

AFE45 *type*

Face Mill AFE45



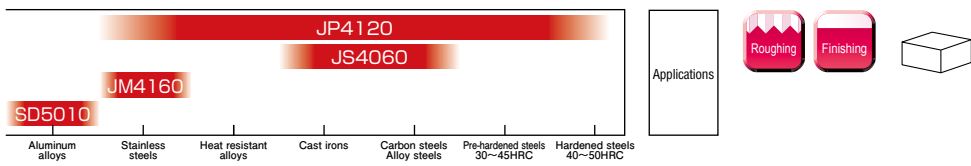
MOLDINO Tool Engineering, Ltd.

New Product News | No.1215E-9 | 2022-11

With a low cutting force edge geometry, cast irons, aluminum alloys, steels and difficult-to-cut materials can be machined.



- Approach angle is 45°**
- Excellent chip discharge**
- Uses carbide sheet**

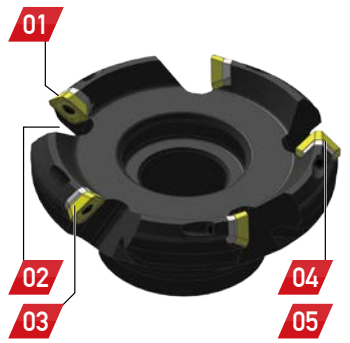


Features 01 Axial runout is good.

- AFE45 suppresses aggravation of the axial runout by the dispersion in the tightening torque. Easy to use.

Features 02 Excellent chip discharge

- Screw clamp system ensures sufficient pocket size, so chips are smoothly discharged.



Features 03 Low cutting force geometry

- Adopting a low cutting force edge geometry enables to machine various work materials.

Features 04 Multi-flute type is standardized.

- Multi-flute type focused on machining efficiency was standardized.

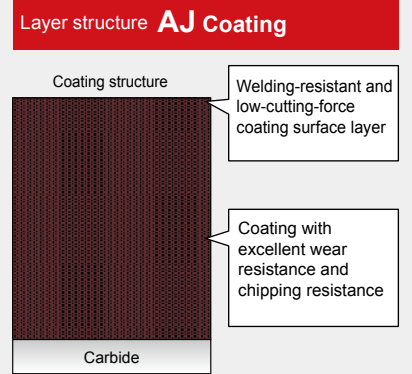
- Adopt layer-thickening technology for PVD Coating layers enables double the tool life of conventional products. 4 types are available for diverse cutting materials: JS4060 with greatly improved wear resistance, JP4120 with excellent heat resistance, JM4160 that has superior adherence and SD5010 with DLC Coating.

Features of AJ Coating series

- Adopt 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!
- Adopt 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!



PVD Technology

Grade for machining pre-hardened or hardened materials **JP4120**

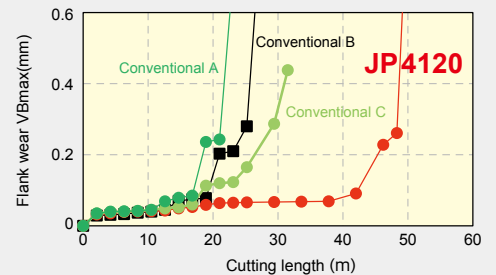
Features

- Adopt 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 steel with hardnesses of 30 to 50 HRC.
- Exhibits excellent wear resistance even on difficult-to-cut diecast tool steel or precipitation-hardened stainless steel, or for finishing.

Cutting performance



Work material : SKD61 (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**

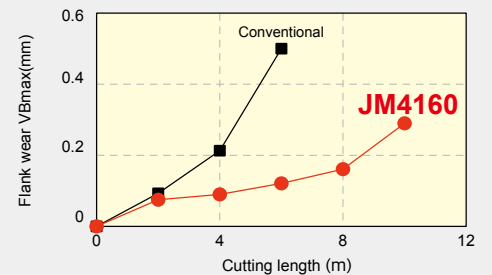
Features

- Adopt a carbide substrate with high toughness and the new "AJ Coating" to improve wear resistance and chipping resistance when machining stainless-steel materials.
- Adopt 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

Line up

AFE45-4 $\odot\odot\odot$ R- $\odot\odot$

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

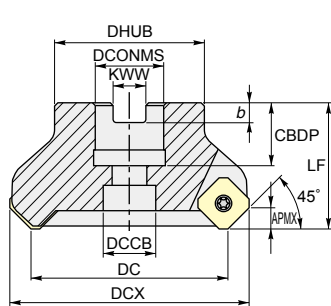


Fig.1

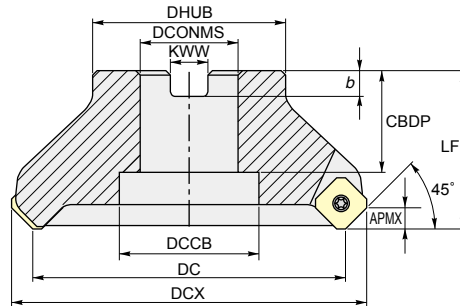


Fig.2

Item code	Stock	No. of flutes	Size (mm)										Weight (kg)	Shape	Inserts	
			DC	LF	DCX	DCONMS	DCCB	CBDP	APMX	KWW	b	DHUB				
Standard type	AFE45-4050R-3	●	3	50	40	63.4	22	17	20	6	10.4	6.3	48	0.5	Fig.1	SEET13T3AGTN SEET13T3AG \square N-S
	AFE45-4063R-4	●	4	63	40	76.6	22	17	20		10.4	6.3	48	0.6		
	AFE45-4080R-4	●	4	80	50	93.5	25.4	35	26		9.5	6	52	1.04	Fig.2	
	AFE45-4100R-5	●	5	100	50	113.5	31.75	45	32		12.7	8	62	1.58		
	AFE45-4125R-6	●	6	125	63	138.5	38.1	70	38		15.9	10	82	3.18		
	AFE45-4160R-8	●	8	160	63	173.4	50.8	80	40		19.1	11	101	5.17		
Closed-pitch type	AFE45-4050R-4	●	4	50	40	63.4	22	17	20	6	10.4	6.3	48	0.45	Fig.1	
	AFE45-4063R-5	●	5	63	40	76.6	22	17	20		10.4	6.3	48	0.56		
	AFE45-4080R-6	●	6	80	50	93.5	25.4	35	26		9.5	6	52	0.94	Fig.2	
	AFE45-4100R-7	●	7	100	50	113.5	31.75	45	32		12.7	8	62	1.48		
	AFE45-4125R-8	●	8	125	63	138.5	38.1	70	38		15.9	10	82	3.05		
	AFE45-4160R-10	●	10	160	63	173.4	50.8	80	40		19.1	11	101	5.08		

[Note] Arbor screw is not included.

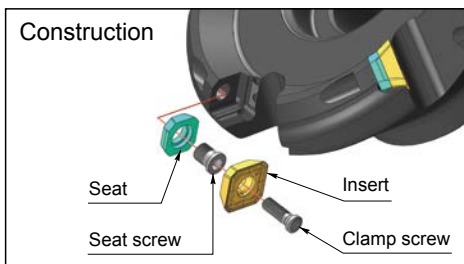
Parts

Parts	Seat	Seat screw	Clamp screw	Screw driver	Wrench for seat	
Shape						
Cutter body			Torx Plus 15IP	Torx Plus 15IP	H3.5	
AFE45-4 $\odot\odot\odot$ R- $\odot\odot$	212-271	212-280	242-143	2.9	106-15IP	100-230

[Note] The seat must be installed so that the surface indicated by * is facing the outside of the cutter.

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.

Torx Plus® is a trademark of Acument Intellectual Properties LLC in the United States.



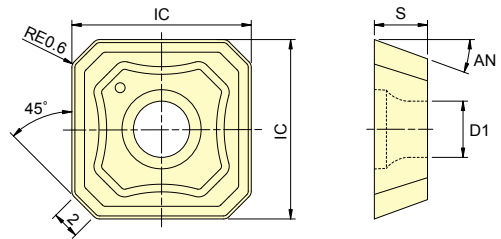
Inserts



Fig.3
General purpose



Fig.4
Low cutting force type S



Item code	Tolerance class	AJ-Coating		JS-Coating	SD-Coating	Size (mm)				Shape
		JP4120	JM4160	JS4060	SD5010	IC	S	D1	AN	
P Carbon steels		■			■					
M SUS, etc.		□	■							
K FC · FCD Cast irons		■			■					
N Aluminum alloys										■
S Titanium alloys		■								
H Hardened steels		■※								
SEMT13T3AGTN	M	●	●	●		φ13.4	3.97	φ4.2	20° (Wiper 29°)	Fig.3
SEET13T3AGTN	E	●		●						Fig.4
SEET13T3AGEN-S	E	●	●							
SEET13T3AGFN-S	E				●					


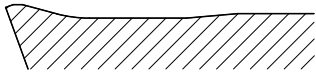




■ : General cutting, First recommended

□ : General cutting, Second recommended

※SEET13T3AGEN-S is not recommended to H:Hardened steels.

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

Insert Variation

	Appearance	Insert cross section	Application
General purpose	 SEMT13T3AGTN SEET13T3AGTN		For a wide variety of cutting materials, including mild steels, carbon steels, steel alloys, cast steels, hardened steels, etc.
Low cutting force type S	 SEET13T3AGEN-S		Difficult-to-cut materials such as stainless steels., heat-resistant alloys, titanium alloys, etc.; low-rigidity work
	 SEET13T3AGFN-S	 Sharp edge type	Aluminum alloys Copper alloys Synthetic resin

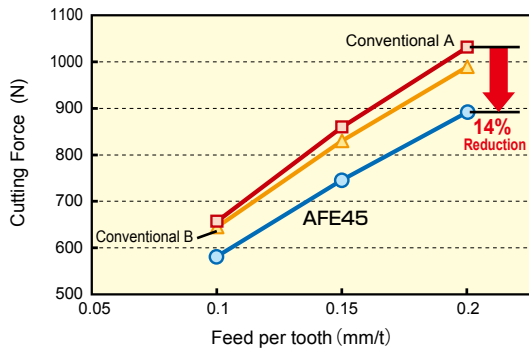
Recommended Cutting Conditions

※Red indicates primary recommended grade.

Work material	Hardness	Recommended grade	Vc Cutting speed (m/min)	fz Feed per tooth (mm/t)	Recommended insert
Mild steels SS400,S10C, etc	≦180HB	※ JS4060	250 (220~300)	0.2 (0.1~0.3)	SEMT13T3AGTN SEET13T3AGTN
Carbon & Alloy steels S50C,SCM440, etc	< 30HRC	JS4060	200 (190~260)	0.2 (0.1~0.3)	SEMT13T3AGTN SEET13T3AGTN
	30~40HRC	JS4060 JP4120	180 (140~220)	0.2 (0.1~0.3)	SEMT13T3AGTN SEET13T3AGTN
Stainless steels SUS304, etc		JM4160 JP4120	220 (120~250)	0.2 (0.1~0.3)	SEET13T3AGEN-S
Cast irons & Ductile cast irons FC250,FCD400, etc		JS4060 JP4120	180 (140~220)	0.2 (0.1~0.3)	SEMT13T3AGTN SEET13T3AGTN
Aluminum alloys A5052,A7075, etc		SD5010	500 (300~1000)	0.2 (0.1~0.3)	SEET13T3AGFN-S
Heat resistant alloys Ni based alloys, etc.		JP4120	40 (20~50)	0.15 (0.1~0.2)	SEET13T3AGEN-S
Pre-hardened steels	30~45HRC	JP4120	100 (80~120)	0.15 (0.1~0.2)	SEMT13T3AGTN SEET13T3AGTN
Hardened steels	40~50HRC				

- [Note]** ① Use the appropriate coolant for the work material and machining shape.
 ② These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
 ③ Please note that the JS Coating does not cause a reaction in conductive touch sensors.
 ④ In order to avoid of insert breakage, please change insert earlier.
 ⑤ The steel chips may cause cuts, burns or damages to eyes. Be sure to install the safty cover around the tool and wear the safety glasses when carring out any works.
 ⑥ Please don't use cutting oil as coolant.(It may be cause of fire.)

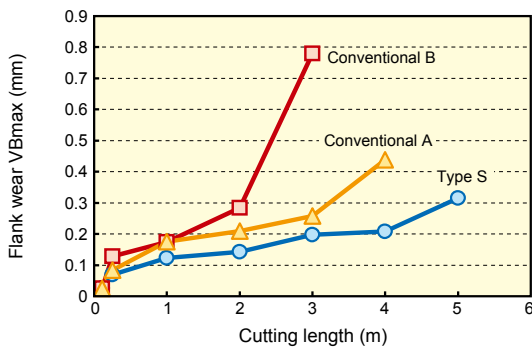
01 Cutting force



Work material : S50C (220HB) Tool diameter : ϕ 63mm
Cutting conditions : $V_c=200\text{m/min}$ $a_p \times a_e = 1 \times 50\text{mm}$

- Low-cutting-force shape reduces cutting force by 14% compared to conventional A.

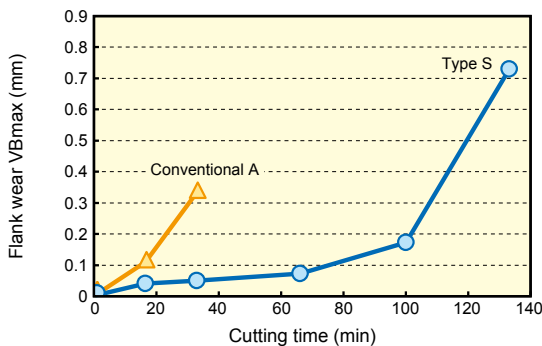
02 Life curve diagram of cutting SUS630



Tool : AFE45-4125R-6 Work material : SUS630
Insert : SEET13T3AGEN-S
Machine used : BT50 M/C
Cutting conditions : $V_c=80\text{m/min}$ $f_z=0.15\text{mm/t}$
 $a_p \times a_e = 2 \times 80\text{mm}$
Coolant : Emulsion oil

- S-shaped breaker provides 1.7 to 2.5 times the tool life of conventional.

03 Life curve diagram of cutting Titanium alloy



Tool : AFE45-4125R-6 (ϕ 125) Work material : Ti-6Al-4V
Insert : SEET13T3AGEN-S Machine used : BT50 M/C
Cutting conditions : $V_c=60\text{m/min}$ $f_z=0.1\text{mm/t}$
 $a_p \times a_e = 2 \times 80\text{mm}$
Coolant : Emulsion oil

- Sharp edged S breaker provides about 3 times the tool life of conventional.

04 Example of machining aluminum alloy with small M/C



Tool : AFE45-4063R-5 Work material : A5052
Insert : SEET13T3AGFN-S SD5010
Machine used : BT30 M/C
Cutting conditions : $V_c=1000\text{m/min}$ $f_z=0.1\text{mm/t}$
 $a_p \times a_e = 3 \times 40\text{mm}$
Metal removal rate : $303\text{ cm}^3/\text{min}$
Air-blow

- Sharp edged S breaker (SD5010) suppresses welding, it enable cutting by air blow.



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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