

AHR *type*

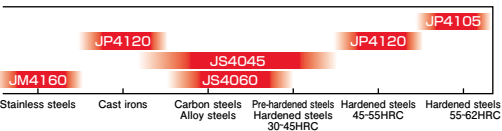
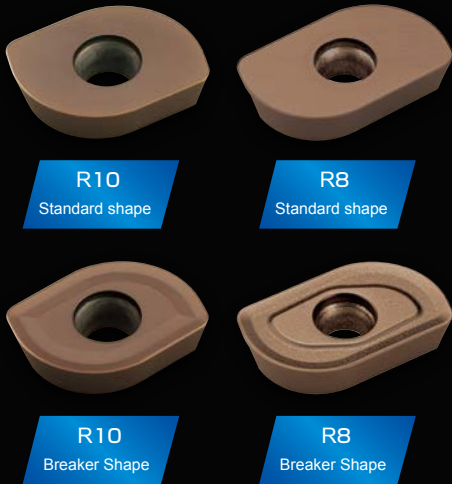
Radius Mill AHR (Heavy radius mill)



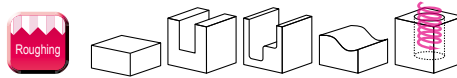
MOLDINO Tool Engineering, Ltd.

New Product News | No.1208E-10 | 2022-11

The optimum tool for casting work with non-uniform stock material.

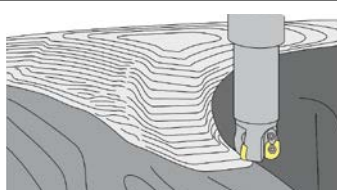


Applications

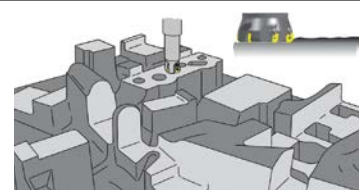


Features and Applications

1 Announcing the development of a radius mill with a long cutting flute to enable machining even of non-uniform work material formed by casting without worrying about the cutting amount.

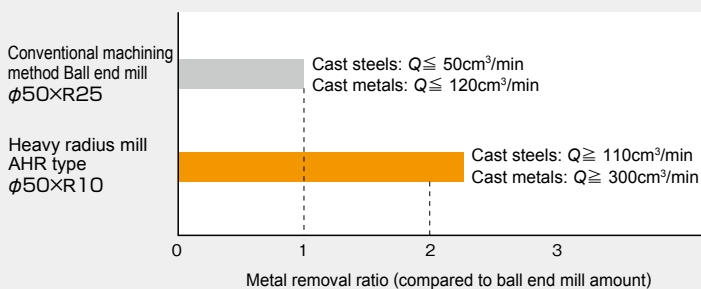


Even if the cutting amount of the work material is not uniform, rough machining of shaped area by contour machining can be performed.

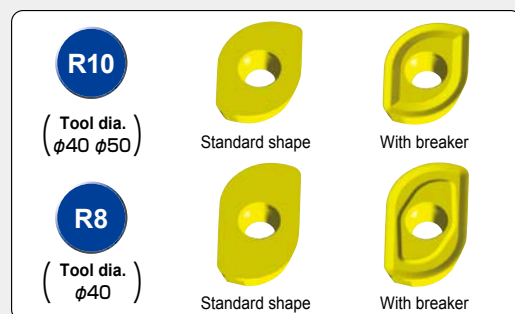


Can also be used for rough machining of flat surfaces of structural areas.

2 Compared to ball end mills of conventional machining methods, this new radius mill offers great leaps in efficiency.



3 Inserts with corner R of R8 and R10 are available.

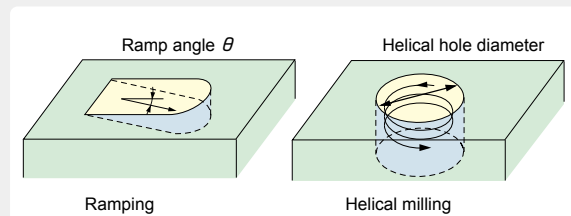


4 Feature comparison by insert shape

Shape	Heavy radius mill AHR type (R10 insert)	Heavy radius mill AHR type (R8 insert)	Conventional round end radius mill
Maximum cutting depth	Deep	Deep	Standard
Toughness of cutting edge	High	Equivalent	Standard
Tool life	Long	Equivalent	Standard
Cutting force	High (Approx. 1.2×)	Equivalent	Standard
Cusp height	Small	Equivalent	Standard

5 Cutting by direct milling is also possible.

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



Tool dia. DCX	φ40-R8	φ40-R10	φ50	φ63	φ80	φ100	φ125
Recommended ramp angle θ	1° or less					0.5° or less	
Max Ramp Angle θ	3°	4.5°	2.9°	1.9°	1.3°	1°	0.7°
Hole diameter	60~78	56~78	76~98	102~124	136~158	176~198	226~248

- [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.

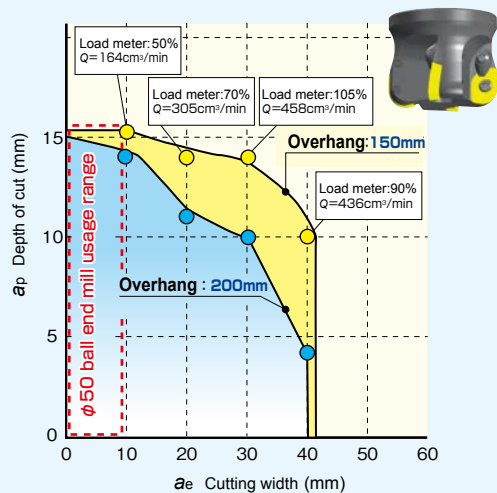
Cutting range

AHR5063R-4 (φ63-R10-4 Flutes)

Insert : ZDNW1505100TR

$v_c=180\text{m/min}$ ($n=909\text{min}^{-1}$), $f_z=0.3\text{mm/t}$ ($v_f=1091\text{mm/min}$)

Work : FCD450, Dry Machine : Vertical MC:15kW

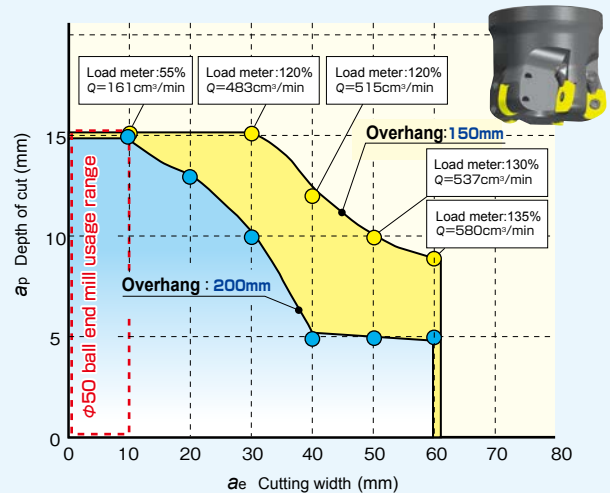


AHR5080R-5 (φ80-R10-5 Flutes)

Insert : ZDNW1505100TR

$v_c=180\text{m/min}$ ($n=716\text{min}^{-1}$), $f_z=0.3\text{mm/t}$ ($v_f=1074\text{mm/min}$)

Work : FCD450, Dry Machine : Vertical MC:15kW



Technology

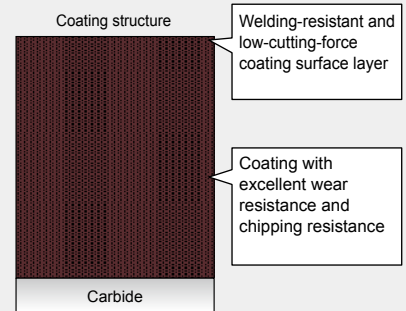
Features of AJ Coating series

- 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 of the work and decreases cutting force!

Layer structure AJ Coating



PVD Technology

Grade for machining pre-hardened or hardened materials JP4120

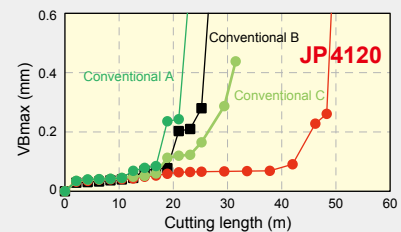
Features

- 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.

Figure 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

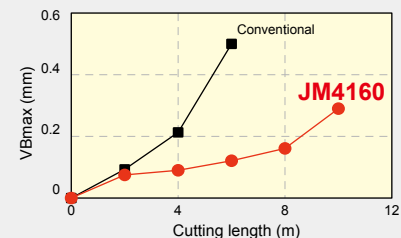
Features

- 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

Figure 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

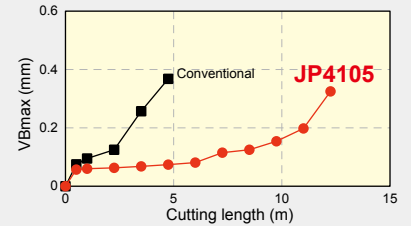
Features

- 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.

Figure 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-speed cutting.
- JS4045 adopts heat resistant substrate, reduces the wear and improves tool life.
- Improves tool life on dry cutting.

Strong fields

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

Layer structure **JS Coating**

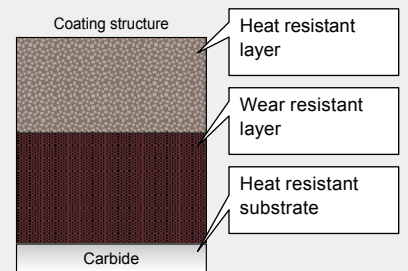
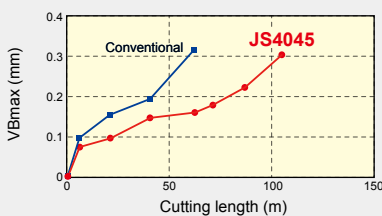


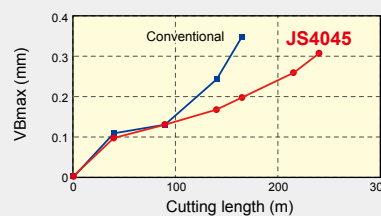
Figure Wear graph after cutting SCM440 (32HRC)



Cutting Conditions

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

Figure Wear graph after cutting P20 (32HRC)



Cutting Conditions

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

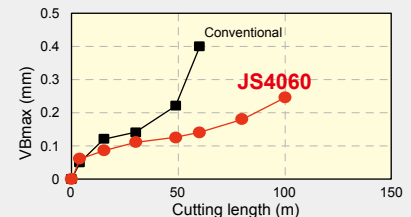
Features

- JS4060 adopts heat resistant layer, reduces the crater wear by high-speed cutting.
- JS4060 adopts a carbide substrate with high toughness to improve chipping resistance.
- Provides long tool life especially for cutting less than 35HRC materials.

Strong fields

- Continuous or interrupted cutting for less than 35 HRC materials such as SS, SC, SCM etc.

Figure Cutting performance



Cutting Conditions

Work Material P20 (260HB)
 Tool ASRT5063R-42
 Insert Model WDNW140520
 Cutting Speed $V_c = 180\text{m/min}$
 Feed per tooth $f_z = 1.5\text{mm/t}$
 Cutting depth $a_p \times a_e = 1 \times 44\text{mm}$
 Coolant Dry cutting
 Single-flute cutting

Shank type

AHR 42R/MT5-M

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and alphabetical character comes in a square □



Fig-1
Straight Shank type

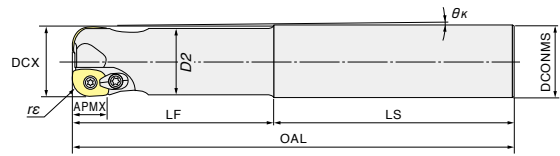
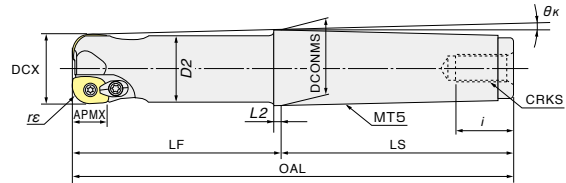


Fig-2
MT Shank type



Shank type	Item code	Stock	No. of flutes	Size (mm)											Shape	Inserts	
				DCX	rε	APMX	OAL	LF	LS	DCONMS	D2	L2	i	CRKS			θκ
Regular	AHRS404042R	●	3	40	8	18	150	50	100	42	38	—	—	—	1.4°	Fig-1	ZDNW1204080TR ZDMT1204080TR
	AHRS4040MT5-M16	●	3	40	8	18	249.5	120	129.5	44.399	38	6.5	32	M16	1.3°	Fig-2	
	AHRS4040MT5-M20		3	40	8	18	249.5	120	129.5	44.399	38	6.5	40	M20	1.3°		
	AHRS4040MT5-M24		3	40	8	18	249.5	120	129.5	44.399	38	6.5	45	M24	1.3°		
	AHRS504042R	●	2	40	10	18	150	50	100	42	38	—	—	—	1.5°	Fig-1	ZDNW1505100TR ZDMT1505100TR
	AHRS5040MT5-M16	●	2	40	10	18	249.5	120	129.5	44.399	38	6.5	32	M16	1.3°	Fig-2	
	AHRS5040MT5-M20		2	40	10	18	249.5	120	129.5	44.399	38	6.5	40	M20	1.3°		
	AHRS5040MT5-M24		2	40	10	18	249.5	120	129.5	44.399	38	6.5	45	M24	1.3°		
	AHRS5050MT5-M16	●	3	50	10	18	249.5	120	129.5	44.399	48	6.5	32	M16	—		
	AHRS5050MT5-M20		3	50	10	18	249.5	120	129.5	44.399	48	6.5	40	M20	—		
AHRS5050MT5-M24		3	50	10	18	249.5	120	129.5	44.399	48	6.5	45	M24	—			
Medium	AHRM404042R	●	3	40	8	18	250	50	200	42	38	—	—	—	1.4°	Fig-1	ZDNW1204080TR ZDMT1204080TR
	AHRM4040MT5-M16	●	3	40	8	18	299.5	170	129.5	44.399	38	6.5	32	M16	0.9°	Fig-2	
	AHRM4040MT5-M20		3	40	8	18	299.5	170	129.5	44.399	38	6.5	40	M20	0.9°		
	AHRM4040MT5-M24		3	40	8	18	299.5	170	129.5	44.399	38	6.5	45	M24	0.9°		
	AHRM504042R	●	2	40	10	18	250	50	200	42	38	—	—	—	1.5°	Fig-1	ZDNW1505100TR ZDMT1505100TR
	AHRM5040MT5-M16	●	2	40	10	18	299.5	170	129.5	44.399	38	6.5	32	M16	0.9°	Fig-2	
	AHRM5040MT5-M20		2	40	10	18	299.5	170	129.5	44.399	38	6.5	40	M20	0.9°		
	AHRM5040MT5-M24		2	40	10	18	299.5	170	129.5	44.399	38	6.5	45	M24	0.9°		
	AHRM5050MT5-M16	●	3	50	10	18	299.5	170	129.5	44.399	48	6.5	32	M16	—		
	AHRM5050MT5-M20		3	50	10	18	299.5	170	129.5	44.399	48	6.5	40	M20	—		
AHRM5050MT5-M24		3	50	10	18	299.5	170	129.5	44.399	48	6.5	45	M24	—			
Long	AHRL404042R	●	3	40	8	18	300	50	250	42	38	—	—	—	1.5°	Fig-1	ZDNW1204080TR ZDMT1204080TR
	AHRL4040MT5-M16	●	3	40	8	18	349.5	220	129.5	44.399	38	6.5	32	M16	0.7°	Fig-2	
	AHRL4040MT5-M20		3	40	8	18	349.5	220	129.5	44.399	38	6.5	40	M20	0.7°		
	AHRL4040MT5-M24		3	40	8	18	349.5	220	129.5	44.399	38	6.5	45	M24	0.7°		
	AHRL504042R	●	2	40	10	18	300	50	250	42	38	—	—	—	1.5°	Fig-1	ZDNW1505100TR ZDMT1505100TR
	AHRL5040MT5-M16	●	2	40	10	18	349.5	220	129.5	44.399	38	6.5	32	M16	0.7°	Fig-2	
	AHRL5040MT5-M20		2	40	10	18	349.5	220	129.5	44.399	38	6.5	40	M20	0.7°		
	AHRL5040MT5-M24		2	40	10	18	349.5	220	129.5	44.399	38	6.5	45	M24	0.7°		
	AHRL5050MT5-M16	●	3	50	10	18	349.5	220	129.5	44.399	48	6.5	32	M16	—		
	AHRL5050MT5-M20		3	50	10	18	349.5	220	129.5	44.399	48	6.5	40	M20	—		
AHRL5050MT5-M24		3	50	10	18	349.5	220	129.5	44.399	48	6.5	45	M24	—			
Extra long	AHRE504042R	●	2	40	10	18	350	50	300	42	38	—	—	—	1.5°	Fig-1	ZDNW1505100TR ZDMT1505100TR
	AHRE5040MT5-M16	●	2	40	10	18	429.5	300	129.5	44.399	38	6.5	32	M16	0.5°	Fig-2	
	AHRE5040MT5-M20		2	40	10	18	429.5	300	129.5	44.399	38	6.5	40	M20	0.5°		
	AHRE5040MT5-M24		2	40	10	18	429.5	300	129.5	44.399	38	6.5	45	M24	0.5°		
	AHRE5050MT5-M16	●	3	50	10	18	429.5	300	129.5	44.399	48	6.5	32	M16	—		
	AHRE5050MT5-M20		3	50	10	18	429.5	300	129.5	44.399	48	6.5	40	M20	—		
AHRE5050MT5-M24		3	50	10	18	429.5	300	129.5	44.399	48	6.5	45	M24	—			

Bore type

AHR5○○○R/(M)-○

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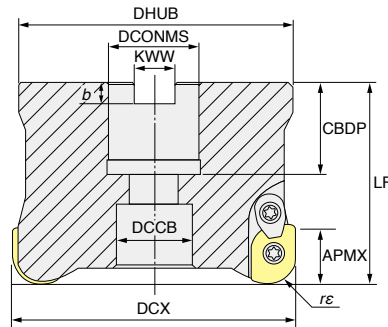


Fig.-3 Bore type

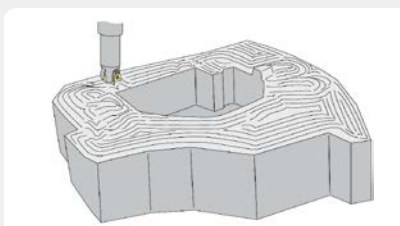
Item code	Stock	No. of flutes	Size (mm)											Shape	Inserts
			DCX	rε	APMX	DHUB	LF	CBDP	KWW	b	DCONMS	DCCB			
Internal diameter inch size	AHR5063R-3	●	3	63	10	18	60	50	19	8.4	5	22.225	17	Fig-3	ZDNW1505100TR ZDMT1505100TR
	AHR5063R-4	●	4	63	10	18	60	50	19	8.4	5	22.225	17		
	AHR5080R-4		4	80	10	18	76	70	32	12.7	8	31.75	26		
	AHR5080R-5	●	5	80	10	18	76	70	32	12.7	8	31.75	26		
	AHR5100R-5		5	100	10	18	96	70	32	12.7	8	31.75	26		
	AHR5100R-6	●	6	100	10	18	96	70	32	12.7	8	31.75	26		
	AHR5125R-6	●	6	125	10	18	100	63	32	12.7	8	31.75	26		
AHR5125R-7		7	125	10	18	100	63	32	12.7	8	31.75	26			
Internal diameter mm size	AHR5063RM-3	●	3	63	10	18	60	50	20	10.4	6.3	22	17	Fig-3	ZDNW1505100TR ZDMT1505100TR
	AHR5063RM-4	●	4	63	10	18	60	50	20	10.4	6.3	22	17		
	AHR5080RM-4		4	80	10	18	76	70	22	12.4	7	27	20		
	AHR5080RM-5	●	5	80	10	18	76	70	22	12.4	7	27	20		
	AHR5100RM-6	●	6	100	10	18	96	70	25	14.4	8	32	26		
	AHR5125RM-6	●	6	125	10	18	100	63	30	16.4	9	40	32		

[Note] Arbor screw is not included.

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	
1	40	Company A	Equivalent to JS4060	SKD11 (anneal)	150 (1200)	840 (0.35)	ap=5 ae=20	2 × the tool life of conventional products.
2	50	Company B	Equivalent to JP4120	SKD61 (45HRC)	120 (764)	690 (0.3)	ap=3 ae=30	1.7 × the tool life of conventional products.
3	50	Company C	Equivalent to JS4060	FC250	180 (1150)	2070 (0.6)	ap=5 ae=30	Enables more stable machining with minimal chipping compared to conventional products.

Reference examples



Work material : Material equivalent to SKD11

Conventional φ50 Ball End Mill



Vc=141m/min (n=900min⁻¹)
Vf=550~650mm/min
ap=7mm, ae=9mm
Metal removal rate Q=40.95cm³/min
Cutting time T = 9 hr. 46 min.

Heavy Radius Mill AHR type ; φ50



Vc=102m/min (n=650min⁻¹)
Vf=750mm/min
ap=5mm, ae=25mm
Metal removal rate Q=93.75cm³/min
Cutting time T = 4 hr. 30 min.

Results :
Machining time reduced to half ;
Efficiency improved 2.16 ×

Line Up

Inserts

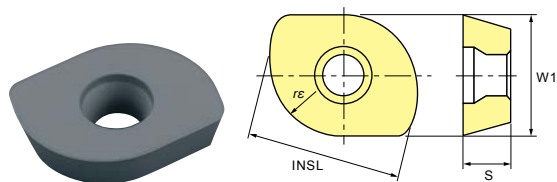


Fig-1 Standard shape

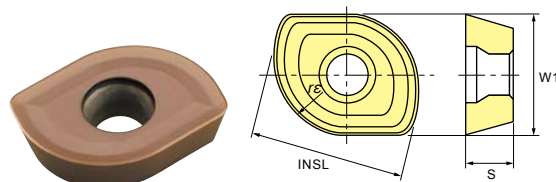
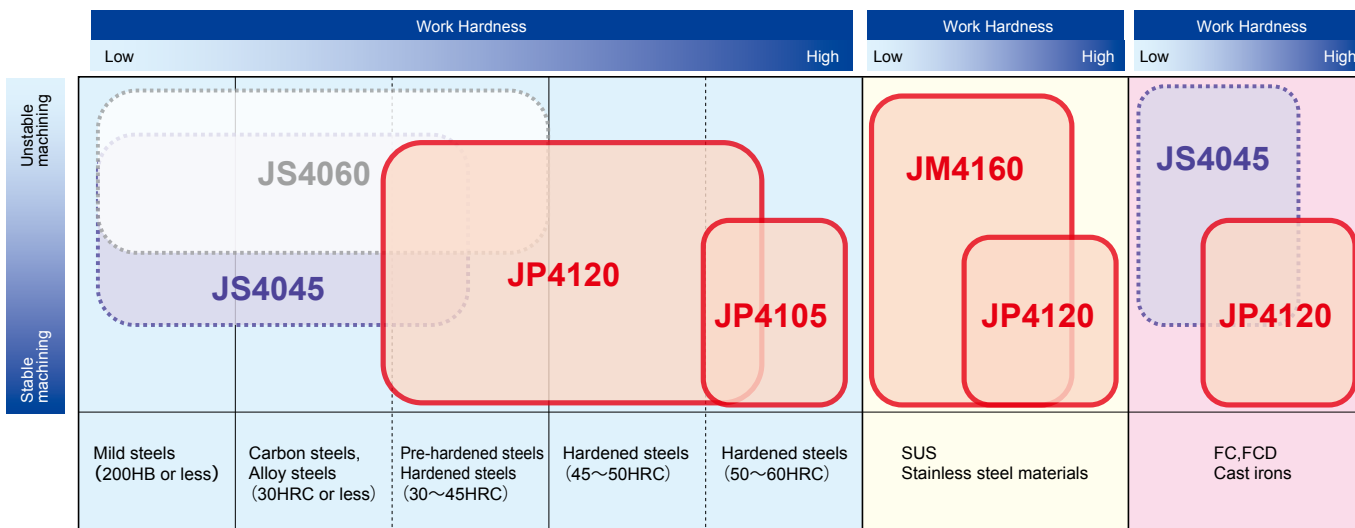


Fig-2 With breaker

P	Carbon steels			■		■	■	■ : General cutting, First recommended □ : General cutting, Second recommended			
M	SUS, etc.				■						
K	FC-FCD Cast irons			□		□	■				
H	Hardened steels	■	□								
Item code (metric)	Tolerance class	AJ Coating			JS Coating		Size (mm)				Shape
		JP4105	JP4120	JM4160	JS4045	JS4060	rε	INSL	S	W1	
ZDNW1204080TR	N	●	●	●	●	●	8	21.5	4.76	12.7	Fig-1
ZDNW1505100TR		●	●	●	●	●	10	21.5	5.56	15.875	
ZDMT1204080TR	M	●	●	●	●	●	8	21.5	4.76	12.7	Fig-2
ZDMT1505100TR		●	●	●	●	●	10	21.5	5.56	15.875	

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

Grade map for work materials



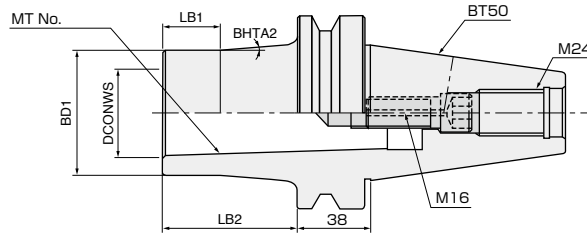
Parts

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Parts	Clamp screw		Clamp piece set	Wrench	Screw anti-seizure agent
Shape		Fastening torque (N·m)			
Cutter body					
AHR S/M/L 4040 42R/MT5-M○○○	262-142	2.9	CM4-141	105-T15	P-37
AHR S/M/L/E 5040 42R/MT5-M○○○	555-141	4.9	CM5-147	105-T20	
AHR S/M/L/E 5050 MT5-M○○○					
AHR 5○○○R/RM-○					

[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 one spare clamp screw.

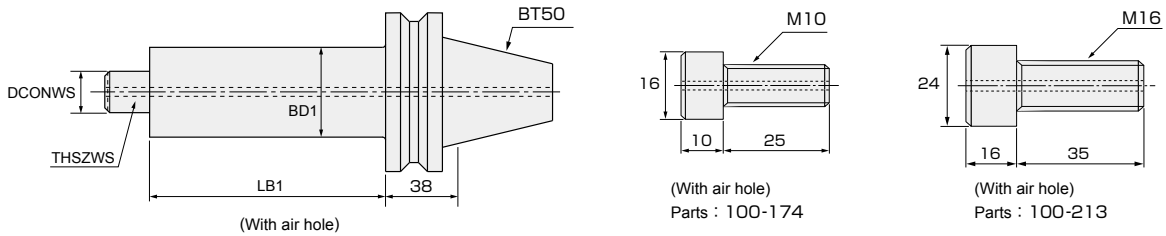
MT5 Shank Arbor



Item code	Stock	Size (mm)						Cutter body
		MT No.	BD1	DCONWS	LB2	LB1	BHTA2	
BT50-MTB503-70-65	●	MT5	65	44.399	70	30	5°	AHR S/M/L 4040MT5-M16 AHR S/M/L/E 5040MT5-M16 AHR S/M/L/E 5050MT5-M16

[Note] Please use 14mm hexagon wrench.

Bore Type Arbor



Item code	Stock	Size (mm)				Weight (kgf)	Arbor screw	Cutter body
		DCONWS	THSZWS	LB1	BD1			
BT50-22.225-50-63	●	22.225	M10	50	60	4.8	100-174	AHR5063R-⊙
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	AHR5080R-⊙
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	AHR5100R-⊙ AHR5125R-⊙
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.

Recommended Cutting Conditions

Red indicates primary recommended grade.

Work material	Recommended grade	Cutting conditions	φ40(2 Flutes)				φ50(3 Flutes)			
			<2DCX	2DCX-3DCX	3DCX-4DCX	>5DCX	<2DCX	2DCX-3DCX	3DCX-4DCX	>5DCX
Carbon-steels Alloy-steels <30HRC	※ JS4060 JS4045	$n(\text{min}^{-1})$	1,440	1,200	1,040	720	1,150	960	830	580
		$V_c(\text{m/min})$	180	150	130	90	180	150	130	90
		$V_f(\text{mm/min})$	2,020	1,440	1,040	720	2,420	1,730	1,250	870
		$f_z(\text{mm/t})$	0.7	0.6	0.5	0.5	0.7	0.6	0.5	0.5
		$a_p(\text{mm})$	5	4	3	2	5	4	3	2
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	283	138	75	29	424	208	113	44
Pre-Hardened steels Alloy-steels 30~40HRC	JS4060 JS4045	$n(\text{min}^{-1})$	1,440	1,200	1,040	720	1,150	960	830	580
		$V_c(\text{m/min})$	180	150	130	90	180	150	130	90
		$V_f(\text{mm/min})$	2,020	1,440	1,040	720	2,420	1,730	1,250	870
		$f_z(\text{mm/t})$	0.7	0.6	0.5	0.5	0.7	0.6	0.5	0.5
		$a_p(\text{mm})$	5	4	3	2	5	4	3	2
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	283	138	75	29	424	208	113	44
Pre-Hardened steels Alloy-steels 40~50HRC	JP4120 JS4045	$n(\text{min}^{-1})$	1,200	1,040	880	720	960	830	710	580
		$V_c(\text{m/min})$	150	130	110	90	150	130	110	90
		$V_f(\text{mm/min})$	960	840	710	580	1,160	1,000	860	700
		$f_z(\text{mm/t})$	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
		$a_p(\text{mm})$	3	2.5	2	1.5	3	2.5	2	1.5
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	81	50	34	17	122	75	52	26
Stainless steels (Wet condition)	JM4160	$n(\text{min}^{-1})$	960	800	720	640	760	640	570	510
		$V_c(\text{m/min})$	120	100	90	80	120	100	90	80
		$V_f(\text{mm/min})$	1,340	960	720	640	1,600	1,150	860	770
		$f_z(\text{mm/t})$	0.7	0.6	0.5	0.5	0.7	0.6	0.5	0.5
		$a_p(\text{mm})$	5	4	3	2	5	4	3	2
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	188	92	52	26	280	138	77	39
Cast irons FC FCD	JP4120 JS4045	$n(\text{min}^{-1})$	1,440	1,200	1,040	720	1,150	960	830	580
		$V_c(\text{m/min})$	180	150	130	90	180	150	130	90
		$V_f(\text{mm/min})$	2,020	1,440	1,040	720	2,420	1,730	1,250	870
		$f_z(\text{mm/t})$	0.7	0.6	0.5	0.5	0.7	0.6	0.5	0.5
		$a_p(\text{mm})$	5	4	3	2	5	4	3	2
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	283	138	75	29	424	208	113	44
Hardened steels (50~55HRC)	JP4120 JP4105	$n(\text{min}^{-1})$	1,000	850	720	640	800	680	580	510
		$V_c(\text{m/min})$	125	106	90	80	125	106	90	80
		$V_f(\text{mm/min})$	400	340	290	260	480	410	350	310
		$f_z(\text{mm/t})$	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		$a_p(\text{mm})$	2	1.5	1	0.5	2	1.5	1	0.5
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	22	12	7	3	34	18	11	4
Hardened steels (55~62HRC)	JP4105	$n(\text{min}^{-1})$	480	480	480	480	390	390	390	390
		$V_c(\text{m/min})$	60	60	60	60	60	60	60	60
		$V_f(\text{mm/min})$	50	50	50	50	60	60	60	60
		$f_z(\text{mm/t})$	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		$a_p(\text{mm})$	0.5	0.4	0.3	0.2	0.5	0.4	0.3	0.2
		$a_e(\text{mm})$	28	24	24	20	35	30	30	25
		Q Volume cm^3/min	0.7	0.5	0.4	0.2	1.1	0.7	0.5	0.3

[Note] ① This table shows the general conditions for shoulder milling. The conditions should be adjusted according to the machine rigidity, tooling, condition of object to be milled, etc. In particular, when performing shoulder milling in combination with slotting or machining of cutting widths close to slots, etc., chattering vibrations may occur, which can lead to trouble. Therefore, please consider the following when adjusting the conditions:

-Use inserts equipped with breakers.

-Reduce rotation speed and table feed rate by 50 to 70%.

-Reduce cutting depth a_p by 50 to 70%.

② Please note that the JS Coating does not cause a reaction in conductive touch sensors.

③ JP4105 is a special high-hardness steel, and is not suitable for Non-heat-treated steel material.

④ For strongly interrupted cutting, when unsupported length is long, or for wet cutting, JM4160 is recommended.

⑤ As a measure to prevent tool damage due to chip jamming, always use an air blower, etc. to remove chips.

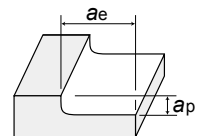
⑥ Since there is a danger of the removed chips flying out and causing injury to workers, fire, or damage to eyes, during use be sure to cover the work area with a safety cover and have workers wear protective equipment such as glasses, etc. to make the work area safe.

⑦ Perform insert replacement at an early stage to prevent chipping due to excessive use.

⑧ The following equation expresses the chip removal amount per unit time:

$$Q(\text{cm}^3/\text{min}) = a_p(\text{mm}) \times a_e(\text{mm}) \times v_f(\text{mm/min})/1000$$

φ63(4 Flutes)				φ80(5 Flutes)			φ100(6 Flutes)			φ125(6 Flutes)			Work material
<2DCX	2DCX-3DCX	3DCX-4DCX	>5DCX	<1DCX	1DCX-2DCX	2DCX-3DCX	<1DCX	1DCX-2DCX	2DCX-3DCX	<1DCX	1DCX-2DCX	2DCX-3DCX	
910	760	660	460	720	520	360	580	420	290	460	340	230	Carbon-steels Alloy-steels <30HRC
180	150	130	90	180	130	90	180	130	90	180	130	90	
2,550	1,830	1,320	920	2,520	1,300	900	2,440	1,260	870	1,940	1,020	690	
0.7	0.6	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	
5	4	3	2	5	4	3	5	4	3	5	4	3	
45	38	38	32	55	50	40	70	60	50	90	75	65	
574	278	150	59	693	260	108	854	302	131	873	306	135	
910	760	660	460	720	520	360	580	420	290	460	340	230	
180	150	130	90	180	130	90	180	130	90	180	130	90	
2,550	1,830	1,320	920	2,520	1,300	900	2,440	1,260	870	1,940	1,020	690	
0.7	0.6	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	
5	4	3	2	5	4	3	5	4	3	5	4	3	
45	38	38	32	55	50	40	70	60	50	90	75	65	
574	278	150	59	693	260	108	854	302	131	873	306	135	
760	660	560	460	600	440	360	480	360	290	390	290	230	
150	130	110	90	150	110	90	150	110	90	150	110	90	
1,220	1,060	900	740	1,200	880	720	1,160	870	700	940	700	560	
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
3	2.5	2	1.5	3	2	2	3	2	2	3	2	2	
45	38	38	32	55	50	40	70	60	50	90	75	65	
165	101	68	36	198	8	58	244	104	70	254	105	73	
610	510	460	400	480	400	360	380	320	290	310	260	230	
120	100	90	80	120	100	90	120	100	90	120	100	90	
1,710	1,220	920	800	1,680	1,000	900	1,600	960	870	1,300	780	690	
0.7	0.6	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	
5	4	3	2	5	4	3	5	4	3	5	4	3	
45	38	38	32	55	50	40	70	60	50	90	75	65	
385	185	105	51	462	200	108	560	230	131	585	234	135	
910	760	660	460	720	520	360	580	420	290	460	340	230	
180	150	130	90	180	130	90	180	130	90	180	130	90	
2,550	1,830	1,320	920	2,520	1,300	900	2,440	1,260	870	1,940	1,020	690	
0.7	0.6	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	
5	4	3	2	5	4	3	5	4	3	5	4	3	
45	38	38	32	55	50	40	70	60	50	90	75	65	
574	278	150	59	693	260	108	854	302	131	873	306	135	
640	540	460	410	500	360	320	400	290	260	320	230	210	
125	106	90	80	125	90	80	125	90	80	125	90	80	
520	440	370	330	500	360	320	480	350	320	390	280	260	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
2	1.5	1	0.5	2	1.5	1	2	1.5	1	2	1.5	1	
45	38	38	32	55	50	40	70	60	50	90	75	65	
47	25	14	5	55	27	13	67	32	16	70	32	17	
310	310	310	310	240	240	240	200	200	200	160	160	160	
60	60	60	60	60	60	60	60	60	60	60	60	60	
70	70	70	70	60	60	60	60	60	60	50	50	50	
0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
0.5	0.4	0.3	0.2	0.5	0.3	0.2	0.5	0.3	0.2	0.5	0.3	0.2	
45	38	38	32	55	50	40	70	60	50	90	75	65	
1.6	1.1	0.8	0.4	1.7	0.9	0.4	2.1	1.1	0.6	2.2	1.1	0.7	





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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