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YG1YHPC190116001

FOR ALUMINUM, ALUMINUM DIE CAST, NON-FERROUS ALLOYS AND PLASTICS

**YG**

**ALU-POWER HPC**

3-FLUTE, HIGH-PERFORMANCE,  
SOLID CARBIDE END MILLS

**Keep Your Edge:  
SPEED, STRENGTH &  
SHARPNESS.**

- 3 Flute
- Square End & Corner Radius
- Standard and Extended Length
- Coated and Uncoated



## ALU-POWER HPC

**Built to Handle High-Speed Cutting Without Buildup.**

- ▶ Excels in Ultra High-Speed, High HP Applications Up to 35,000 RPM
- ▶ Rigid Design for Excellent Ramping
- ▶ Reduced Vibration in Heavy Cutting



While other 3-flute End mills can muster up the speed for rough cutting aluminum, few can make it through without melting down the aluminum that surrounds the work itself. That's where the ALU-POWER HPC has a distinct advantage – speed, strength and sharpness.

### Why ALU-POWER HPC Keeps Its Edge Under Tough Conditions

ALU-POWER HPC's highly polished 3-flute design provides more balanced cutting performance – without excessive heat buildup. In fact, while other End mills can gum up at surface speeds of 3,000 or less, ALU-POWER HPC keeps its cool by dissipating heat and providing outstanding chip evacuation. Add that to its ultra-micrograin carbide design and the result is:

- ▶ Balanced cutting with less vibration
- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation
- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life

## ALU-POWER HPC 3-FLUTE END MILLS

### The Anatomy of Efficiency

#### Specialized Design of Corner Gash

- ▶ Unique flute design and superior corner protection adds both tool life and protection against catastrophic failure in high feed applications
- ▶ Polished flutes for excellent chip flow



#### Cylindrical Land

- ▶ Increased performance in a variety of cutting conditions
- ▶ Also helps reduce vibration and chatter



#### Available in a Wide Variety of Sizes and Corner Radii

#### Ideal Symmetrical Shape

- ▶ 3-flute design "to the center" (all 3 flutes come to center)
- ▶ Designed with high spindle speeds in mind
- ▶ Highly effective in vertical ramping up to 20 degrees and step-over plunging applications



#### Engineered Flute Design

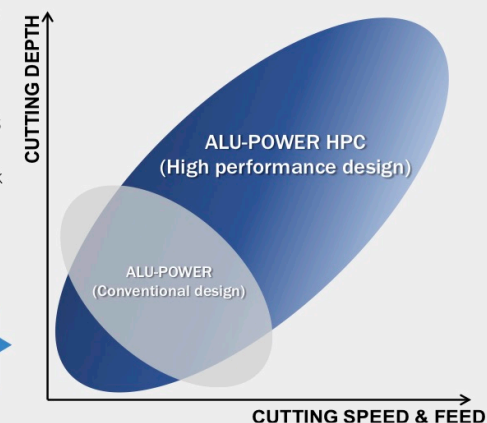
- ▶ Effective chip evacuation at high feed rates with lower cutting forces than competitive products

#### DLC Diamond-Like Carbon

- ▶ Excels in hard aluminum and high speeds
- ▶ Provides edge strength and unsurpassed tool life

What do you get when you add 3 flutes to the center, polished ultra-micrograin carbide, extra-large chip gullets and a razor-sharp cylindrical land design? In technical terms, it's called the ALU-POWER HPC. In a machinist's terms, it's called an extremely sharp, highly durable milling monster that won't back down, cut after cut after cut.

Compared to conventional aluminum-specific End mills, the ALU-POWER HPC provides more versatile performance. Its high-performance design allows you to cut deeper and run at both faster and slower cutting speeds and feeds.





## From Side Cuts to Rough Cuts to Aggressive Ramping, No One Withstands Extreme Radial Forces Better-or Longer.



**▲ Rough Cutting**  
Ultra-micrograin carbide supplies the rigidity to keep the chips flying. Highly polished 3-flute design ensures they'll keep flying – cut after cut.



**▲ Ramping**  
In steep, aggressive ramping conditions, the ALU-POWER HPC holds its own to resist the torsional stress from extreme helical output.



**▲ Side cutting**  
No one offers a cooler-running super high-speed end mill. While others melt down the materials they're cutting, ALU-POWER HPC keeps cutting cool in aluminum and softer alloys, to boot.

## The Benefits of Balanced Cutting

When you lock an ALU-POWER HPC into your milling machine, you've unleashed the fastest-running, lowest-heat-producing end mill in the business. And that means you've got the speed and sharpness to take on not only the tough materials but even more fragile mixed alloy castings with ease. Discover the ALU-POWER HPC and start pushing your productivity higher.

### Another Advantage of YG-1's Perfect Geometry and Superior Coating

Whether you're running parts in today's most advanced 5-axis machining centers on the market today, or in machines built decades ago, ALU-POWER HPC makes the most of your manufacturing assets. That's because its unique 3-flute, 37-degree helix design can operate at lower speeds with higher efficiency.



## CASE STUDY

**■ The Goal:** Reduce cycle time by at least 25%.

### ■ The Test:

Three YG-1 3-flute ALU-POWER HPC End mills are pitted against two strong competitors using similar configurations for milling aluminum alloy.

Cutting Conditions		
Material	7075 T-6 (Ribs)	
Machine	5-axis horizontal machining center	
Coolant	High pressure	
Tool Holder	Shrink fit Haimer	
Speed (mm)	RPM	Vc (SMM)
25mm tool	33,000	2,594
20mm tool	30,000	1,886
16mm tool	26,000	1,308
Speed (in.)	RPM	SFM
.9843 in. tool	33,000	8,510
.7874 in. tool	30,000	6,189
.6299 in. tool	26,000	4,291
Feed (mm)	m/min	mm/rev
25mm tool	20	.6071
20mm tool	24.5	.8179
16mm tool	11.4	.4420
Feed (in.)	in./min	in./rev
.9843 in. tool	787.4	.0239
.7874 in. tool	964.565	.0322
.6299 in. tool	452.755	.0174
Step (mm)	0.5 – 18	
Step (in.)	.01968 – .7087	
Axial (mm)	13	
Axial (in.)	.5118	
Competitor	U.S. Manufacturer and UK Manufacturer	
YG-1 Tools	3 ALU-POWER HPC Tools	
Fixture	Screws & Vacuum	

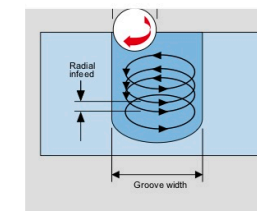
### ■ The Results:

**Saved up to \$2 million by improving the process by 27%.**

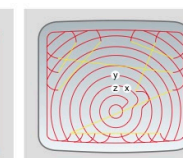
The combination of advanced geometry and the superior coating of the YG-1 3-Flute ALU-POWER HPC End mills beat both competitors in:

- ▶ Trochoidal machining
- ▶ Peel milling
- ▶ Cutter path performance

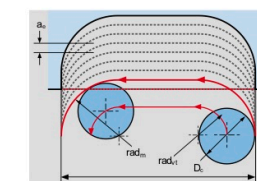
These process improvements resulted in a savings of seven minutes per part. The process was rolled out to all machines in the company.



**▲ In trochoidal milling applications,** the cutter follows a spiral path by moving radially as it rotates providing faster machining times, lower tooling costs and reduced loads on machine components.







**▲ Outstanding chip evacuation** through deep gullet design coupled with high speed milling leaves a **well-defined clean cutter path.**



**▶ Peel milling applications** benefit from ALU-POWER HPC's super sharp high-speed milling ability.



## SELECTION GUIDE

EDP No.		MODEL	DESCRIPTION	SIZE		PAGE
Uncoated	DLC			MIN	MAX	
<b>E5H24</b>	<b>JAH24</b>		3 FLUTE CORNER RADIUS	6	20	<b>10</b>
<b>E5H25</b>	<b>JAH25</b>		3 FLUTE CORNER RADIUS with EXTENDED NECK	6	20	<b>11</b>
<b>E5H22</b>	<b>JAH22</b>		3 FLUTE	3	25	<b>10</b>
<b>E5H23</b>	<b>JAH23</b>		3 FLUTE with EXTENDED NECK	6	20	<b>11</b>
RECOMMENDED CUTTING CONDITIONS						<b>14</b>

◎ : Excellent ○ : Good

N			
Aluminum	Aluminum Die Cast	Non-Ferrous Alloys	Plastics
◎	◎	○	○
◎	◎	○	○
◎	◎	○	○
◎	◎	○	○

### Guide to icons

 The tool is made of  
micrograin carbide

**MG**

Helix Angle



Tool Ends:



Square Radius

No. of Flutes

**3**

Type of Shank

**PLAIN**

Plain Shank

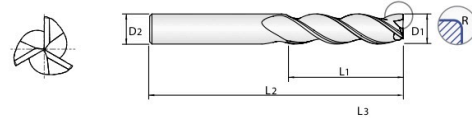
Cutting Conditions



## HIGH-PERFORMANCE SOLID CARBIDE END MILLS 3-FLUTE CORNER RADIUS

DLC COATED **E5H24 Series**  
UNCOATED **JAH24 Series**  
**PLAIN SHANK**

- Balanced cutting with less vibration
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P. 14 - 15

Unit : mm						
EDP No.		Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
Uncoated	DLC	R	D1	D2	L1	L2
E5H24060	JAH24060	0.5	6	6	13	57
E5H24901	JAH24901	1	6	6	13	57
E5H24902	JAH24902	1.5	6	6	13	57
E5H24903	JAH24903	0.8	6	6	13	72
E5H24904	JAH24904	1.2	6	6	13	72
E5H24905	JAH24905	0.5	6	6	24	75
E5H24906	JAH24906	1	6	6	24	75
E5H24080	JAH24080	0.3	8	8	19	63
E5H24907	JAH24907	0.5	8	8	19	63
E5H24908	JAH24908	1	8	8	19	63
E5H24909	JAH24909	1.5	8	8	19	63
E5H24910	JAH24910	0.5	8	8	32	75
E5H24911	JAH24911	1	8	8	32	75
E5H24912	JAH24912	1.5	8	8	32	75
E5H24913	JAH24913	2	8	8	32	75
E5H24100	JAH24100	0.3	10	10	22	72
E5H24914	JAH24914	0.5	10	10	22	72
E5H24915	JAH24915	1	10	10	22	72
E5H24916	JAH24916	1.5	10	10	22	72
E5H24917	JAH24917	0.5	10	10	40	100
E5H24918	JAH24918	1	10	10	40	100
E5H24919	JAH24919	1.5	10	10	40	100
E5H24920	JAH24920	2	10	10	40	100
E5H24120	JAH24120	1.5	12	12	26	83
E5H24921	JAH24921	2	12	12	26	83
E5H24922	JAH24922	2.5	12	12	26	83
E5H24923	JAH24923	3	12	12	26	83
E5H24924	JAH24924	0.5	12	12	48	100
E5H24925	JAH24925	1	12	12	48	100
E5H24926	JAH24926	1.5	12	12	48	100
E5H24927	JAH24927	2	12	12	48	100
E5H24928	JAH24928	2.5	12	12	48	100
E5H24929	JAH24929	3	12	12	48	100

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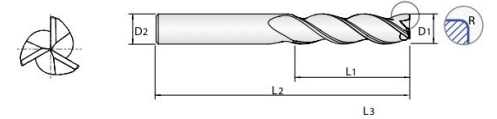
◎ : Excellent ○ : Good

N			
Aluminum	Aluminum Die Cast	Non-Ferrous Alloys	Plastics
◎	◎	○	○

## HIGH-PERFORMANCE SOLID CARBIDE END MILLS 3-FLUTE CORNER RADIUS

DLC COATED **E5H24 Series**  
UNCOATED **JAH24 Series**  
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P. 14 - 15

Unit : mm						
EDP No.		Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Overall Length
Uncoated	DLC	R	D1	D2	L1	L2
E5H24140	JAH24140	1	14	14	30	89
E5H24930	JAH24930	2	14	14	30	89
E5H24931	JAH24931	3	14	14	30	89
E5H24160	JAH24160	1.5	16	16	32	92
E5H24932	JAH24932	2	16	16	32	92
E5H24933	JAH24933	2.5	16	16	32	92
E5H24934	JAH24934	3	16	16	32	92
E5H24935	JAH24935	4	16	16	32	92
E5H24936	JAH24936	0.5	16	16	64	125
E5H24937	JAH24937	1	16	16	64	125
E5H24938	JAH24938	1.5	16	16	64	125
E5H24939	JAH24939	2	16	16	64	125
E5H24940	JAH24940	2.5	16	16	64	125
E5H24941	JAH24941	3	16	16	64	125
E5H24942	JAH24942	4	16	16	64	125
E5H24200	JAH24200	2	20	20	38	104
E5H24943	JAH24943	2.5	20	20	38	104
E5H24944	JAH24944	3	20	20	38	104
E5H24945	JAH24945	4	20	20	38	104
E5H24946	JAH24946	0.5	20	20	80	150
E5H24947	JAH24947	1	20	20	80	150
E5H24948	JAH24948	1.5	20	20	80	150
E5H24949	JAH24949	2	20	20	80	150
E5H24950	JAH24950	2.5	20	20	80	150
E5H24951	JAH24951	3	20	20	80	150
E5H24952	JAH24952	4	20	20	80	150

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/- .00032	
1/4 - 3/8	+0/- .00035	
1/2 - 5/8	+0/- .00043	
3/4 - 1	+0/- .00051	

h6

◎ : Excellent ○ : Good

N			
Aluminum	Aluminum Die Cast	Non-Ferrous Alloys	Plastics
◎	◎	○	○



### HIGH-PERFORMANCE SOLID CARBIDE END MILLS 3 FLUTE CORNER RADIUS with EXTENDED NECK

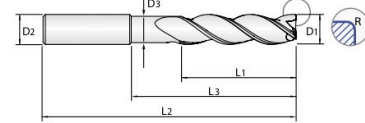
DLC COATED **E5H25 Series**  
UNCOATED **JAH25 Series**  
**PLAIN SHANK**

- Balanced cutting with less vibration
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UNCOATED



DLC COATED



P. 14 - 15

EDP No.		Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Neck Diameter	Overall Length
Uncoated	DLC	R	D1	D2	L1	L3	D3	L2
E5H25060	JAH25060	0.5	6	6	10	20	5.7	63
E5H25901	JAH25901	1	6	6	10	20	5.7	63
E5H25902	JAH25902	0.5	6	6	13	30	5.7	72
E5H25903	JAH25903	1	6	6	13	30	5.7	72
E5H25080	JAH25080	0.3	8	8	12	25	7.4	75
E5H25904	JAH25904	0.5	8	8	12	25	7.4	75
E5H25905	JAH25905	0.8	8	8	12	25	7.4	75
E5H25906	JAH25906	1	8	8	12	25	7.4	75
E5H25907	JAH25907	1.2	8	8	12	25	7.4	75
E5H25908	JAH25908	1.5	8	8	12	25	7.4	75
E5H25909	JAH25909	1.6	8	8	12	25	7.4	75
E5H25100	JAH25100	0.3	10	10	14	35	9.2	100
E5H25910	JAH25910	0.5	10	10	14	35	9.2	100
E5H25911	JAH25911	0.8	10	10	14	35	9.2	100
E5H25912	JAH25912	1	10	10	14	35	9.2	100
E5H25913	JAH25913	1.2	10	10	14	35	9.2	100
E5H25914	JAH25914	1.5	10	10	14	35	9.2	100
E5H25915	JAH25915	1.6	10	10	14	35	9.2	100
E5H25916	JAH25916	2.4	10	10	14	35	9.2	100
E5H25120	JAH25120	0.5	12	12	16	40	11	100
E5H25917	JAH25917	0.8	12	12	16	40	11	100
E5H25918	JAH25918	1	12	12	16	40	11	100
E5H25919	JAH25919	1.2	12	12	16	40	11	100
E5H25920	JAH25920	1.5	12	12	16	40	11	100
E5H25921	JAH25921	1.6	12	12	16	40	11	100
E5H25922	JAH25922	2	12	12	16	40	11	100
E5H25923	JAH25923	2.4	12	12	16	40	11	100
E5H25924	JAH25924	2.5	12	12	16	40	11	100
E5H25925	JAH25925	3	12	12	16	40	11	100
E5H25926	JAH25926	4	12	12	16	40	11	100

► NEXT PAGE

◎ : Excellent ○ : Good

N			
Aluminum	Aluminum Die Cast	Non-Ferrous Alloys	Plastics
◎	◎	○	○

### HIGH-PERFORMANCE SOLID CARBIDE END MILLS 3 FLUTE CORNER RADIUS with EXTENDED NECK

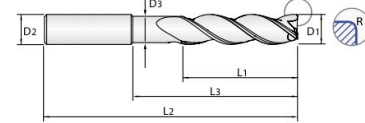
DLC COATED **E5H25 Series**  
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UNCOATED



DLC COATED



P. 14 - 15

EDP No.		Corner Radius	Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Neck Diameter	Overall Length
Uncoated	DLC	R	D1	D2	L1	L3	D3	L2
E5H25140	JAH25140	1	14	14	18	45	13	125
E5H25927	JAH25927	2	14	14	18	45	13	125
E5H25928	JAH25928	3	14	14	18	45	13	125
E5H25929	JAH25929	4	14	14	18	45	13	125
E5H25160	JAH25160	0.8	16	16	20	50	15	125
E5H25930	JAH25930	1.2	16	16	20	50	15	125
E5H25931	JAH25931	1.6	16	16	20	50	15	125
E5H25932	JAH25932	2	16	16	20	50	15	125
E5H25933	JAH25933	2.4	16	16	20	50	15	125
E5H25934	JAH25934	2.5	16	16	20	50	15	125
E5H25935	JAH25935	3	16	16	20	50	15	125
E5H25936	JAH25936	3.2	16	16	20	50	15	125
E5H25937	JAH25937	4	16	16	20	50	15	125
E5H25200	JAH25200	0.8	20	20	25	65	19	150
E5H25938	JAH25938	1.2	20	20	25	65	19	150
E5H25939	JAH25939	1.6	20	20	25	65	19	150
E5H25940	JAH25940	2	20	20	25	65	19	150
E5H25941	JAH25941	2.4	20	20	25	65	19	150
E5H25942	JAH25942	2.5	20	20	25	65	19	150
E5H25943	JAH25943	3	20	20	25	65	19	150
E5H25944	JAH25944	3.2	20	20	25	65	19	150
E5H25945	JAH25945	4	20	20	25	65	19	150

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/-0.0032	h6
1/4 - 3/8	+0/-0.0035	
1/2 - 5/8	+0/-0.0043	
3/4 - 1	+0/-0.0051	

◎ : Excellent ○ : Good

N			
Aluminum	Aluminum Die Cast	Non-Ferrous Alloys	Plastics
◎	◎	○	○

## HIGH-PERFORMANCE SOLID CARBIDE END MILLS

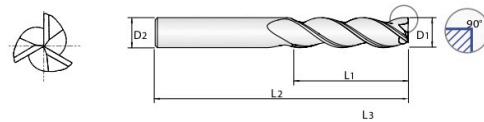
### 3 FLUTE

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- ▶ Ability to run at higher speeds with less heat in aluminum
- ▶ More efficient chip evacuation
- ▶ Ability to counteract extreme radial forces
- ▶ DLC Coating provides edge strength and unsurpassed tool life

UNCOATED



DLC COATED



P. 14 - 15

DLC COATED **E5H22 Series**  
UNCOATED **JAH22 Series**  
**PLAIN SHANK**

Unit : mm

EDP No.		Mill Diameter	Shank Diameter	Length of Cut	Overall Length
Uncoated	DLC	D1	D2	L1	L2
E5H22030	JAH22030	3	6	8	52
E5H22040	JAH22040	4	6	11	55
E5H22050	JAH22050	5	6	13	57
E5H22060	JAH22060	6	6	13	57
E5H22901	JAH22901	6	6	13	72
E5H22902	JAH22902	6	6	24	75
E5H22080	JAH22080	8	8	19	63
E5H22903	JAH22903	8	8	32	75
E5H22100	JAH22100	10	10	22	72
E5H22904	JAH22904	10	10	40	100
E5H22120	JAH22120	12	12	26	83
E5H22905	JAH22905	12	12	48	100
E5H22140	JAH22140	14	14	30	89
E5H22160	JAH22160	16	16	32	92
E5H22906	JAH22906	16	16	64	125
E5H22200	JAH22200	20	20	38	104
E5H22907	JAH22907	20	20	80	150
E5H22250	JAH22250	25	25	50	125

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/- .00032	
1/4 - 3/8	+0/- .00035	
1/2 - 5/8	+0/- .00043	
3/4 - 1	+0/- .00051	

h6

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## HIGH-PERFORMANCE SOLID CARBIDE END MILLS

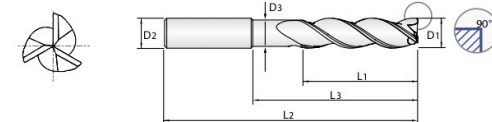
### 3 FLUTE with EXTENDED NECK

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UNCOATED



DLC COATED



P. 14 - 15

DLC COATED **E5H23 Series**  
UNCOATED **JAH23 Series**  
**PLAIN SHANK**

Unit : mm

EDP No.		Mill Diameter	Shank Diameter	Length of Cut	Length Below Shank	Neck Diameter	Overall Length
Uncoated	DLC	D1	D2	L1	L3	D3	L2
E5H23060	JAH23060	6	6	10	20	5.7	75
E5H23080	JAH23080	8	8	12	25	7.4	75
E5H23100	JAH23100	10	10	14	35	9.2	100
E5H23120	JAH23120	12	12	16	40	11	100
E5H23140	JAH23140	14	14	18	45	13	125
E5H23160	JAH23160	16	16	20	50	15	125
E5H23200	JAH23200	20	20	25	65	19	150

Outside Diameter Tolerances (inch)		Shank Diameter Tolerance
Diameter	Tolerance	
1/8 - 3/16	+0/- .00032	
1/4 - 3/8	+0/- .00035	
1/2 - 5/8	+0/- .00043	
3/4 - 1	+0/- .00051	

h6

◎ : Excellent ○ : Good

N			
Aluminum	Aluminum Die Cast	Non-Ferrous Alloys	Plastics
◎	◎	○	○