M25							140		115						3.1	0.4
A100-RSG10-170-M25							170	25	145						3.5	0.5
A100-RSG10-200-M25							200		175						4.4	0.5
A100-RSG10-165-M50							165		115						3.2	0.8
A100-RSG10-195-M50							195	50	145						3.6	1.0
A100-RSG10-225-M50		M10	10.5	22	6.5	19	225		175		36	38			4.5	1.0
A100-RSG10-190-M75							190		115						3.3	1.6
A100-RSG10-220-M75							220	75	145						3.7	1.8
A100-RSG10-250-M75							250		175						4.6	1.8
A100-RSG10-215-M100							215		115						3.3	2.7
A100-RSG10-245-M100							245	100	145						3.7	2.9
A100-RSG10-275-M100							275		175						4.6	2.9
A100-RSG10-235-M120							235		115						3.4	0.4
A100-RSG10-265-M120							265	120	145						3.8	0.5
A100-RSG10-295-M120							295		175						4.7	0.6
A100-RSG10-255-M140		M10	10.5	22	6.5	19	255		115		36	38			3.5	0.6
A100-RSG10-285-M140							285	140	145						3.9	0.8
A100-RSG10-315-M140							315		175						4.8	0.8
A100-RSG12-140-M25							140		115						3.4	0.3
A100-RSG12-170-M25							170	25	145						3.7	0.4
A100-RSG12-200-M25							200		175						4.7	0.4
A100-RSG12-165-M50							165		115						3.5	0.5
A100-RSG12-195-M50							195	50	145						3.8	0.6
A100-RSG12-225-M50							225		175						4.8	0.6
A100-RSG12-190-M75							190		115						3.7	0.8
A100-RSG12-220-M75							220	75	145						4.0	1.0
A100-RSG12-250-M75							250		175						5.0	1.0
A100-RSG12-215-M100							215		115						3.8	1.4
A100-RSG12-245-M100		M12	12.5	22	6	24	245	100	145		43	45			4.1	1.6
A100-RSG12-275-M100							275		175						5.1	1.6
A100-RSG12-240-M125							240		115						4.0	2.1
A100-RSG12-270-M125							270	125	145						4.3	2.4
A100-RSG12-300-M125							300		175						5.3	2.4
A100-RSG12-265-M150							265		115						4.1	3.0
A100-RSG12-295-M150							295	150	145						4.4	3.4
A100-RSG12-325-M150							325		175						5.4	3.4
A100-RSG12-290-M175							290		115						4.3	4.3
A100-RSG12-320-M175							320	175	145						4.6	4.6
A100-RSG12-350-M175							350		175						5.6	4.6
A100-RSG16-140-M25							140		115						4.0	0.2
A100-RSG16-170-M25							170	25	145						4.5	0.2
A100-RSG16-200-M25							200		175						5.7	0.2
A100-RSG16-165-M50							165		115						4.2	0.3
A100-RSG16-195-M50							195	50	145						4.7	0.4
A100-RSG16-225-M50							225		175						5.9	0.4
A100-RSG16-190-M75							190		115						4.5	0.5
A100-RSG16-220-M75							220	75	145						5.0	0.6
A100-RSG16-250-M75							250		175						6.1	0.6
A100-RSG16-215-M100							215		115						4.7	0.8
A100-RSG16-245-M100							245	100	145						5.2	0.9
A100-RSG16-275-M100							275		175						6.3	0.9
A100-RSG16-240-M125							240		115						4.9	1.1
A100-RSG16-270-M125		M16	17	25	6	29	270	125	145		52	54			5.4	1.3
A100-RSG16-300-M125							300		175						6.5	1.3
A100-RSG16-265-M150							265		115						5.1	1.6
A100-RSG16-295-M150							295	150	145						5.6	1.8
A100-RSG16-325-M150							325		175						6.7	1.8
A100-RSG16-290-M175							290		115						5.3	2.2
A100-RSG16-320-M175							320	175	145						5.8	2.4
A100-RSG16-350-M175							350		175						7.0	2.5
A100-RSG16-315-M200							315		115						5.5	3.0
A100-RSG16-345-M200							345	200	145						6.0	3.2
A100-RSG16-375-M200							375		175						7.2	3.3
A100-RSG16-340-M225							340		115						5.7	3.9
A100-RSG16-370-M225							370	225	145						6.3	4.2
A100-RSG16-400-M225							400		175						7.4	4.2

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					
A100-RSG10-235-M120							235		115						3.4	4.0
A100-RSG10-265-M120							265	120	145						3.8	4.2
A100-RSG10-295-M120							295		175						4.7	

Recommended Cutting Conditions

※Red indicates primary recommended grade.

Work material	Recommended grade	Cutting speed Vc (m/min)	Feed rate fz (mm/t)	φ20 (2 Flutes)			φ25 (2 Flutes)			φ30 (2 Flutes)			φ40 (3 Flutes)		
				Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min	Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min	Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min	Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min
General structural steel (200HRC or less)	※GX2140 JS4060 JS4045	180~200	0.6~1.5	2,860	3,430	69	2,290	2,750	69	1,900	5,700	171	1,430	6,400	256
		vc=180m/min fz=0.6mm/t ap=1.0mm ae=1.0DCX			vc=180m/min fz=1.5mm/t ap=1.0mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.0mm ae=1.0DCX							
Carbon steels Alloy steels (30HRC or less)	GX2140 JS4045 JS4060	180~200	0.6~1.5	2,860	3,430	69	2,290	2,750	69	1,900	5,700	171	1,430	6,400	256
		vc=180m/min fz=0.6mm/t ap=1.0mm ae=1.0DCX			vc=180m/min fz=1.5mm/t ap=1.0mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.0mm ae=1.0DCX							
Carbon steels Alloy steels (30~45HRC)	JP4120 JS4045 JS4060	180~200	0.6~2.0	1,430	1,720	34	1,150	1,380	34	960	2,880	86	720	3,240	130
		vc=90m/min fz=0.6mm/t ap=1.0mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.0mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.0mm ae=1.0DCX							
Carbon steels Alloy steels (30~45HRC)	JP4120 JS4045 JS4060	80~120	0.4~0.8	1,430	1,430	29	1,150	1,150	29	960	1,500	45	720	1,730	69
		vc=90m/min fz=0.5mm/t ap=1.0mm ae=1.0DCX			vc=90m/min fz=0.8mm/t ap=1.0mm ae=1.0DCX			vc=90m/min fz=0.8mm/t ap=1.0mm ae=1.0DCX							
Stainless steels SUS	JM4160	80~130	0.5~1.0	1,592	1,910	38	1,274	1,528	38	1,061	1,273	38	796	1,433	57
		vc=100m/min fz=0.6mm/t ap=1.0mm ae=1.0DCX			vc=200m/min fz=0.6mm/t ap=0.8mm ae=1.0DCX			vc=200m/min fz=0.6mm/t ap=0.8mm ae=1.0DCX							
Cast irons FC, FCD	JP4120 GX2140 JS4045	180~200	0.8~2.0	2,860	4,580	92	2,290	3,670	92	1,900	7,600	342	1,430	8,580	515
		vc=180m/min fz=0.8mm/t ap=1.0mm ae=1.0DCX			vc=180m/min fz=2.0mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=2.0mm/t ap=1.5mm ae=1.0DCX							
Hardened steels Pre-Hardened steels (45~50HRC)	JP4120 JS4045	70~120	0.2~0.6	1,600	950	19	1,270	760	19	1,060	640	19	790	710	28
		vc=100m/min fz=0.3mm/t ap=1.0mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=1.0mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=1.0mm ae=1.0DCX							
Hardened steels (50~55HRC)	JP4105	70~100	0.05~0.2	1,110	440	5	890	350	5	740	300	5	550	330	7
		vc=70m/min fz=0.2mm/t ap=0.5mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=0.5mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=0.5mm ae=1.0DCX							
Hardened steels (55~60HRC)	JP4105	50~100	0.05~0.2	790	80	1	630	60	1	530	53	0.8	400	60	1
		vc=50m/min fz=0.05mm/t ap=0.5mm ae=1.0DCX			vc=50m/min fz=0.05mm/t ap=0.5mm ae=1.0DCX			vc=50m/min fz=0.05mm/t ap=0.5mm ae=1.0DCX							

Work material	Recommended grade	Cutting speed Vc (m/min)	Feed rate fz (mm/t)	φ50 (4 Flutes)			φ63 (4 Flutes)			φ80 (5 Flutes)			φ100 (6 Flutes)		
				Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min	Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min	Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min	Revolution min ⁻¹	Feed speed mm/min	Q cm ³ /min
General structural steel (200HRC or less)	※GX2140 JS4060 JS4045	180~200	0.6~1.5	1,150	6,900	510	910	5,500	520	720	5,400	650	570	5,130	770
		vc=180m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX							
Carbon steels Alloy steels (30HRC or less)	GX2140 JS4045 JS4060	180~200	0.6~1.5	1,150	6,900	510	910	5,500	520	720	5,400	650	570	5,130	770
		vc=180m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX							
Carbon steels Alloy steels (30~45HRC)	JP4120 JS4045 JS4060	180~200	0.6~2.0	570	3,420	257	455	2,730	258	360	2,700	325	290	2,610	390
		vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=1.5mm/t ap=1.5mm ae=1.0DCX							
Carbon steels Alloy steels (30~45HRC)	JP4120 JS4045 JS4060	80~120	0.4~0.8	570	1,820	130	455	1,450	140	360	1,440	170	290	1,400	210
		vc=90m/min fz=0.8mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=0.8mm/t ap=1.5mm ae=1.0DCX			vc=90m/min fz=0.8mm/t ap=1.5mm ae=1.0DCX							
Stainless steels SUS	JM4160	80~130	0.5~1.0	637	1,528	76	505	1,213	76	398	1,194	96	319	1,146	115
		vc=100m/min fz=0.6mm/t ap=1.0mm ae=1.0DCX			vc=200m/min fz=0.6mm/t ap=0.8mm ae=1.0DCX			vc=200m/min fz=0.6mm/t ap=0.8mm ae=1.0DCX							
Cast irons FC, FCD	JP4120 GX2140 JS4045	180~200	0.8~2.0	1,150	9,200	920	910	7,280	920	720	7,200	1,150	570	6,840	1,370
		vc=180m/min fz=2.0mm/t ap=2.0mm ae=1.0DCX			vc=90m/min fz=2.0mm/t ap=2.0mm ae=1.0DCX			vc=90m/min fz=2.0mm/t ap=2.0mm ae=1.0DCX							
Hardened steels Pre-Hardened steels (45~50HRC)	JP4120 JS4045	70~120	0.2~0.6	630	760	38	500	600	38	400	600	48	320	576	58
		vc=100m/min fz=0.3mm/t ap=1.0mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=1.0mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=1.0mm ae=1.0DCX							
Hardened steels (50~55HRC)	JP4105	70~100	0.05~0.2	440	360	18	350	280	18	280	280	22	220	260	26
		vc=70m/min fz=0.2mm/t ap=0.5mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=0.5mm ae=1.0DCX			vc=70m/min fz=0.2mm/t ap=0.5mm ae=1.0DCX							
Hardened steels (55~60HRC)	JP4105	50~100	0.05~0.2	310	62	1.5	250	50	1.5	200	50	2.0	160	48	2.4
		vc=50m/min fz=0.05mm/t ap=0.5mm ae=1.0DCX			vc=50m/min fz=0.05mm/t ap=0.5mm ae=1.0DCX			vc=50m/min fz=0.05mm/t ap=0.5mm ae=1.0DCX							

① When using the BT30 arbor for modular mills, determine the cutting conditions using the standard cutting conditions table as a general guide.

If vibrations are a concern due to the cutting conditions, adjust conditions by 1.reducing cutting depth (ap) or 2.reducing per-flute feed rate (fz).

② The cutting conditions in this catalog shown in the table above are reference cutting conditions, and should be adjusted according to the actual shape to be machined, the machine used, and purpose for machining.

③ Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.

④ Please use an air-blast to remove the thick and heavy swarf created by this tool, through spindle air is recommended if available. Pay particular attention for vertical operations.

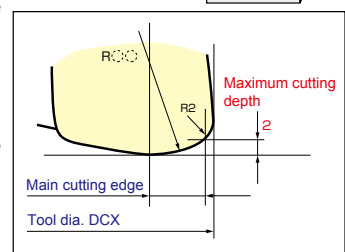
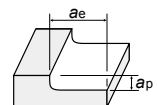
⑤ For man-less machining be sure to take care of swarf evacuation to create safe working conditions.

⑥ The evacuation of swarf can cause burns, cuts or damage to the eyes please ensure the correct safety cover is fitted around the machine, and necessary personal protection equipment is worn by the machine operator.

⑦ Ensure to index the insert at the correct time to ensure safety of the tool-body.

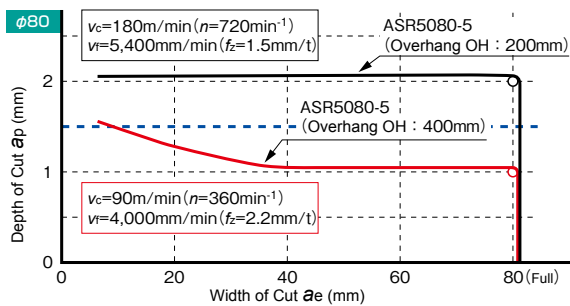
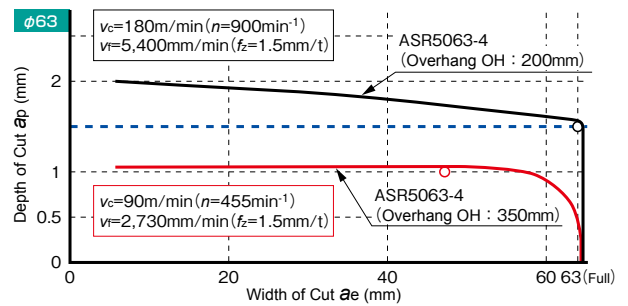
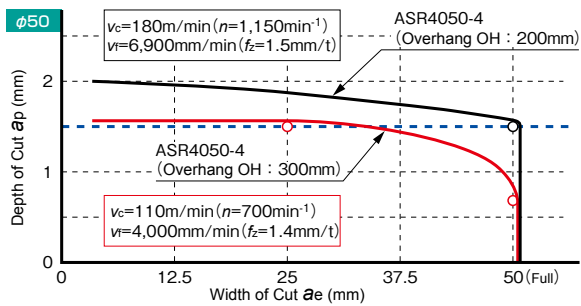
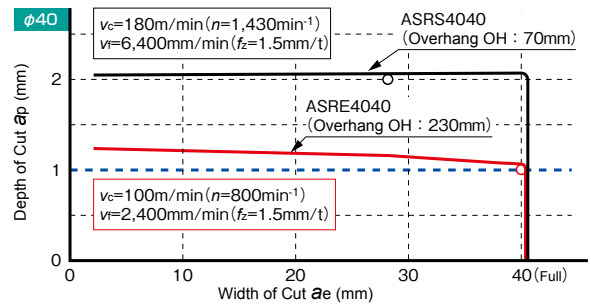
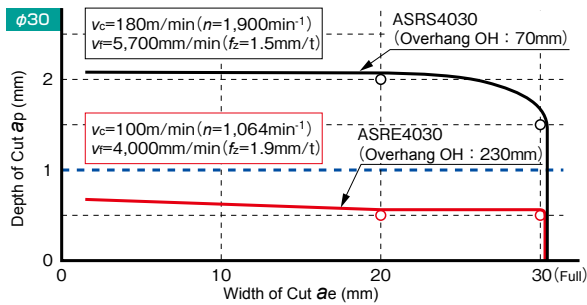
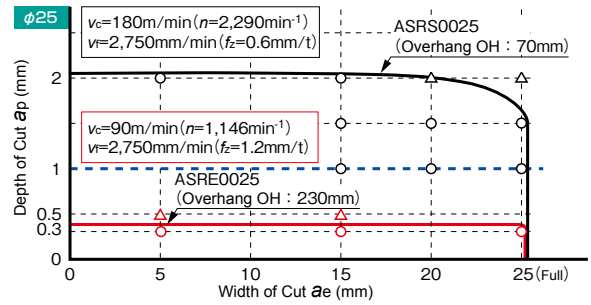
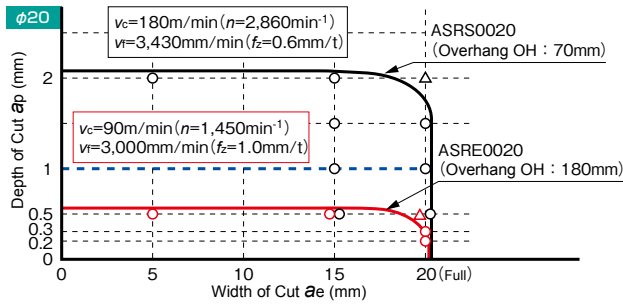
⑧ Ensure that the depth of cut is no greater than 2mm (Right figure).

⑨ Due to fire risks do not use neat cutting oil as a coolant.



Cutting performance

Overhang and Application Area work material : S50C(220HB)



Cutting performance

Breaker type



Low resistance

Standard shape



First recommendation

Convex shape type



Strong toughness for interrupt cutting

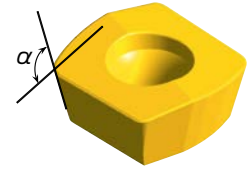
Convex shape type insert for interrupt cutting

01 Features

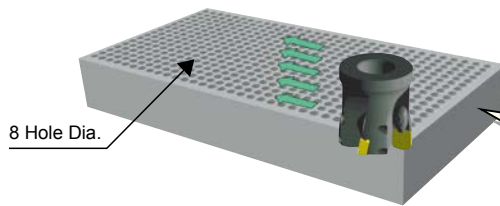
- It is possible to cut stably under interrupt cutting condition by insert with large included angle.

Large Included Angle (α)

Especially for interrupt cutting ! ▶ Increase tool life !!



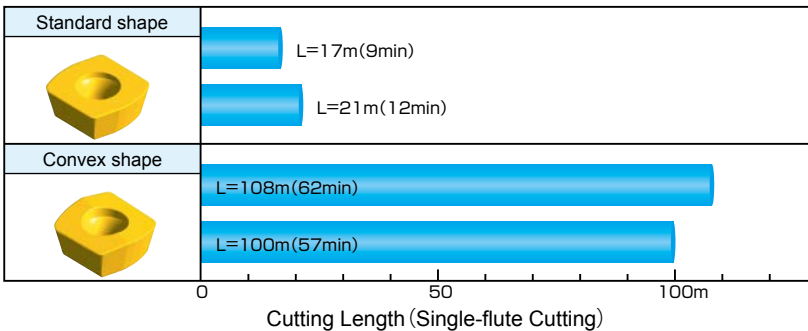
02 High Performance for interrupt cutting



8 Hole Dia.

Cutting Conditions

Work material:SCM440(HRC30)
Tools:ASR ϕ 50
Cutting speed: $V_c=180\text{m/min}(1,146\text{min}^{-1})$
Feed rate per flute: $f_z=1.5\text{mm/t}$ (Single-flute cutting)
Axial cutting depth: $a_p=1.0\text{mm}$
Radial cutting depth: $a_e=33\text{mm}$
Coolant:Dry Down-Cut



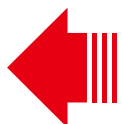
5 times as tough as standard shape under heavy interrupt cutting !!!

Insert with breaker for low resistance

01 Features

- It is possible to do high feed cutting by insert breaker with sharp and high rigidity cutting edge.

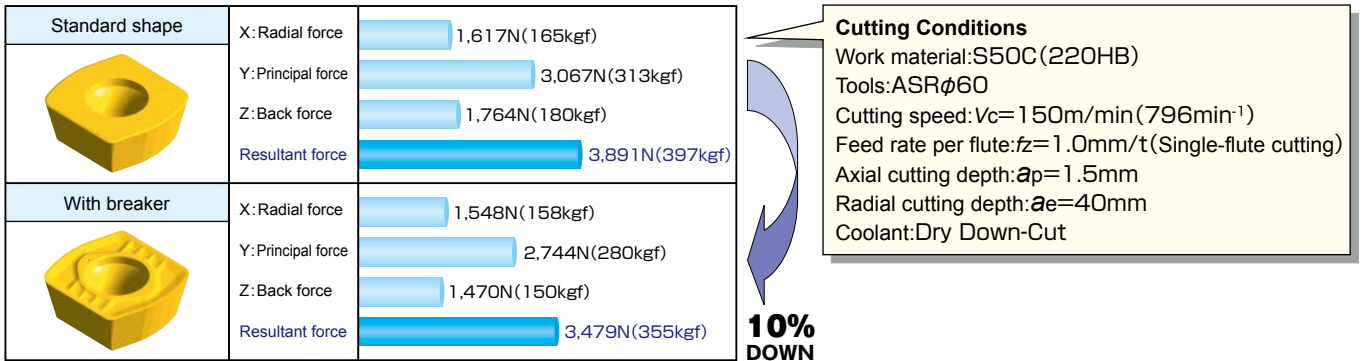
Increase tool life !!



- For continuous cutting.
- For crater wear and heat crack.
- From free cutting steel to difficult-to-cut material.



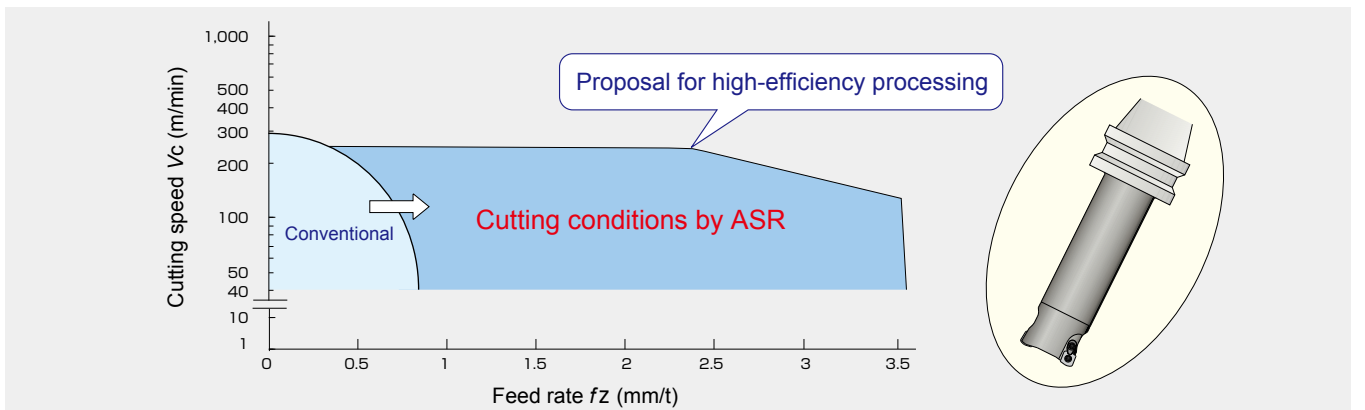
02 Cutting force (three forces)



03 Field Data (User Test Results)

No	Tool dia. DCX	User	Insert shape Insert item code	Work material	Cutting conditions			Result
					V_c m/min n (min ⁻¹)	V_f mm/min f_z (mm/t)	$a_p \times a_e$ mm	
1	50	Company K	Convex shape EDNW15T4TN-15Z	FCD450	188 (1,200)	7,000 (1.94)	1.5×35	A conventional product was chipped after 4 hours. The convex shaped insert wore normally.
2	63	Company W	Breaker EDMT15T4TN-15	12 Cr material	90 (455)	1,100 (0.6)	$a_p=1.5$	Breaker effect reduced resistance to provide good cutting.
3		Company T	Convex shape EDNW15T4TN-15Z	P20	90 (455)	4,000 (2.22)	$a_p=1$	Tool life was more than 2 times as long.
4		Company R	Standard shape EDNW15T4TN-15	P21 (40HRC)	97 (490)	1,060 (0.54)	$a_p=1$	Tool life was 1.5 times as long.
5		Company R	Standard shape EDEW15T4TN-15	SKD61 (47HRC)	120 (606)	364 (0.15)	$a_p=1$	9 hours of machining. Achieved 4.5 times the tool life of a Company S product.
6	80	Company T	Standard shape EDNW15T4TN-15	S55C	140 (560)	3,200 (1.14)	$a_p=1$	After 4 hours of machining, V_{Bmax} was 0.16mm. Can be used for intermittent machining.
7		Company F	Convex shape EDNW15T4TN-15Z	SKD11 (30HRC)	100 (400)	3,600 (1.8)	1.0×40	A conventional product was chipped at the pin hole section. The convex shaped insert provided stable machining at $v_f=3,600\text{mm/min}$.

Introducing the Super Radius Mill ASR. High-feed, high-efficiency processing capability is in your hands.

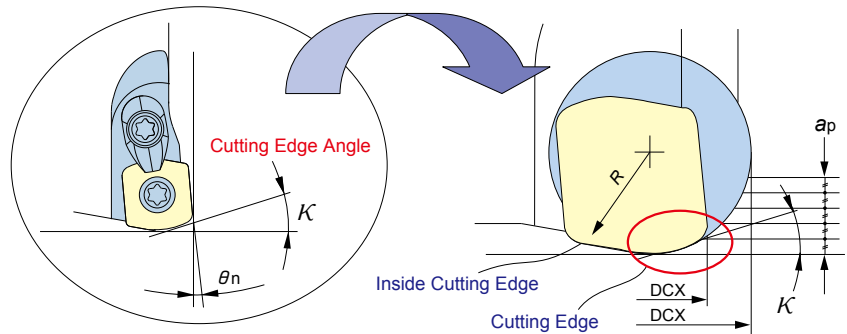


Cutting performance

Features and Uses

01 Specialized R-cutting edge for high-efficiency processing

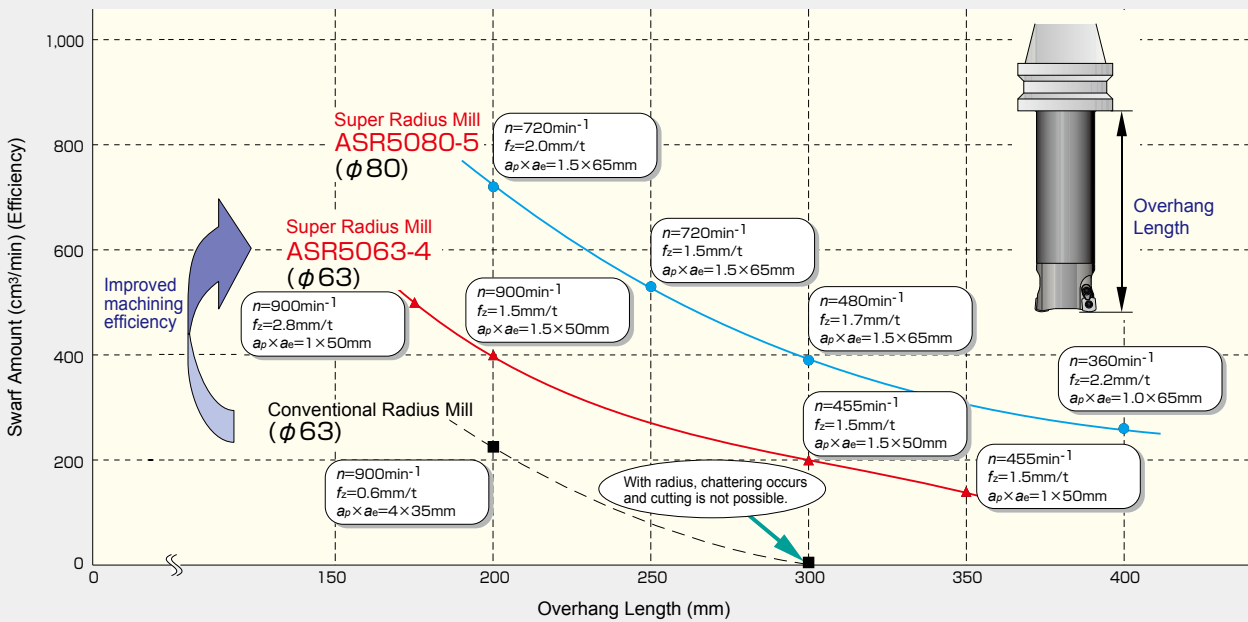
- By shortening the cutting edge length compared to round-insert and setting it at an ideal angle (κ, θ_n), cut deflection during processing is reduced, stabilizing the load and making high-feed cutting possible.



02 2~5 Times increased efficiency compared to conventional radius mills

- 4~5 times increased efficiency for deep milling (overhang length 3DCX or more), 2~3 times increased efficiency even for shallow milling (overhang length 3DCX or less).

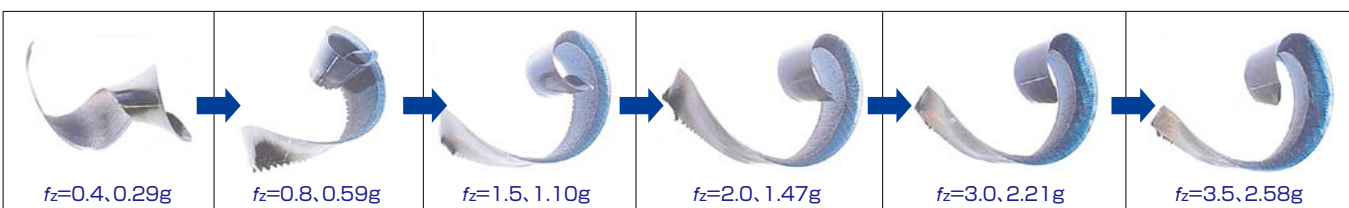
Work material: Example of S50C (220HB)



03 Possible high feed processing.

- The contoured, low-cut structure increases feed amount per tooth : f_z by 5 times or more for high-feed performance.
Steel cutting : $f_z = 0.6 \sim 3.5\text{mm/t}$ (Cast iron cutting : $f_z = 0.8 \sim 4.0\text{mm/t}$)

Shape and Weight of Steel Chip



04 Efficient chip removal

- With compatible processing machinery and tool path, metal removal rate can be as much as 600cm³/min or more for steel milling, and 1,000cm³/min or more for cast iron milling when cutting Dia. of $\phi 63$ or more is used.

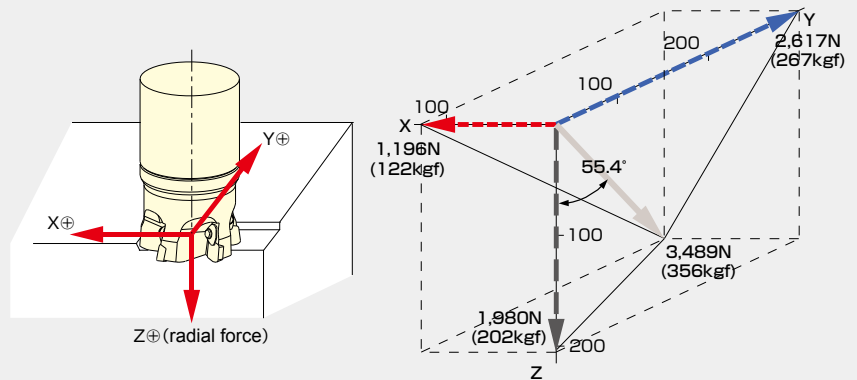
05 Bend-proof insert shape even with long overhang length

- With horizontal (XY plane) processing, radial force is kept at a level equal to that of slant milling and helical milling, for a bend-proof insert performance.

Measurement example for 3 force components of cutting resistance

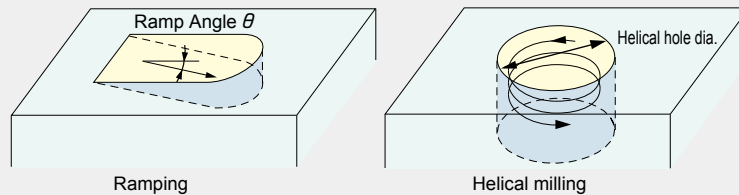
Cutting Conditions

Super Radius Mill $\phi 80 \times 5$ flutes
(ASR5080-5)
 $V_c = 180 \text{ m/min}$ ($n = 720 \text{ min}^{-1}$)
 $V_f = 1,500 \text{ mm/min}$
 $f_z = 0.42 \text{ mm/t}$
 $a_p \times a_e = 1.5 \times 60 \text{ mm}$
down cut, dry cutting



06 Processing by direct milling possible

- Although Ramp angle is limited due to cutting edge design, direct milling is possible without pre-cutting with Ramping and helical milling methods like next pictures.



(mm)

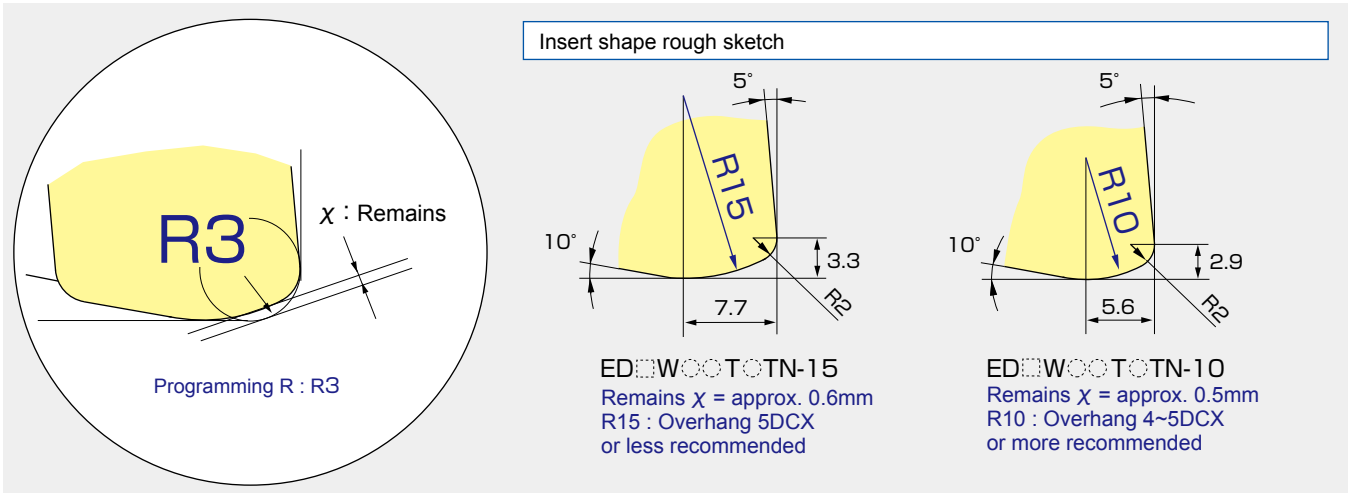
Tool dia. DCX	$\phi 20$	$\phi 25$	$\phi 30$	$\phi 32$	$\phi 40$	$\phi 50$	$\phi 60$	$\phi 63$	$\phi 80$	$\phi 100$
Maximum ramp angle θ	2°	2°	3°	2.5°	2°	1.5°	1°	1°	0.5°	0.5°
Helical hole dia.	27~38	37~48	38~58	42~62	58~78	78~98	98~118	101~124	136~158	176~198

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

Cutting performance

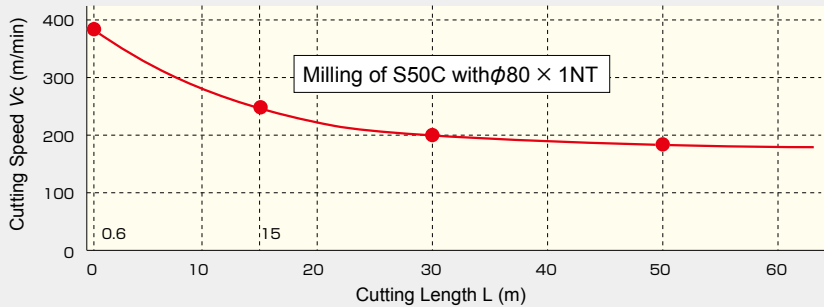
07 To define cutting edge shape for programming

- By inputting Radius Mill programming R (R3), insert R cutting remains cutting as shown below is possible for roughing procedures.



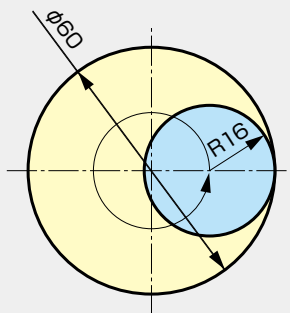
Performance Data

Vc-L Line Graph (Relationship between Cutting Speed : Vc and Cutting Length : L)



Helical Cutting and Required Power Machine: Vertical type M.C15KW work material : S50C (220HB)

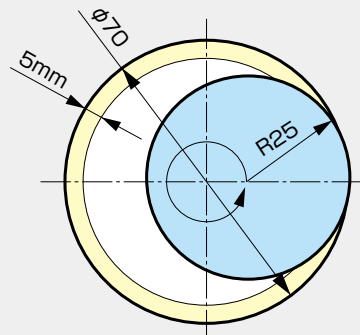
General Boring



Tool : ASR ϕ 32 (ASRL4032)
Vc=93m/min. fz=1.5mm/t
Air-blow
Overhang : 130mm

Helical Pitch	Load Meter
1.0mm	35% (5.3kw)
1.5mm	45% (6.8kw)
2.0mm	85% (12.8kw)

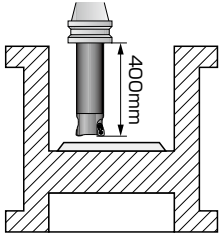
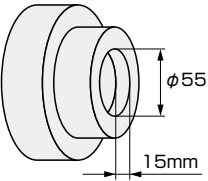
Expansion Boring



Tool : ASR ϕ 50 (ASRL5050)
Vc=141m/min. fz=1.5mm/t
 a_e =5mm, Air-blow
Overhang : 150mm





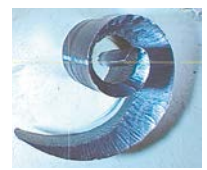
Helical Pitch	Load Meter
1.0mm	25% (3.8kw)
1.5mm	35% (5.3kw)
2.0mm	45% (6.8kw)
2.5mm	80% (12kw)

Field Data (User Test Results)

ASR5063-4	Cutting conditions	Result
	Work material :FC250 Tools :ASR5063-4 Holder :BT50-22.225-350-63 Insert :EDNW15T4TN-15 Rotation speed : $n=540\text{min}^{-1}$ Cutting speed : $V_c=107\text{m/min}$ Feed rate : $V_f=5,000\text{mm/min}$ Feed rate per flute : $f_z=2.3\text{mm/t}$ Axial cutting depth : $a_p=2\text{mm}$ Radial cutting depth : $a_e=48\text{mm}$	For cutting with the work whose protrusion length is 400mm, the radius mill of the conventional tool gives too large vibration to cut it so that a high sloughing mill should be used. But introducing the ASR has provided the table feed of 5,000mm/min and metal removal rate of 480cm ³ /min, which is 5 times as efficient as the conventional tool.
ASR4032	Cutting conditions	Result
	Work material :SCM435 Tools :ASR4032 Holder :BT40 Insert :EDNW13T4TN-10 Rotation speed : $n=1,790\text{min}^{-1}$ Cutting speed : $V_c=180\text{m/min}$ Feed rate : $V_f=3,580\text{mm/min}$ Feed rate per flute : $f_z=1.0\text{mm/t}$ Axial cutting depth : $a_p=0.5\text{mm}$ Radial cutting depth : $a_e=32\text{mm}$	Using the ASR on multitasking machine for drilling an inside diameter that was made by boring process with conventional lathe machine resulted in the working time of 39 seconds, twice as efficient as before.

No	Tool dia. DCX	User	Grade	Work material	Cutting conditions			Overhang mm	Result
					V_c m/min n (min ⁻¹)	V_f mm/min f_z (mm/t)	$a_p \times a_e$:mm		
1	32	Company T	P40	S45C	180 (1800)	4,500 (1.25)	1.0×22	100	2× the tool life of conventional products.
2	50	Company S	P30	SKD61	94 (600)	3,000 (1.67)	0.5×40	300	Although normally processing at depths greater than 200mm is not possible, it is with this tool.
3		Company S	P10	SKD61 (47HRC)	90 (570)	1,900 (1.1)	1.0×25	100	Long tool life with less chipping than conventional products.
4	63	Company R	P10	SKD61 (45HRC)	75 (380)	2,500 (1.6)	0.8×42	180	Long tool life with less chipping than conventional products.
5	80	Company A	P30	P20	90~120	4,000 (1.7)	1.5×54	300	Good. 12 hours of work reduced to 3.4 hours.
6		Company Y	P40	SCM (30HRC)	240 (955)	4,000 (0.8)	0.8×25	100	1.5× the tool life of conventional products.

Example of Super High efficient Machining

ASR5063-4($\phi 63 \times 4\text{NT}$)		Result
Work material:S55C Overhang of the tool: 240mm(measured from the gauge line)	Metal removal rate: 625cm ³ /min Insert: EDNW15T4TN-15 Machine: M.C (22KW) Cutting speed: $V_c=165\text{m/min}$ Rotation speed: $n=834\text{min}^{-1}$ Cutting speed: $V_f=10\text{m/min}$ Feed rate per flute: $f_z=3\text{mm/t}$ Axial cutting depth: $a_p=1.25\text{mm}$ Radial cutting depth: $a_e=50\text{mm}$ Coolant: Dry	Flank Wear: $VB_{\text{max}}=0.276\text{mm}$ after 500m cutting. Superior. 
	Metal removal rate: 750cm ³ /min Insert: EDNW15T4TN-15 Machine: M.C (22KW) Cutting speed: $V_c=165\text{m/min}$ Rotation speed: $n=834\text{min}^{-1}$ Cutting speed: $V_f=12\text{m/min}$ Feed rate per flute: $f_z=3.6\text{mm/t}$ Axial cutting depth: $a_p=1.25\text{mm}$ Radial cutting depth: $a_e=50\text{mm}$ Coolant: Dry	Flank Wear: $VB_{\text{max}}=0.432\text{mm}$ after 400m cutting. Superior. 
 $f_z=3\text{mm/t}$	 $f_z=3.6\text{mm/t}$	



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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