

ASRF *type*

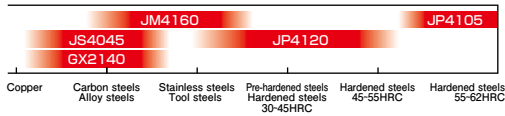
Radius Mill 4 Corners ASRF



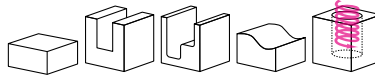
MOLDINO Tool Engineering, Ltd.

New Product News | No.1206E-10 | 2022-11

Technology



Applications



AJ Coating series

JP4120 JM4160 JP4105

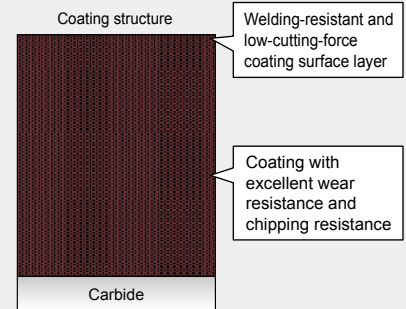
Features of AJ Coating series

- 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

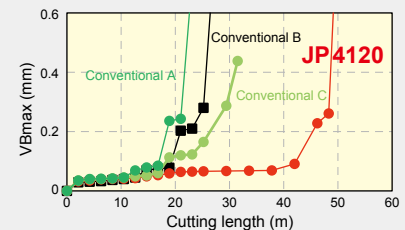
Features

- 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

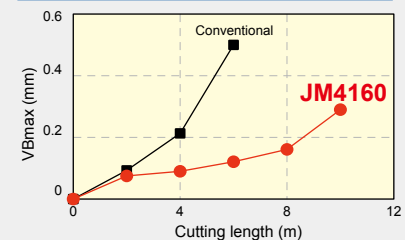
Features

- 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

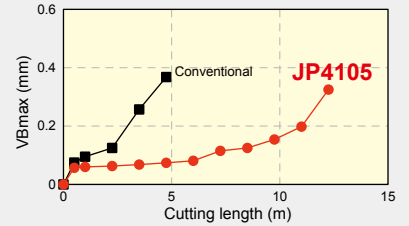
Features

- 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

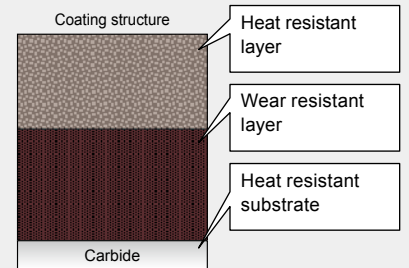
Features

- 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**

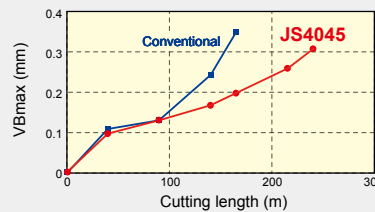


Wear graph after cutting SCM440 (32HRC)



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

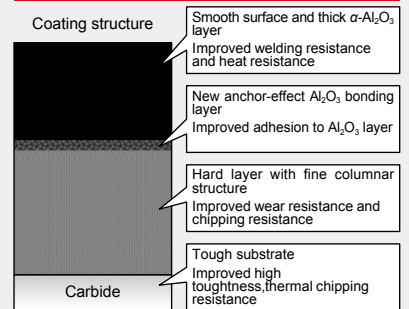
Features

- 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.

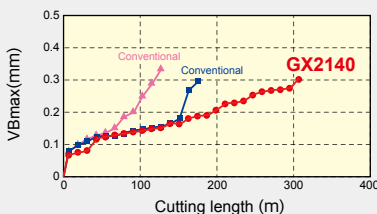
Strong fields

- 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**

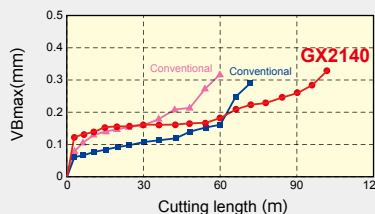


Wear graph after cutting S50C (220HB)



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 ASRF 40 R

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



Fig.1(Standard type)

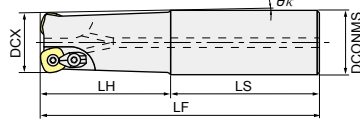
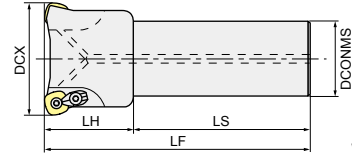


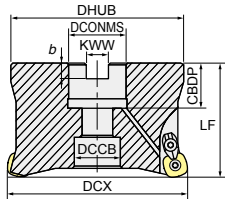
Fig.2(Undercut type)



Item code		Stock	No. of flutes	Size(mm)						Shape	Inserts	
				DCX	LF	DCONMS	LH	LS	θ_k			
Shank type	Regular	ASRFS4032R	●	2	32	150	32	70	80	—	Fig.1	SDNW1205ZDTN-R15 SDMT1205ZDTN-R15
		ASRFS4040R	●	3	40	150	42	70	80	1.4°		
		ASRFS4050R	●	4	50	150	42	50	100	—	Fig.2	
		ASRFS4063R	●	4	63	150	42	50	100	—		
	Long	ASRFL4032R	●	2	32	200	32	120	80	—	Fig.1	
		ASRFL4040R	●	3	40	220	42	120	100	0.6°		
		ASRFL4050R	●	3	50	250	42	50	200	—	Fig.2	
		ASRFL4063R	●	4	63	250	42	50	200	—		
Extra Long	ASRFE4032R	●	2	32	300	32	180	120	—	Fig.1		
	ASRFE4040R	●	2	40	300	42	180	120	0.4°			

Bore type ASRF 4 R(M)-

Numeric figure in a circle ○



With air hole

Item code		Stock	No. of flutes	Size(mm)										Inserts
				DCX	DHUB	LF	CBDP	KWW	b	DCONMS	DCCB			
Bore type	Internal diameter inch size	ASRF4050R-3	●	3	50	47	50	19	8.4	5	22.225	17	SDNW1205ZDTN-R15 SDMT1205ZDTN-R15	
		ASRF4050R-4	●	4	50	47	50	19	8.4	5	22.225	17		
		ASRF4063R-3	●	3	63	60	50	19	8.4	5	22.225	17		
		ASRF4063R-4	●	4	63	60	50	19	8.4	5	22.225	17		
		ASRF4080R-4	●	4	80	76	70	32	12.7	8	31.75	26		
		ASRF4080R-5	●	5	80	76	70	32	12.7	8	31.75	26		
	Internal diameter mm size	ASRF4100R-5	●	5	100	96	70	32	12.7	8	31.75	26		
		ASRF4100R-6	●	6	100	96	70	32	12.7	8	31.75	26		
		ASRF4050RM-3	●	3	50	47	50	20	10.4	6.3	22	17		
		ASRF4050RM-4	●	4	50	47	50	20	10.4	6.3	22	17		
		ASRF4063RM-3	●	3	63	60	50	20	10.4	6.3	22	17		
		ASRF4063RM-4	●	4	63	60	50	20	10.4	6.3	22	17		
ASRF4080RM-5	●	5	80	76	70	22	12.4	7	27	20				
ASRF4100RM-6	●	6	100	96	70	25.5	14.4	8	32	26				

[Note] Arbor screw is not included.

Parts

Parts	Clamp screw	Clamp piece set	Wrench	Screw anti-seizure agent
Shape				
Cutter body	fastening torque (N · m)			
ASRF S/L/E 4 R ASRF 4 R ASRF 4 RM	262-142	2.9	CM4-141	105-T15
				P-37

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

● : Stocked Items.

Inserts

Fig.1
Standard shape

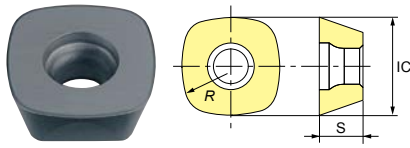
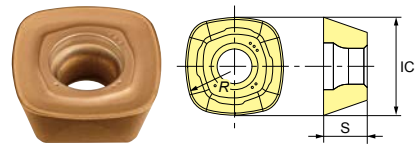


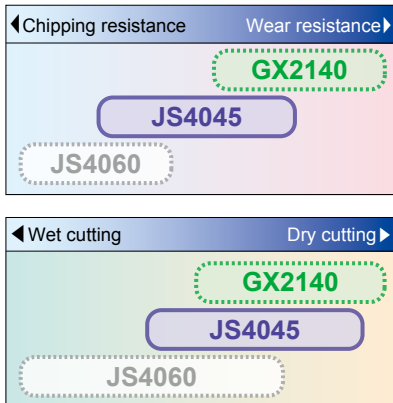
Fig.2
With breaker



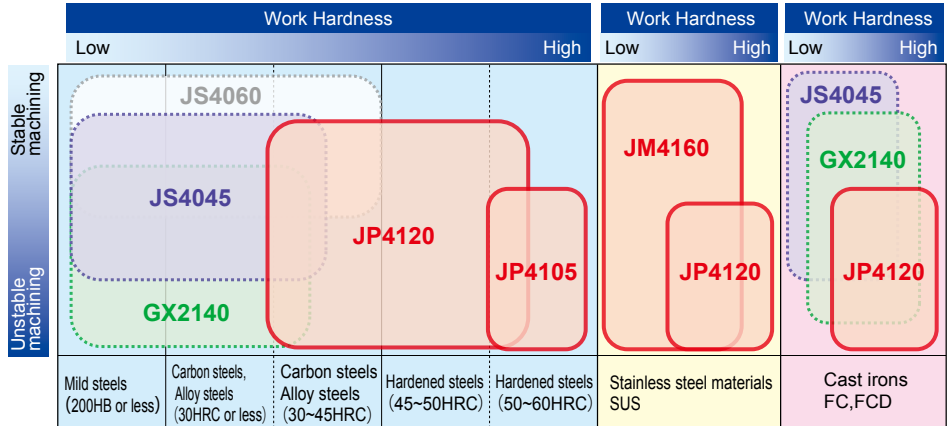
P Carbon steels		■		■	■	■										■ : General cutting, First recommended	
M SUS, etc.			■													□ : General cutting, Second recommended	
K FC·FCD Cast irons			■		■	■											
H Hardened steels		■	□														
Item code	Tolerance class	AJ Coating			GX Coating	JS Coating		C Coating	Size(mm)			Shape	Cutter body				
		JP4105	JP4120	JM4160	GX2140	JS4045	JS4060	CY250	R	S	IC						
SDNW1205ZDTN-R15	N	●	●	●	●	●	●	●	15	5.56	12.7	Fig.1	ASRF S/L/E 4	○	○	○	R
SDMT1205ZDTN-R15	M	●	●	●	●	●	●	●				Fig.2	ASRF 4	○	○	○	R-○
													ASRF 4	○	○	○	RM-○

[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



High-feed tools lineup

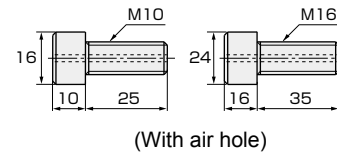
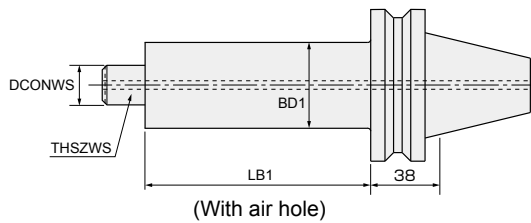
Type	Feature				Holder	Insert			Programming R (mm)	APMX (mm)
	Economical (No. of corners)	High accuracy (Less uncut remnants)	Supports for high-hardened steel	Efficiency (No. of Flutes)	Tool dia. (mm)	No. of corners	Shape	Inscribed circle code		
TD4N	◎	◎	○	High Efficiency multiflutes	φ16~40	4		06	2.0	1.0
ASR Multi-Flutes		○	○	High Efficiency multiflutes	φ16~66	2		06 12	2.0 3.0	1.5 2.0
ASRF-mini	◎		○	General	φ20~63	4		07	2.0	1.2
ASR		○	○	General	φ20~100	2		08~15	3.0	2.0
ASRT	○	○	○	General	φ25~100	3		09~14		
ASRF	◎		○	General	φ32~100	4		12		
TD6N	◎	○	○	General	φ50~125	6		14 14	3.0	1.5 3.0
TR4F	◎		○	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

Arbors



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	ASRF4050R-○
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	ASRF4063R-○
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	ASRF4080R-○
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	ASRF4100R-○
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		

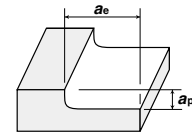
[Note] The arbor screw for attaching the cutter is included with the arbor, but is not included with the cutters themselves.

Parts for optional arbor screws

Arbor screw	Cutter body	Arbor screw	Cutter body	Arbor screw	Cutter body
	100-178		100-179		100-180

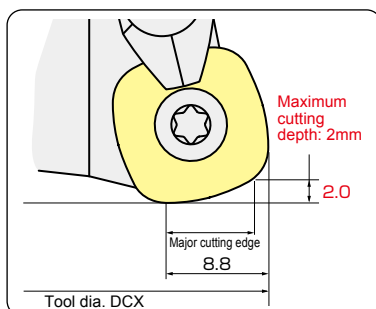
[Note] When supplying air and cutting agent to each flute, please use the arbor screws listed above. They are not included with the cutters themselves. Even with the screws included with the arbor, the arbor can be used as it is for center through.

Recommended Cutting Conditions



※Red indicates primary recommended grade.

Work material	Recommended grade	Tool dia. DCX	φ32 / 2 flutes					φ40 / 3 flutes					φ50 / 4 flutes				
			<3DCX		3DCX 5DCX	5DCX 7DCX	>7DCX	<3DCX		3DCX 5DCX	5DCX 7DCX	>7DCX	<3DCX		3DCX 5DCX	5DCX 7DCX	>7DCX
			General purpose	High speed processing				General purpose	High speed processing				General purpose	High speed processing			
Mild steels 200HB or less	※ GX2140 JS4060 JS4045	<i>n</i> (min ⁻¹)	1,490	1,990	1,490	1,290	900	1,190	1,590	1,190	1,030	720	950	1,270	950	830	570
		<i>vc</i> (m/min)	150	200	150	130	90	150	200	150	130	90	150	200	150	130	90
		<i>vf</i> (mm/min)	4,470	7,160	4,470	3,870	2,700	5,360	8,590	5,360	4,640	3,240	5,700	9,140	5,700	4,980	3,420
		<i>fz</i> (mm/t)	1.5	1.8	1.5	1.5	1.5	1.5	1.8	1.5	1.5	1.5	1.5	1.8	1.5	1.5	1.5
		<i>ap</i> (mm)	1.0	0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5	1.5	1.2	1.1	0.8	0.8
		<i>ae</i> (mm)	26	26	26	26	26	32	32	32	32	32	40	40	40	40	40
		<i>Q</i> (cm ³ /min)	116	149	81	50	35	172	220	120	74	52	342	439	251	159	109
		Carbon steels Alloy steels 35HRC or less	GX2140 JS4060 JS4045	<i>n</i> (min ⁻¹)	1,490	1,990	1,490	1,290	900	1,190	1,590	1,190	1,030	720	950	1,270	950
<i>vc</i> (m/min)	150			200	150	130	90	150	200	150	130	90	150	200	150	130	90
<i>vf</i> (mm/min)	2,980			4,780	2,980	2,580	1,800	3,570	5,720	3,570	3,090	2,160	5,700	9,140	5,700	4,980	3,420
<i>fz</i> (mm/t)	1.0			1.2	1.0	1.0	1.0	1.0	1.2	1.0	1.0	1.0	1.5	1.8	1.5	1.5	1.5
<i>ap</i> (mm)	1.0			0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5	1.5	1.2	1.1	0.8	0.8
<i>ae</i> (mm)	26			26	26	26	26	32	32	32	32	32	40	40	40	40	40
<i>Q</i> (cm ³ /min)	77			99	54	34	23	114	146	80	49	35	342	439	251	159	109
Carbon steels Alloy steels 35~45HRC or less	JP4120 JS4045 JS4060			<i>n</i> (min ⁻¹)	900	1,190	900	780	540	720	950	720	620	430	570	760	570
		<i>vc</i> (m/min)	90	120	90	78	54	90	120	90	78	54	90	120	90	78	54
		<i>vf</i> (mm/min)	1,440	2,380	1,440	1,250	860	1,730	2,850	1,730	1,490	1,030	1,820	3,040	1,820	1,600	1,090
		<i>fz</i> (mm/t)	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8
		<i>ap</i> (mm)	1.0	0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5	1.5	1.2	1.1	0.8	0.8
		<i>ae</i> (mm)	26	26	26	26	26	32	32	32	32	32	40	40	40	40	40
		<i>Q</i> (cm ³ /min)	37	50	26	16	11	55	73	39	24	16	109	146	80	51	35
		Stainless steels SUS	JM4160	<i>n</i> (min ⁻¹)	990	1,320	990	870	600	800	1,060	800	690	480	640	850	640
<i>vc</i> (m/min)	100			133	100	87	60	100	133	100	87	60	100	133	100	87	60
<i>vf</i> (mm/min)	1,580			2,640	1,580	1,390	960	1,920	3,180	1,920	1,660	1,150	2,050	3,400	2,050	1,760	1,220
<i>fz</i> (mm/t)	0.8			1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8
<i>ap</i> (mm)	1.2			1.0	0.8	0.6	0.6	1.2	1.0	0.8	0.6	0.6	1.5	1.2	1.1	0.8	0.8
<i>ae</i> (mm)	26			26	26	26	26	32	32	32	32	32	40	40	40	40	40
<i>Q</i> (cm ³ /min)	49			69	33	22	15	74	102	49	32	22	123	163	90	56	39
Cast irons FC, FCD	GX2140 JS4045 JP4120			<i>n</i> (min ⁻¹)	1,490	1,990	1,490	1,290	900	1,190	1,590	1,190	1,030	720	950	1,270	950
		<i>vc</i> (m/min)	150	200	150	130	90	150	200	150	130	90	150	200	150	130	90
		<i>vf</i> (mm/min)	4,470	7,160	4,470	3,870	2,700	7,140	11,450	7,140	6,180	4,320	7,600	12,190	7,600	6,640	4,560
		<i>fz</i> (mm/t)	1.5	1.8	1.5	1.5	1.5	2.0	2.4	2.0	2.0	2.0	2.0	2.4	2.0	2.0	2.0
		<i>ap</i> (mm)	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	2.0	1.6	1.4	1.0	1.0
		<i>ae</i> (mm)	26	26	26	26	26	32	32	32	32	32	40	40	40	40	40
		<i>Q</i> (cm ³ /min)	174	223	128	80	56	343	440	251	158	111	608	780	426	266	182
		Hardened steels 45~55HRC	JP4120	<i>n</i> (min ⁻¹)	900	1,190	900	780	540	720	950	720	620	430	570	760	570
<i>vc</i> (m/min)	90			120	90	78	54	90	120	90	78	54	90	120	90	78	54
<i>vf</i> (mm/min)	360			480	360	310	220	430	570	430	370	260	460	610	460	400	270
<i>fz</i> (mm/t)	0.20			0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
<i>ap</i> (mm)	1.0			0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5
<i>ae</i> (mm)	26			26	26	26	26	32	32	32	32	32	40	40	40	40	40
<i>Q</i> (cm ³ /min)	9			10	7	4	3	14	15	10	6	4	18	20	13	8	5
Hardened steels 55~60HRC	JP4105			<i>n</i> (min ⁻¹)	600	800	600	520	360	480	640	480	410	290	380	510	380
		<i>vc</i> (m/min)	60	80	60	52	36	60	80	60	52	36	60	80	60	52	36
		<i>vf</i> (mm/min)	60	160	120	100	70	70	190	140	120	90	80	200	150	130	90
		<i>fz</i> (mm/t)	0.05	0.10	0.10	0.10	0.10	0.05	0.10	0.10	0.10	0.10	0.05	0.10	0.10	0.10	0.10
		<i>ap</i> (mm)	0.5	0.4	0.4	0.3	0.3	0.5	0.4	0.4	0.3	0.3	0.5	0.4	0.4	0.3	0.3
		<i>ae</i> (mm)	26	26	26	26	26	32	32	32	32	32	40	40	40	40	40
		<i>Q</i> (cm ³ /min)	1	2	1	1	1	1	2	2	1	1	2	3	2	2	1



Recommended Cutting Conditions

Work material	Recommended grade	Tool dia. DCX	$\phi 63 / 4 \text{ flutes}$					$\phi 80 / 5 \text{ flutes}$					$\phi 100 / 6 \text{ flutes}$					
			Overhang	<3DCX		3DCX	5DCX	>7DCX	<3DCX		3DCX	5DCX	>7DCX	<3DCX		3DCX	5DCX	>7DCX
				General purpose	High speed processing	5DCX	7DCX		General purpose	High speed processing	5DCX	7DCX		General purpose	High speed processing	5DCX	7DCX	
Mild steels 200HB or less	※ GX2140 JS4060 JS4045	$n \text{ (min}^{-1}\text{)}$	760	1,010	760	660	450	600	800	600	520	360	480	640	480	410	290	
		$v_c \text{ (m/min)}$	150	200	150	130	90	150	200	150	130	90	150	200	150	130	90	
		$v_f \text{ (mm/min)}$	4,560	7,270	4,560	3,960	2,700	4,500	7,200	4,500	3,900	2,700	4,320	6,910	4,320	3,690	2,610	
		$f_z \text{ (mm/t)}$	1.5	1.8	1.5	1.5	1.5	1.5	1.8	1.5	1.5	1.5	1.5	1.8	1.5	1.5	1.5	
		$a_p \text{ (mm)}$	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	342	436	251	158	108	432	553	317	200	138	518	663	380	236	167	
Carbon steels Alloy steels 35HRC or less	GX2140 JS4060 JS4045	$n \text{ (min}^{-1}\text{)}$	760	1,010	760	660	450	600	800	600	520	360	480	640	480	410	290	
		$v_c \text{ (m/min)}$	150	200	150	130	90	150	200	150	130	90	150	200	150	130	90	
		$v_f \text{ (mm/min)}$	4,560	7,270	4,560	3,960	2,700	4,500	7,200	4,500	3,900	2,700	4,320	6,910	4,320	3,690	2,610	
		$f_z \text{ (mm/t)}$	1.5	1.8	1.5	1.5	1.5	1.5	1.8	1.5	1.5	1.5	1.5	1.8	1.5	1.5	1.5	
		$a_p \text{ (mm)}$	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	342	436	251	158	108	432	553	317	200	138	518	663	380	236	167	
Carbon steels Alloy steels 35~45HRC or less	JP4120 JS4045 JS4060	$n \text{ (min}^{-1}\text{)}$	450	610	450	390	270	360	480	360	310	210	290	380	290	220	170	
		$v_c \text{ (m/min)}$	90	120	90	78	54	90	120	90	78	54	90	120	90	68	54	
		$v_f \text{ (mm/min)}$	1,440	2,440	1,440	1,250	860	1,440	2,400	1,440	1,240	840	1,390	2,280	1,390	1,060	820	
		$f_z \text{ (mm/t)}$	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8	
		$a_p \text{ (mm)}$	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	108	146	79	50	34	138	184	101	63	43	167	219	122	68	52	
Stainless steels SUS	JM4160	$n \text{ (min}^{-1}\text{)}$	510	670	510	440	300	400	530	400	350	240	320	420	320	280	190	
		$v_c \text{ (m/min)}$	100	133	100	87	60	100	133	100	87	60	100	133	100	87	60	
		$v_f \text{ (mm/min)}$	1,630	2,680	1,630	1,410	960	1,600	2,650	1,600	1,400	960	1,540	2,520	1,540	1,340	910	
		$f_z \text{ (mm/t)}$	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.8	
		$a_p \text{ (mm)}$	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	1.5	1.2	1.1	0.8	0.8	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	122	161	90	56	38	154	204	113	72	49	185	242	136	86	58	
Cast irons FC, FCD	GX2140 JS4045 JP4120	$n \text{ (min}^{-1}\text{)}$	760	1,010	760	660	450	600	800	600	520	360	480	640	480	410	290	
		$v_c \text{ (m/min)}$	150	200	150	130	90	150	200	150	130	90	150	200	150	130	90	
		$v_f \text{ (mm/min)}$	6,080	9,700	6,080	5,280	3,600	6,000	9,600	6,000	5,200	3,600	5,760	9,220	5,760	4,920	3,480	
		$f_z \text{ (mm/t)}$	2.0	2.4	2.0	2.0	2.0	2.0	2.4	2.0	2.0	2.0	2.0	2.4	2.0	2.0	2.0	
		$a_p \text{ (mm)}$	2.0	1.6	1.4	1.0	1.0	2.0	1.6	1.4	1.0	1.0	2.0	1.6	1.4	1.0	1.0	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	608	776	426	264	180	768	983	538	333	230	922	1180	645	394	278	
Hardened steels 45~55HRC	JP4120	$n \text{ (min}^{-1}\text{)}$	450	610	450	390	270	360	480	360	310	210	290	380	290	250	170	
		$v_c \text{ (m/min)}$	90	120	90	78	54	90	120	90	78	54	90	120	90	78	54	
		$v_f \text{ (mm/min)}$	360	490	360	310	220	360	480	360	310	210	350	460	350	300	200	
		$f_z \text{ (mm/t)}$	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
		$a_p \text{ (mm)}$	1.0	0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5	1.0	0.8	0.7	0.5	0.5	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	18	20	13	8	6	23	25	16	10	7	28	29	20	12	8	
Hardened steels 55~60HRC	JP4105	$n \text{ (min}^{-1}\text{)}$	300	400	300	260	180	240	320	240	210	140	190	250	190	170	110	
		$v_c \text{ (m/min)}$	60	80	60	52	36	60	80	60	52	36	60	80	60	52	36	
		$v_f \text{ (mm/min)}$	60	160	120	100	70	60	160	120	110	70	60	150	110	100	70	
		$f_z \text{ (mm/t)}$	0.05	0.10	0.10	0.10	0.10	0.05	0.10	0.10	0.10	0.10	0.05	0.10	0.10	0.10	0.10	
		$a_p \text{ (mm)}$	0.5	0.4	0.4	0.3	0.3	0.5	0.4	0.4	0.3	0.3	0.5	0.4	0.4	0.3	0.3	
		$a_e \text{ (mm)}$	50	50	50	50	50	64	64	64	64	64	80	80	80	80	80	
		$Q \text{ (cm}^3\text{/min)}$	2	3	2	2	1	2	4	3	2	1	2	5	4	2	2	

- [Note]** 1. These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
 (If the overhang is 3DCX or less, the recommended cutting speed is $v_c=180\sim 200\text{m/min}$; 3DCX or more : $v_c=90\sim 130\text{m/min}$.)
 2. Please note that the GX Coating and JS Coating do not cause a reaction in conductive touch sensors.
 3. 『JP4105 insert's grade specialized in High hardened steels is not suitable for Non-heat-treated steel material.
 4. The thick and heavy chips are generated by using this tool. Be sure to remove them with air blow in order to avoid any breakage by blocking with chips.
 The recommended method is "Spindle center through" when blowing air. (Pay attention when removing chips in cavity work with the machining center <vertical type>.)
 5. Before carrying out the work without any workers, be sure to remove the chips and confirm the safe condition for cutting.
 6. The steel chips may cause cuts, burns or damages to eyes. Be sure to install the safety cover around the tool and wear the safety glasses when carrying out any works.
 7. Replace the insert in good time to avoid any breakage of the tools because of wear and tear.
 8. The following formula shows the metal removal rate (Q) per unit time.
 $Q(\text{cm}^3\text{/min})=a_p(\text{mm})\times a_e(\text{mm})\times v_f(\text{mm/min})/1000$

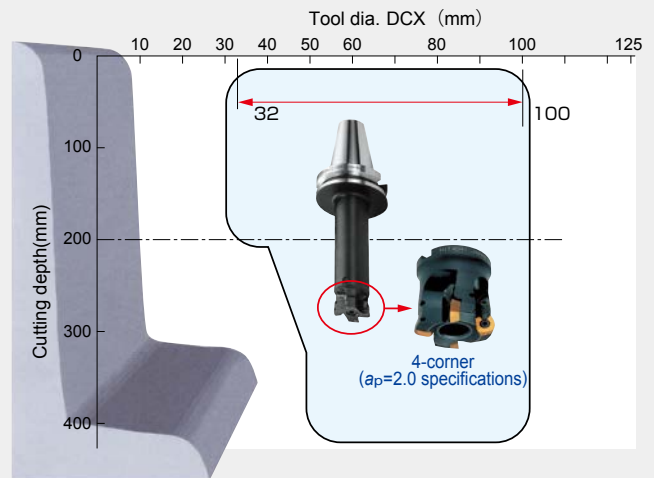
Cutting performance

Features

01

Features of ASRF type

- 4-corner ASRF type with diameters of $\phi 32$ to $\phi 100$ mm have been added to the regular product lineup, offering deep cutting capability as well as specifications greatly surpassing those of 2-corner ASR type inserts.



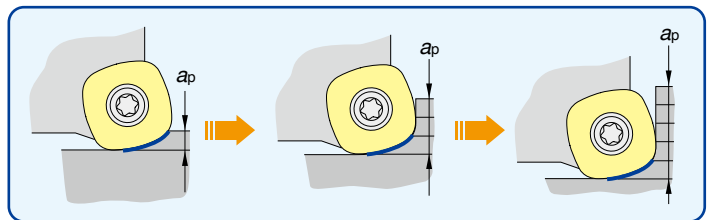
01

4-corners specifications with major cutting edge shape almost identical to that of conventional ASR type.



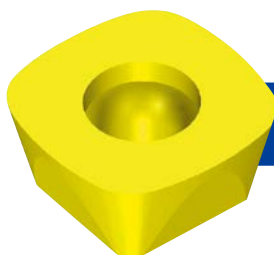
- With ASRF : Even for deep cutting, stable, high-performance machining with an almost constant load is possible.

Figure For ASRF



02

Select from two types of inserts available as standard products.



Standard type



Low-resistance breaker type

Cutting performance

03 Method for defining conditions of insert tip programmatically

- For roughing, please create a program with corner R values close to those shown as references below.

When corner R is set to 4.5:

Normally, you should create a program with an input corner R of approximately 4.5. At an approximate input corner R of 4.5, there is no overcutting.

When corner R is set larger:

Although overcutting occurs when the approximate R is set to higher values, if the overcutting is within the surplus for the next process, there is no problem with the cutting shape and the amount of remainder can be suppressed.

(mm)

Programming R	R4.5	R5	R5.5	R6	R6.5
Remainder	0.83 or less ($\theta_1=22.1^\circ$)	0.69 or less ($\theta_1=20.6^\circ$)	0.55 or less ($\theta_1=19^\circ$)	0.42 or less ($\theta_1=17.1^\circ$)	0.3 or less ($\theta_1=14.9^\circ$)
Overcutting	No overcutting	0.07 or less ($\theta_2=75.3^\circ$)	0.2 or less ($\theta_2=67.7^\circ$)	0.37 or less ($\theta_2=63.1^\circ$)	0.55 or less ($\theta_2=60^\circ$)

[Note] ① Overcutting and remainder vary according to the processing shape. The values in the table above are maximum values.

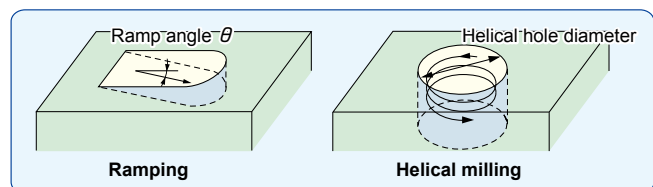
② The values of θ shown are the slopes of the processing surfaces when overcutting and remainder are at their maximum respective values.

For example, when a program is created with an programming R of 5:

Remainder of around 0.69mm is left when the slope of the processing surface is approximately 20.6° , and when the slope of the cutting surface is approximately 75.3° , about 0.07mm of overcutting occurs. At areas with other slopes, the overcutting and remainder values are below these values.

Processing by direct milling is also possible.

- Since the cutting flute do not extend to the center, the ramp angle and hole diameter were limited, but as shown below, cutting by direct milling without a pilot hole is possible by ramping and helical milling.



(mm)

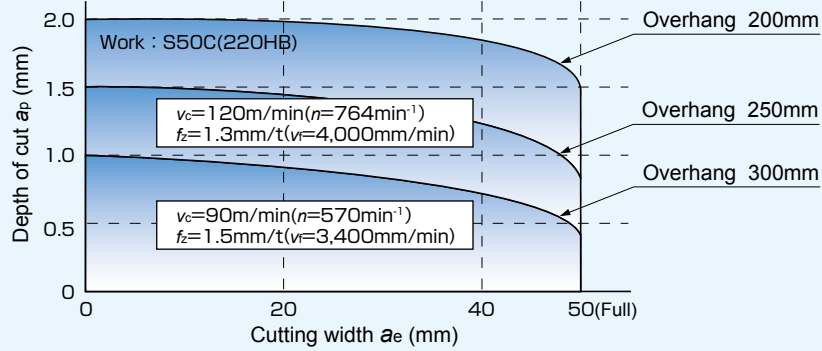
Tool dia. DCX	$\phi 32$	$\phi 40$	$\phi 50$	$\phi 63$	$\phi 80$	$\phi 100$
Maximum ramp angle θ	7°	4.5°	3°	1.7°	1°	1°
Hole Dia.	$\phi 44 \sim 61$	$\phi 61 \sim 76$	$\phi 80 \sim 96$	$\phi 107 \sim 122$	$\phi 142 \sim 156$	$\phi 179 \sim 195$

[Note] ① The ramp angle θ should be set within the ranges listed above. Use at ramp angles of 1° or less is recommended.

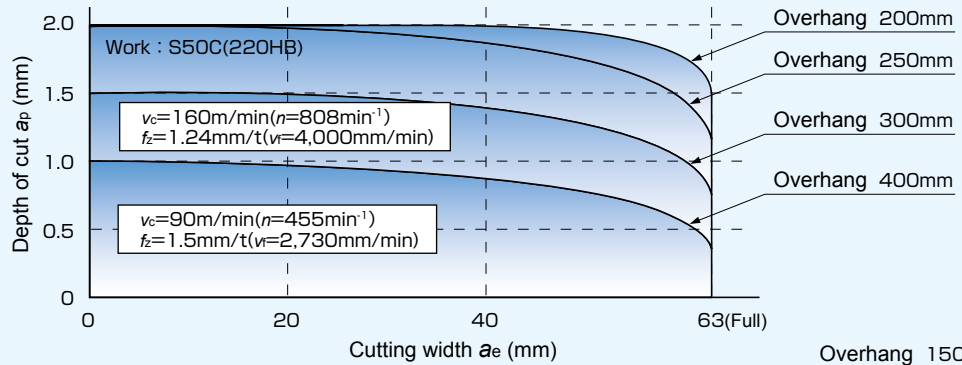
② In case of hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Cutting region

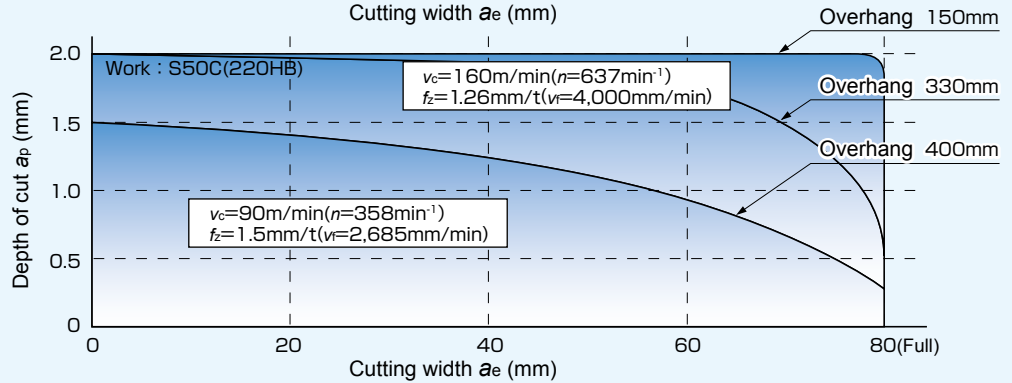
φ50-4NT



φ63-4NT



φ80-5NT



Field Data

No.	Tool dia. DCX	User	Insert grade	Work material	Cutting conditions				Result
					Vc m/min n(min⁻¹)	Vf mm/min fz(mm/t)	ap × ae:mm	Overhang mm	
1	32	Company A	Equivalent to JP4120	SKD61 (48HRC)	200 (2000)	2000 (0.5)	ap=0.2 ae=20	120	Tool life was 1.5 times that of conventional products.
2	40	Company B	Equivalent to JP4120	SKD61 (47HRC)	80 (640)	780 (0.4)	ap=0.5 ae=28	70	Tool life was twice that of conventional products.
3	63	Company C	JS4060	S50C (220HB)	120 (600)	2880 (1.2)	ap=0.8 ae=40	150	Enabled processing at stable cutting with less chipping than conventional products.
4	80	Company D	JS4060	SCM (32HRC)	180 (720)	2160 (0.6)	ap=0.5 ae=56	200	Tool life was twice that of conventional products.
5	80	Company E	GX2140	S50C (220HB)	160 (640)	6400 (2)	ap=2 ae=56	150	Tool life was twice that of conventional products.



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

1. Attention 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. Attention 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. Attention 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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