# IAHU/AHU

MOLDINO
The Edge To Innovation

## Advanced Design End Mills and Face Mills Radically Reduce Cutting Forces

MODULAR STYLE

FACE MILL STYLE

## FEATURES

Unique high rake geometry reduces cutting forces

30% increased rigidity thanks to special steel material and chip pocket geometry

New insert coating grades JS, JP, JM, GX and SD improve efficiency and tool life

All tools feature coolant-thru the tool

## INTRODUCTION

The AHU High Feed Ultra Series Indexable Tools incorporate unique body design, advanced insert geometries and technologically advanced coatings to create an exceptionally tough line-up. AHU tools are available in End Mill styles ranging from 25mm to 40mm (0.984" to 1.575") in diameter and Face Mill styles of 50mm to 100mm (2.0" to 4.0").

Ideal for shoulder milling, the AHU Series can also perform direct ramping and slotting operations. All tools feature coolant-thru the tool, improving both tool life and cutting performance.

## FEATURES

| 1. | New Type Breakers |
|---|---|

Inserts join the ranks of tools for difficult-to-cut materials. Newly appear two kind of breakers

**B7 type breaker**

Strongly-raked low-cutting-force breaker

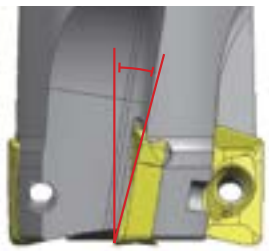
For cutting of stainless steel materials, machining of titanium alloys, and cutting of nickel-based alloys.

**C7 type breaker**

Mildly-raked low-cutting-force breaker

For machining of stainless steel materials and machining of nickel-based alloys.

Achieved low cutting force by larger axial rake angle.



**Conventional Insert**
15 degrees

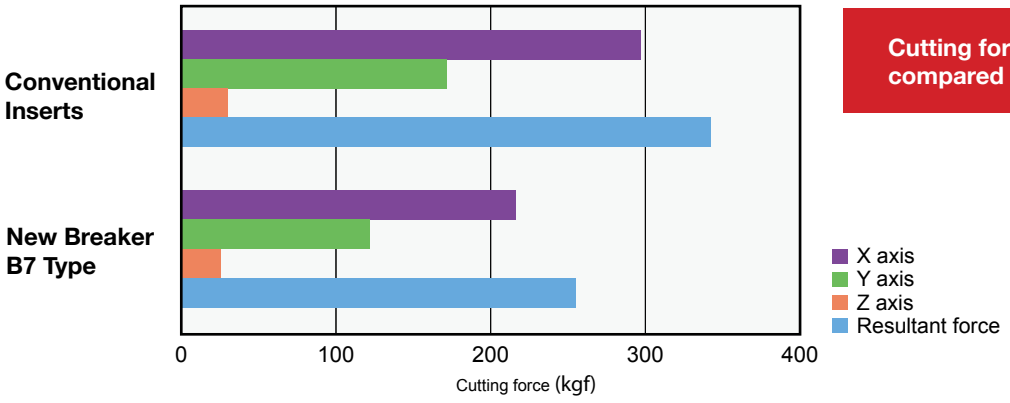
**New breaker B/C type**
18 degrees

The cutting flute length is shortened to suppress chattering vibrations during slotting, etc.

15 Type – Max $a_p$=7mm


When using B7/C7 breakers, there are restrictions on maximum cutting depth ap.
Please use after checking machining conditions beforehand.

| 2. | Comparison of Cutting Force |
|---|---|




**Cutting force is reduced by 25% compared to conventional breakers**

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**Face Mill Style**
**Inch + Metric**

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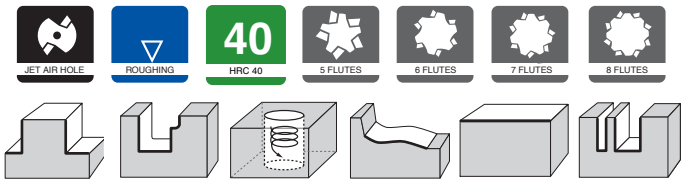


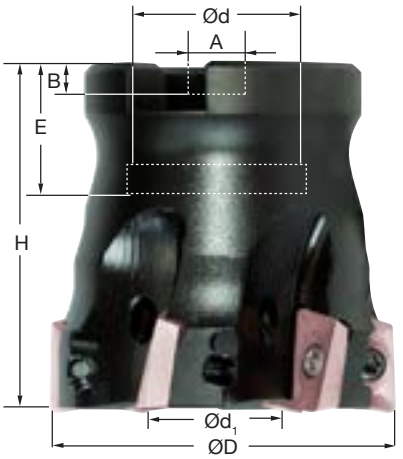


| D | -0.1/-0.2 |
|---|---|

**IAHUB-Inch (Face Mill Style with Coolant Holes)**

| Part No. | Flutes | ØD | Ød | H | Ød1 | E | A | B | Insert |
|---|---|---|---|---|---|---|---|---|---|
| **IAHUB1532R-5** | 5 | 2.0 | 0.750 | 1.969 | 0.65 | 0.748 | 0.315 | 0.197 | JDMT1505 |
| **IAHUB1540R-6** | 6 | 2.5 | 0.750 | 1.969 | 0.65 | 0.748 | 0.315 | 0.197 | JDMT1505 |
| **IAHUB1548R-7** | 7 | 3.0 | 1.000 | 2.480 | 0.83 | 1.378 | 0.354 | 0.236 | JDMT1505 |
| **IAHUB1564R-8** | 8 | 4.0 | 1.500 | 2.756 | 1.26 | 1.378 | 0.626 | 0.394 | JDMT1505 |

**AHUB-Metric (Face Mill Style without Coolant Holes)**

| Part No. | Flutes | ØD | Ød | H | Ød1 | E | A | B | Insert |
|---|---|---|---|---|---|---|---|---|---|
| **AHUB1550RM-5** | 5 | 50 | 22.00 | 50 | 17 | 20 | 10.4 | 6.3 | JDMT1505 |
| **AHUB1563RM-6** | 6 | 63 | 22.00 | 50 | 17 | 20 | 10.4 | 6.3 | JDMT1505 |
| **AHUB1580R-7** | 7 | 80 | 25.40 | 50 | 20 | 26 | 9.5 | 6.0 | JDMT1505 |
| **AHUB15100R-8** | 8 | 100 | 31.75 | 50 | 45 | 32 | 12.7 | 8.0 | JDMT1505 |

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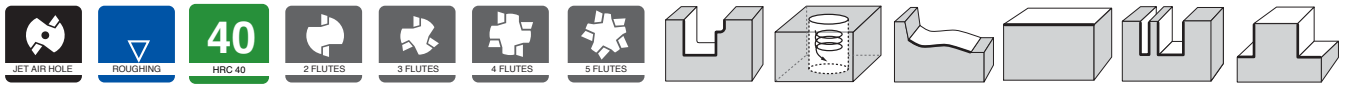
**Shank Style**
**Inch + Metric**





| D | -0.1/-0.2 |
|---|---|

**IAHU-Inch (Shank Style with Coolant Holes)**

| Part No. | Flutes | ØD | L | l | $l_1$ | ls | Ød | Insert |
|---|---|---|---|---|---|---|---|---|
| **IAHU1516R-2** | 2 | 1 | 4 | 0.551 | 1.5 | 2.5 | 1 | JDMT1505 |

**AHU-Metric (Shank Style with Coolant Holes)**

| Part No. | Flutes | ØD | L | l | $l_1$ | ls | Ød | Insert |
|---|---|---|---|---|---|---|---|---|
| **AHU1525R-2** | 2 | 25 | 100 | 14 | 40 | 85 | 25 | JDMT1505 |
| **AHU1532R-3** | 3 | 32 | 140 | 14 | 45 | 85 | 25 | JDMT1505 |
| **AHU1540R-4** | 4 | 40 | 140 | 14 | 45 | 95 | 32 | JDMT1505 |
| **AHUL1525R-2** | 2 | 25 | 180 | 14 | 75 | 105 | 25 | JDMT1505 |
| **AHUL1532R-3** | 3 | 32 | 200 | 14 | 90 | 110 | 32 | JDMT1505 |
| **AHUL1540R-5** | 5 | 40 | 220 | 14 | 45 | 175 | 32 | JDMT1505 |

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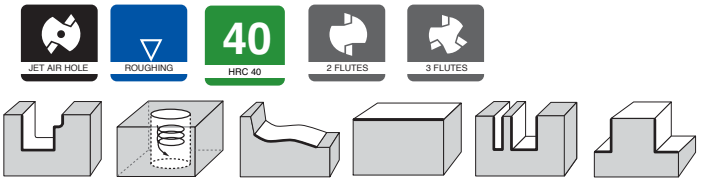
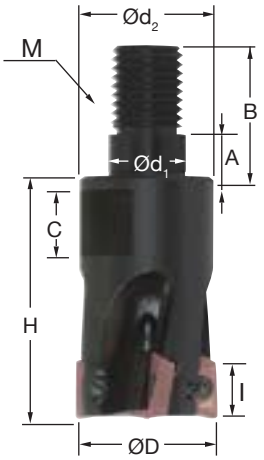
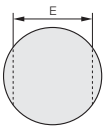
## Modular Style




| D | -0.1/-0.2 |
|---|---|

**AHUM-Metric (Modular Style with Coolant Holes)**

| Part No. | Flutes | ØD | H | I | $Ød_1$ | M | $Ød_2$ | A | B | C | E | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AHUM1525R-2** | 2 | **25** | 35 | 14 | 12.5 | M12 | 21 | 5.5 | 22 | 10.0 | 17 | **JDMT1505** |
| **AHUM1532R-3** | 3 | **32** | 40 | 14 | 17.0 | M16 | 29 | 6.0 | 23 | 12.0 | 22 | **JDMT1505** |

Modular Shanks on p. 163

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| Part No. | Clamp Screw | Wrench | Arbor Screw |
|---|---|---|---|
| |  |  |  |
| **AHU(L)15xxR-x** | 412-141 | 105-T15 | |
| **AHUB1550RM-5** | 412-141 | 105-T15 | 100-175 |
| **AHUB1563RM-6** | 412-141 | 105-T15 | 100-175 |
| **AHUB1580R-7** | 412-141 | 105-T15 | 100-212 |
| **AHUB15100R-8** | 412-141 | 105-T15 | |
| **IAHUB1532R-5** | 412-141 | 104-T15 | 100-178 |
| **IAHUB1540R-6** | 412-141 | 104-T15 | 100-178 |
| **IAHUB1548R-7** | 412-141 | 104-T15 | 100-179 |
| **IAHUB1564R-8** | 412-141 | 104-T15 | AP408004 |

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## Inserts

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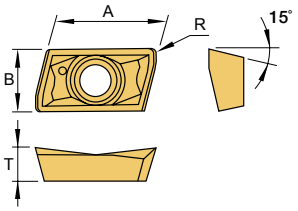
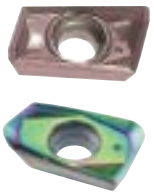
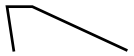
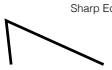
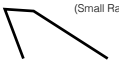


| | Conventional | FA | B7 | C7 |
|---|---|---|---|---|
| Insert Cross-Section Shape |  |  Sharp Edge |  Positive Land (Large Rake) |  Positive Land (Small Rake) |
| Application | General Purpose | Aluminum Use | Stainless Steel (Wet Cutting) Titanium Inconel Use | Stainless Steel (Dry Cutting) Inconel Use |

### Inserts

| Part No. | JS4045 | PTH30E | JP4120 | JM4160 | GX2160 | SD5010 | R | A | B | T | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **JDMT150504R** | | • | | | | | 0.4 | 16.0 | 9.12 | 5.0 | Conventional |
| **JDMT150508R** | • | • | | | | | 0.8 | 16.0 | 9.12 | 5.0 | Conventional |
| **JDMT150520R** | • | • | | | | | 2.0 | 16.0 | 9.12 | 5.0 | Conventional |
| **JDMT150530R** | • | • | | | | | 3.0 | 16.0 | 9.12 | 5.0 | Conventional |
| **JDMT150508R-B7** | | | • | • | | | 0.8 | 16.0 | 9.12 | 5.0 | B7 |
| **JDMT150508R-C7** | | | • | | • | | 0.8 | 16.0 | 9.12 | 5.0 | C7 |
| **JDMT150520R-B7** | | | • | • | | | 2.0 | 16.0 | 9.12 | 5.0 | B7 |
| **JDMT150520R-C7** | | | • | | • | | 2.0 | 16.0 | 9.12 | 5.0 | C7 |
| **JDMT150530R-B7** | | | • | • | | | 3.0 | 16.0 | 9.12 | 5.0 | B7 |
| **JDMT150530R-C7** | | | • | | • | | 3.0 | 16.0 | 9.12 | 5.0 | C7 |
| **JDET150502R-FA** | | | | | | • | 0.2 | 16.0 | 9.12 | 5.0 | FA |
| **JDET150504R-FA** | | | | | | • | 0.4 | 16.0 | 9.12 | 5.0 | FA |
| **JDET150530R-FA** | | | | | | • | 3.0 | 16.0 | 9.12 | 5.0 | FA |

All inserts have two effective cutting edges

**Note:** When using inserts with a radius larger than R 2.0, it is necessary to carry out additional processing of the cutter body corner section.

### COATING MATERIALS FOR INSERTS

| Material name<br>ISO Classification | Coating Name<br>Coating Type | Application | Features |
|---|---|---|---|
| **JS4045**<br>P30-K30 | **JS Coating**<br>PVD | General purpose for steel | Uses rough grain substrate and JS coating<br>Suitable for general steel cutting |
| **JP4120**<br>P10-M10-K10 | **AJ Coating**<br>PVD | For pre-hardened steel (35~50HRC) and alloy steel | Uses fine grain substrate and AJ coating.<br>Suitable for cutting of common steels through pre-hardened steels. |
| **JM4160**<br>M40 | **AJ Coating**<br>PVD | General purpose for stainless steel | Uses high toughness substrate and AJ coating.<br>Suitable for cutting of stainless steels. |
| **GX2160**<br>M40 | **GX Coating**<br>CVD | For dry high speed stainless steel cutting | Uses CVD coating with excellent heat resistance to improve wear resistance and provide long tool life when dry-cutting stainless steel. |
| **SD5010**<br>N10 | **SD Coating**<br>PVD | For aluminum alloys and non ferrous metals | The hydrogen-free DLC coating infinitely close to that of diamonds. Hardness: more than 60GPa |
| **PTH30E**<br>K30 | **TH Coating (TiSiN)**<br>PVD | General purpose for steel | Uses moderate substrate, multi purpose grade |

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## Cutting Conditions
## Inch

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| | ø<br>Flutes | 1" or 25mm<br>2 | | 1.25" or 32mm<br>3 | | 1.5" or 40mm<br>4 | | 2" or 50mm<br>5 | | 2.5" or 63mm<br>6 | | 3" or 80mm<br>7 | | 4" or 100mm<br>8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Work Material** | **Cutting Condition** | **Rotation Speed** | **Feed** | **Rotation Speed** | **Feed** | **Rotation Speed** | **Feed** | **Rotation Speed** | **Feed** | **Rotation Speed** | **Feed** | **Rotation Speed** | **Feed** | **Rotation Speed** | **Feed** |
| Carbon Steel<br>Alloy Steel<br>(<30HRC)<br><br>JS4045 | n(rpm) / vf(in/min) | 1,910 | 30 | 1,490 | 35 | 1,190 | 37 | 950 | 37 | 760 | 36 | 600 | 33 | 480 | 30 |
| | vc(sfm) | 394-590 (492) | | | | | | | | 394-590 (492) | | | | 394-590 (492) | |
| | fz(in/t) | 0.006-0.01 (0.008) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |
| Tool Steel<br>Alloy Steel<br>(30-40HRC)<br><br>JS4045 | n(rpm) / vf(in/min) | 1,270 | 15 | 990 | 18 | 800 | 19 | 640 | 19 | 510 | 18 | 400 | 17 | 320 | 15 |
| | vc(sfm) | 262-394 (328) | | | | | | | | 262-394 (328) | | | | 262-394 (328) | |
| | fz(in/t) | 0.004-0.008 (0.006) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |
| Stainless Steel<br>(Dry Condition)<br><br>GX2160<br>JM4160 | n(rpm) / vf(in/min) | 3,180 | 50 | 2,490 | 59 | 1,990 | 63 | 1,590 | 63 | 1,260 | 60 | 990 | 55 | 760 | 48 |
| | vc(sfm) | 656-984 (820) | | | | | | | | 656-984 (820) | | | | 656-918 (787) | |
| | fz(in/t) | 0.006-0.01 (0.008) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |
| Stainless Steel<br>(Wet Condition)<br><br>JM4160<br>PTH30E | n(rpm) / vf(in/min) | 1,270 | 20 | 990 | 24 | 800 | 25 | 640 | 25 | 510 | 24 | 400 | 22 | 320 | 20 |
| | vc(sfm) | 262-394 (328) | | | | | | | | 262-394 (328) | | | | 262-394 (328) | |
| | fz(in/t) | 0.006-0.01 (0.008) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | | 0.197/0.118 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |
| Cast Iron<br><br>JS4045 | n(rpm) / vf(in/min) | 1,780 | 28 | 1,390 | 33 | 1,110 | 35 | 890 | 35 | 710 | 33 | 560 | 31 | 450 | 28 |
| | vc(sfm) | 394-525 (459) | | | | | | | | 394-525 (459) | | | | 394-525 (459) | |
| | fz(in/t) | 0.006-0.01 (0.008) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | | 0.551/0.394 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |
| Titanium Alloy<br>(Wet Condition)<br>Ti-6Al-4V<br><br>JP4120<br>PTH30E<br>JM4160 | n(rpm) / vf(in/min) | 570 | 7 | 450 | 8 | 360 | 8 | 290 | 8 | 230 | 8 | 180 | 7 | 130 | 6 |
| | vc(sfm) | 98-197 (150) | | | | | | | | 98-197 (150) | | | | 98-157 (131) | |
| | fz(in/t) | 0.004-0.008 (0.006) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |
| Ni Based Alloy<br>(Wet Condition)<br>Inconel 718<br><br>JP4120<br>JM4160 | n(rpm) / vf(in/min) | 510 | 4 | 400 | 5 | 320 | 5 | 250 | 5 | 200 | 5 | 160 | 4 | 130 | 4 |
| | vc(sfm) | 98-164 (130) | | | | | | | | 98-164 (130) | | | | 98-164 (130) | |
| | fz(in/t) | 0.003-0.005 (0.004) | | | | | | | | | | | | | |
| | ap (in) side milling/slotting | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | | 0.118/0.079 | |
| | ae (in) side milling/slotting | 0.236/1Dc | | 0.315/1Dc | | 0.394/1Dc | | 0.669/1Dc | | 0.787/1Dc | | 0.984/1Dc | | 1.378/1Dc | |

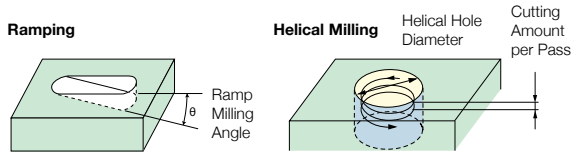
### Adjustment of cutting condition

- Feed rate and spindle revolution must be adjusted to correspond to tool projection and machining conditions.
- Please consider the standard cutting condition as 100% and adjust the machining conditions by reffering to the table below.

| | | Projection ratio | | |
|---|---|---|---|---|
| | | <3Dc | 3Dc-5Dc | 5Dc< |
| **Surfacing Shoulder Cutting** | rpm | 100% | 70% | 50% |
| | vf | 100% | 70% | 50% |
| **Slotting** | rpm | 100% | 70% | 50% |
| | vf | 70% | 50% | 35% |
| **Ramping** | rpm | 100% | 70% | 50% |
| | vf | 80% | 55% | 40% |

### Ramping and Helical Milling Data

Although ramp angle is limited due to cutting edge design, direct milling is possible without pre-hole with ramping and helical milling methods like next pictures.




| Tool Diameter | 1" or 25mm | 1.25" or 32mm | 1.5" or 40mm | 2" or 50mm |
|---|---|---|---|---|
| θ ramp angle | 5° | 4° | 3° | 2° |
| Hole Dia. (in) | 1.33-1.85 | 1.85-2.36 | 2.19-2.99 | 3.26-3.81 |
| Hole Dia. (mm) | 34-47 | 47-60 | 64-76 | 83-97 |

1. The ramp angle SI-TA should be set within listed above. Use at ramp angles of 1° or less is recommended.
2. For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

| | ø<br>Flutes | 1" or 25mm<br>2 | 1.25" or 32mm<br>3 | 1.5" or 40mm<br>4 | 2" or 50mm<br>5 | 2.5" or 63mm<br>6 | 3" or 80mm<br>7 | 4" or 100mm<br>8 |
|---|---|---|---|---|---|---|---|---|
| Expanded Aluminum Alloy Material (Air-Blow or Wet: Water-Soluble Fluid)<br>SD5010 | n (min-1) | 12,000 | 9,950 | 9,500 | 7,640 | 6,060 | 5,970 | 4,770 |
| | vf (in/min) | 189 | 235 | 299 | 301 | 286 | 329 | 300 |
| | fz (in/t) | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| | vc (sfm) | 3116 | 3,280 | 3,936 | 3,936 | 3,936 | 4,920 | 4,920 |
| | ap (in) | 0.2 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 |
| Cast Aluminum Alloy Material (Air-Blow or Wet: Water-Soluble Fluid)<br>SD5010 | n (min-1) | 9,600 | 7,960 | 7,600 | 6,110 | 4,850 | 4,780 | 3,820 |
| | vf (in/min) | 151 | 188 | 239 | 241 | 229 | 263 | 240 |
| | fz (in/t) | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| | vc (sfm) | 2492.8 | 2624 | 3148.8 | 3148.8 | 3148.8 | 3,936 | 3,936 |
| | ap (in) | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 |
| Pure Copper (Air-Blow or Wet: Water-Soluble Fluid).<br>SD5010 | n (min-1) | 3,820 | 2,980 | 2,390 | 1,910 | 1,520 | 1,190 | 955 |
| | vf (in/min) | 60 | 70 | 75 | 75 | 72 | 66 | 60 |
| | fz (in/t) | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |
| | vc (sfm) | 984 | 984 | 984 | 984 | 984 | 984 | 984 |
| | ap (in) | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 |

**Shoulder cutting: $a_e$=0.5Dc**

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 machining and work-piece conditions.
3. When slotting, reduce the feed rate by 30% (set it to 0.7 times the value shown above).
4. When L/D=4 or higher, reduce the rotation speed and feed rate by 60% (set them to 0.4 times the values shown above).
5. Use on a machine equipped with splashguards. During use, be sure to wear protective equipment such as safety glasses, and always perform work in a safety environment.
6. When using a machine that cannot provide the rotation speed shown above, set the highest rotation speed possible and calculate the feed rate using the fz value.
7. Be sure to use this tool at rotation speeds within the acceptable range for the milling chuck being used. If the acceptable rotation speed range is below the roation speed shown above, set the highest acceptable rotation speed and calculate the feed rate using the fz value.