

3 Flutes NON-COAT for Aluminum Milling



Size $\phi 1 \sim \phi 12$

AZS



Material Applications (★ Highly Recommended ● Recommended ○ Suggested)

Work Material																	
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels					Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
			~50HRC	~55HRC	~60HRC	~65HRC	~70HRC										
								★		○	○						

Features

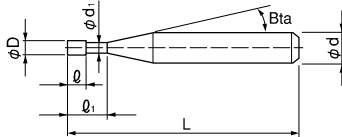
Capable of vertical milling into a flat surface.

Achieves shorter processing time by removing pre-drilling or ramping cycle.

45° helix angle offers excellent chip evacuation.

The flute shape is specifically designed for reducing burrs on Aluminum Alloys.

The micro flatland design greatly helps control of chipping.

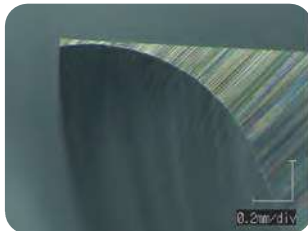


The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.

Diameter Tolerance

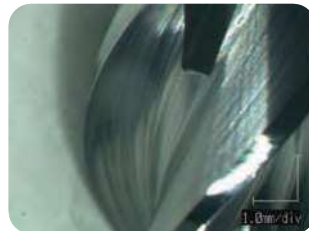
Outside Diameter (ϕD)	Tolerance
$\phi 1 \sim \phi 6, \phi 7, \phi 9, \phi 11$	0 -0.015
$\phi 8, \phi 10, \phi 12$	0 -0.005

Micro Flatland Design



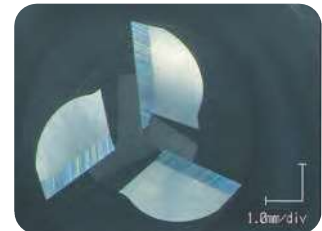
Excellent sharpness + Chipping protection design

Smooth Flute Design



Outstanding chip evacuation by seamless flute.

3 Flute Design



Highly efficient 3 flutes. Significant productivity improvement.

- φ3mm Shark V Series
- UDC-PCD Series
- CBN Series
- Square
- Long Neck Square
- Radius
- Long Neck Radius
- Taper Neck Radius
- Ball / Long Shank Ball
- Long Neck Ball
- Taper Neck Ball
- Taper
- Barrel
- Spiral V Cutter
- Drill
- Technical Data

Total 28 models

Unit (mm)

Model Number	Outside Diameter ϕD	Effective Length ℓ_1	Length of Cut ℓ	Neck Diameter ϕd_1	Shank Taper Angle β	Overall Length L	Shank Diameter ϕd	Suggested Retail Price ¥
AZS 3010-030	1	3	2	0.95	16°	60	4	5,880
AZS 3010-050		5				60		6,400
AZS 3015-045	1.5	4.5	3	1.43	16°	60	4	5,880
AZS 3020-060	2	6	4	1.93	16°	60	4	5,880
AZS 3020-100		10				60		6,400
AZS 3025-075	2.5	7.5	5	2.4	16°	60	4	7,080
AZS 3030-090	3	9	6	2.9	16°	70	6	7,080
AZS 3030-150		15				70		7,700
AZS 3035-105	3.5	10.5	7	3.4	16°	70	6	7,320
AZS 3040-120	4	12	8	3.9	16°	70	6	7,320
AZS 3040-200		20				70		8,000
AZS 3045-135	4.5	13.5	9	4.4	16°	70	6	7,920
AZS 3050-150	5	15	10	4.9	16°	70	6	7,920
AZS 3050-250		25				70		8,700
AZS 3060-180	6	18	12	5.8	—	70	6	8,280
AZS 3060-300		30				70		9,100
AZS 3070-210	7	21	14	6.82	16°	80	8	11,040
AZS 3070-350		35				80		12,100
AZS 3080-240	8	24	16	7.82	—	80	8	11,040
AZS 3080-400		40				80		12,100
AZS 3090-270	9	27	18	8.82	16°	90	10	13,920
AZS 3090-450		45				90		15,300
AZS 3100-300	10	30	20	9.82	—	90	10	13,920
AZS 3100-500		50				90		15,300
AZS 3110-330	11	33	22	10.82	16°	110	12	19,560
AZS 3110-550		55				110		21,500
AZS 3120-360	12	36	24	11.82	—	110	12	19,560
AZS 3120-600		60				110		21,500

3 Flutes

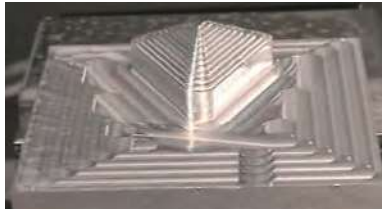
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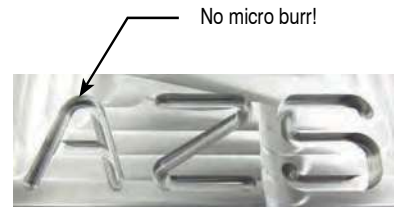
Roughing Example

A5052

Model Number	Milling Process	Spindle Speed	Z Feed Rate	XY Feed Rate	a_p	a_e	Cycle Time
AZS 3100-300 ($\phi 10 \times EL 30$)	Drilling ①	6,480 min ⁻¹	180 mm/min	—	10 mm	—	6 min 35 sec
	Roughing		—	1,500 mm/min	10 mm	5 mm	
	Drilling ②		180 mm/min	—	20 mm	—	
	Roughing		—	1,500 mm/min	20 mm	5 mm	
AZS 3030-090 ($\phi 3 \times EL 9$)	Drilling + Slotting	14,000 min ⁻¹	145 mm/min	1,450 mm/min	3 mm	—	30 sec



Coolant : Water Soluble



Pocket Milling Example

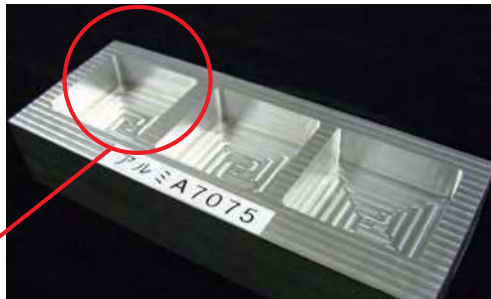
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Tool	AZS 3060-180 ($\phi 6 \times EL 18$)	
Milling Process	Roughing	Finishing
Spindle Speed	17,600 min ⁻¹	17,600 min ⁻¹
Feed Rate	3,000 mm/min	2,000 mm/min
a_p	6 mm	6 mm
a_e	4.8 mm	0.3 mm

AZS series
A7075
Milling Video



Bottom



Milling from roughing to finishing
with 1 pc.

Pocket size : 50 x 50 x 18 mm
Coolant : Oil Mist

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Slotting Comparison of burrs under different conditions

A5052

3 Flutes



- Coolant Water soluble
- Overhang 20 mm



Tool used
AZS $\phi 5 \times L10 \times EL15$

◆ Feed per tooth fixed at 0.05 mm/t. Comparison of burrs at different spindle speeds and feed rates.

	Spindle speed (min ⁻¹)	Feed rate (mm/min)	Velocity (m/min)	a_p (mm)	Feed per tooth (mm/t)	Milling condition details	Slot wall Down cut side
Condition 1	13,000	2,000	200	3.75 (0.75D)	0.05	Spindle speed and feed rate = Catalogue milling conditions	Best result
Condition 2	11,700	1,750	180			Spindle speed and feed rate = 10% lower than catalogue milling conditions	
Condition 3	10,000	1,500	160			Spindle speed and feed rate = 25% lower than catalogue milling conditions	Some burrs
Condition 4	7,700	1,150	120			Spindle speed and feed rate = 40% lower than catalogue milling conditions	
Condition 5	3,200	480	50			Spindle speed and feed rate = 75% lower than catalogue milling conditions	Most burrs

No burrs under condition 1, catalogue milling conditions.

As the spindle speed was lowered, burrs began to appear, and the most burrs occurred at the velocity of 50 m/min in condition 5.

At the same feed per tooth, burrs were more likely to occur if the velocity was reduced too much.

◆ Spindle speed fixed at 10,000min⁻¹. Comparison of burrs at different feed rates.

	Spindle speed (min ⁻¹)	Feed rate (mm/min)	Velocity (m/min)	a_p (mm)	Feed per tooth (mm/t)	Milling condition details	Slot wall Down cut side
Condition 6	10,000	2,000	160	3.75 (0.75D)	0.07	Spindle speed 10,000min ⁻¹ Feed per tooth +30%	
Condition 7		2,400			0.08	Spindle speed 10,000min ⁻¹ Feed per tooth +60%	

At a fixed spindle speed of 10,000 min⁻¹, burrs slightly increased compared to condition 3 when the feed rate was raised, but there was no significant difference.

