Member IMC Group Tungaloy

MillLine

For more information

High feed milling cutter

# ADDFEED/DOFEED

Tungaloy Report No. 545-US

# Ultimate high feed milling cutter series for maximum productivity

TUNGALOY ADDFORCE ACCELERATED LINES

TUNGALOY

# ADDFORCE MILL

ACCELERATED MILLING

## ADDDFEED/DOFEED

High-feed cutters reduce machining time in a wide range of applications

# Complete high feed milling solutions

New

## ADDDOFEED

**Insert size 02**

Max. depth of cut: 0.020"
Tool diameter: ø0.375" - ø1.000"

- ✓ Tool diameters as small as **0.375"**
- ✓ **Highly reliable design**
- ✓ Perfect option for **replacing solid end mills**

P.8 - 13

## DOFEED

**Insert size 03**


Max. depth of cut: 0.035" (UER), 0.039" (ZER)
Tool diameter: ø0.625" - ø2.000"

- ✓ **Close pitch cutter design** for high productivity
- ✓ **Extensive lineup** for various applications
- ✓ **New UER inserts with small approach angle for long tool life**

P.14 - 25

## DOFEED

**Insert size 06**

Max. depth of cut: 0.059"
Tool diameter: ø1.250" - ø6.000"

- ✓ **Close pitch cutter design** for high productivity
- ✓ Tool diameters available for up to 7.87", ideal for **rough milling of medium- and large-sized components**
- ✓ **Wiper inserts** for improved surface roughness

P.26 - 31

### Tool diameters and number of teeth for each insert size

| Insert size | Max. depth of cut (mm) | Workpiece material | Tool diameter (in), Number of teeth | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ø0.375" | ø0.500" | ø0.625" | ø0.688" | ø0.750" | ø0.875" | ø1.000" | ø1.125" | ø1.250" | ø1.500" | ø2.000" | ø2.500" | ø3.000" | ø4.000" | ø5.000" | ø6.000" |
| 02 | 0.020" | P M K S H | 1 | 2 | 3, 4 | | 4, 5 | | 6, 7 | | | | | | | | | |
| 03 | 0.035" (UER) 0.039" (ZER) | P M K S H | | | 2 | 2 | 2, 3 | 2, 3 | 4, 5 | 4, 5 | 5, 6 | 5, 6 | 5, 8, 10 | | | | | |
| 06 | 0.059" | P M K S H | | | | | | | | | 2 | 3 | 4, 5 | 4, 6 | 5, 7 | 6, 10 | 8, 12 | 10, 14 |

# Features for DoFeed series

## Cutter body design for maximum productivity

### Extremely stiff body design with a large core

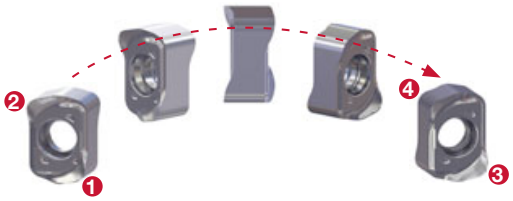

### Close pitch cutter design for increased productivity

■ Inserts per diameter density comparisons:
DoFeed series vs competitor's high feed cutter

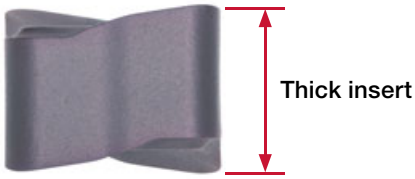
| Tool diameter (in) | ADDFEED | DOFEED 03 | DOFEED 06 | Competitor |
|---|---|---|---|---|
| ø0.625" | 4 | 2 | - | 2 |
| ø1.000" | 7 | 5 | - | 4 |
| ø2.000" | - | 8 | 5 | 4 |

## Reliable and economical inserts

### Economical double-sided inserts with four cutting edges

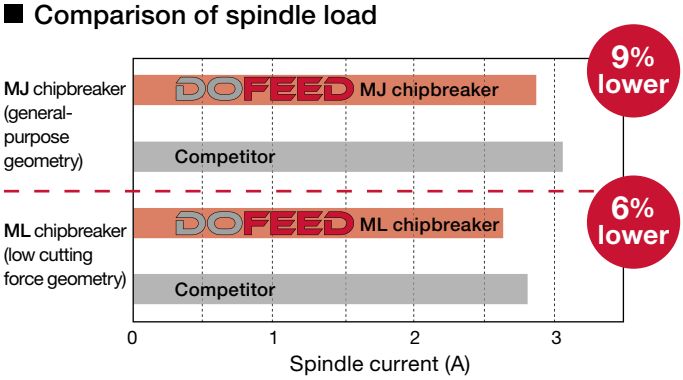



### Thick insert design for increased reliability




## Soft cutting geometry with superior chip control

■ Comparison of spindle load



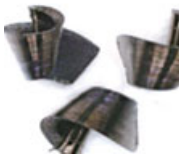
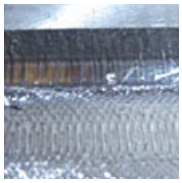
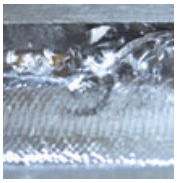

P

| | |
|---|---|
| Cutter | : EXN03R100U0100-05 (ø1.000", CICT = 5) |
| Insert | : LNMU0303ZER-MJ / ML AH725 |
| Workpiece material | : Carbon steels (1055) |
| Cutting speed | : *Vc* = 820 sfm |
| Feed per tooth | : *fz* = 0.020 ipt (1 insert) |
| Depth of cut | : *ap* = 0.020" |
| Width of cut | : *ae* = 1.000" (Slot milling) |
| Coolant | : Dry |
| Machine | : Vertical M/C, CAT40 |

Note: Test cut using a single insert

### Provides stable, high productivity due to the excellent chip evacuation

Forms compact chips

| | DOFEED | Competitor |
|---|---|---|
| Chip shapes |  |  |
| Shoulder surfaces after grooving operations |  |  |

# ADDDOFEED/DOFEED

## GRADES

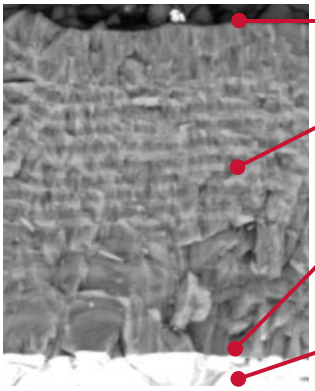
### Addition of AH3225 grade for enhanced insert grade lineup

**Grades with long tool life for a wide range of materials**

New

### AH3225 P M

- Nano multi-layer coating technology with three major properties for optimal cutting edge integrity
- Increased resistance to wear, fracture, oxidation, built-up edge, and delamination



**Resistance to built-up edge**
The coating surface prevents built-up edge

**Resistance to wear, oxidation, and fracture**
Multi-layered coating is designed to resist wear and oxidation, while preventing micro-cracks from propagating in the coating layer for improved resistance to edge chipping

**Strong coating / substrate adhesion**
Coating is optimized for strong adhesion property with substrate to maintain strong cutting edge integrity

**Carbide substrate**
High resistance to fracture

## PREMIUMTEC

### AH120 K

- Exceptionally wear resistant in cast iron machining

### AH8015 P K H

- High wear and chipping resistance and minimized built up edge due to nano multi-layered AlTiN coating with high Al content
- Well-suited for difficult materials of 45 - 55 HRc

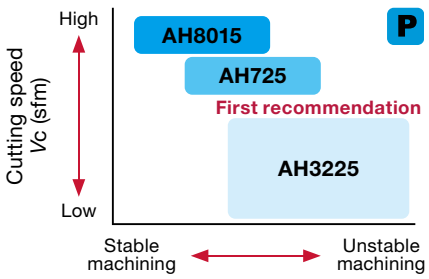
### AH8005 H

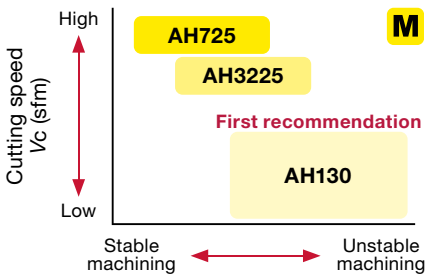
- High wear and chipping resistance and minimized built-up edge due to nano multi-layered AlTiN coating with high Al content
- Ideal for hardened steel of 55HRc and above

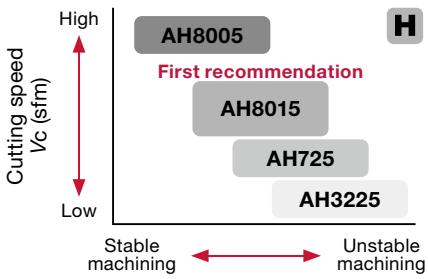
### AH130 M S

- High chipping resistance
- Ideal for titanium alloy machining

## APPLICATION AREAS



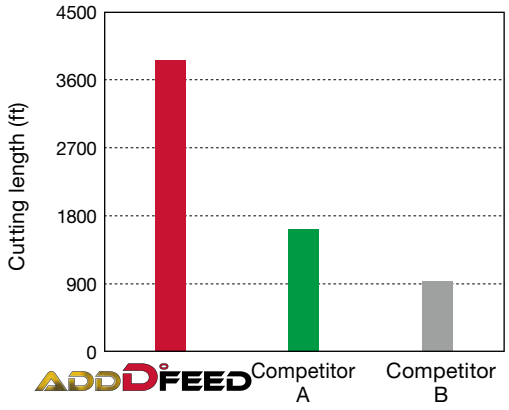



## CUTTING PERFORMANCE

### Grade: AH3225

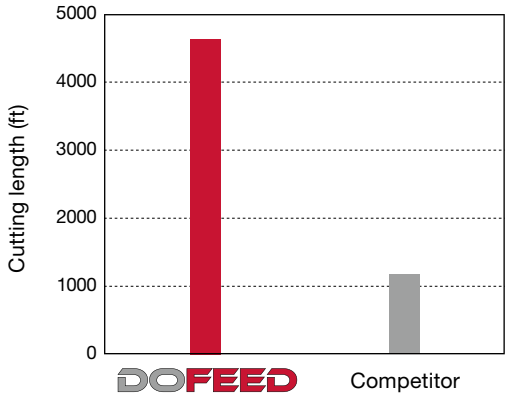
**P** 1055 (190HB)

Insert size 02



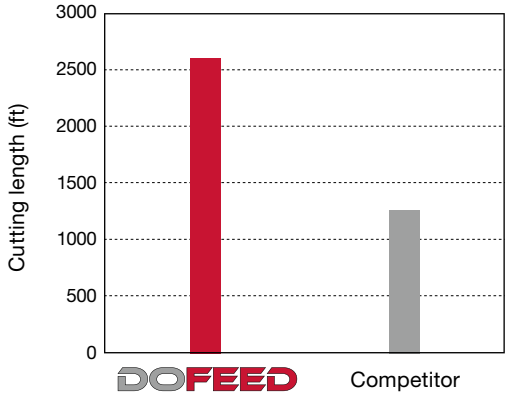

| | |
|---|---|
| Cutter | : EXN02R050U0050-02 (ø0.500", CICT = 2) |
| Insert | : LNMU0202ZER-MM |
| Overhang length | : 30 mm |
| Cutting speed | : *Vc* = 820 sfm |
| Feed per tooth | : *fz* = 0.024 ipt |
| Depth of cut | : *ap* = 0.016" |
| Width of cut | : *ae* = 0.386" |
| Coolant | : Dry |
| Machine | : Vertical M/C, CAT40 |

Insert size 03



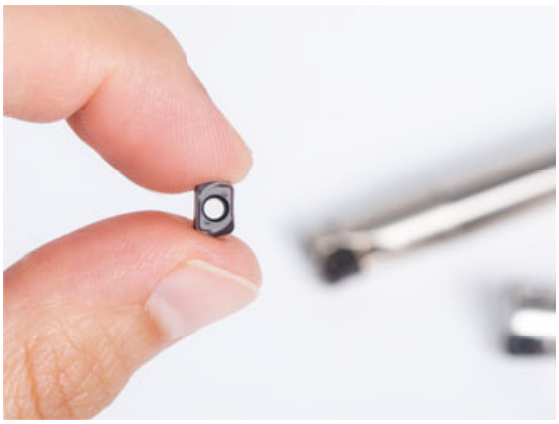

| | |
|---|---|
| Cutter | : EXN03R100U0100-05 (ø1.000", CICT = 5) |
| Insert | : LNMU0303ZER-MJ |
| Cutting speed | : *Vc* = 656 sfm |
| Feed per tooth | : *fz* = 0.039 ipt |
| Depth of cut | : *ap* = 0.024" |
| Width of cut | : *ae* = 0.590" |
| Coolant | : Dry |
| Machine | : Vertical M/C, CAT50 |

Insert size 06




| | |
|---|---|
| Cutter | : TXN03R200U0075A05 (ø2.000", CICT = 5) |
| Insert | : LNMU06X5ZER-MJ |
| Cutting speed | : *Vc* = 492 sfm |
| Feed per tooth | : *fz* = 0.039 ipt |
| Depth of cut | : *ap* = 0.039" |
| Width of cut | : *ae* = 1.377" |
| Coolant | : Dry |
| Machine | : Vertical M/C, CAT50 |

# First choice for cutter diameters ø0.375" - ø1.000"



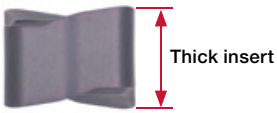
## High reliability

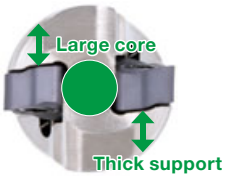
**Three features of the insert design increase reliability of the small inserts, providing process security**

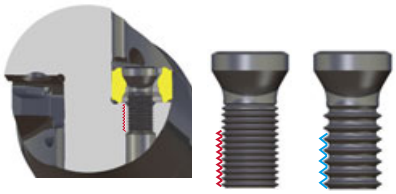
**1. Thick insert**
Insert with thickest possible design to prevent insert fracture.

**2. Thick insert support**
Sustains massive cutting loads generated during high feed machining.

**3. Fine screw threads**
Shallow-pitched fine threads prevent screw from self-loosening due to higher number of threads in contact.



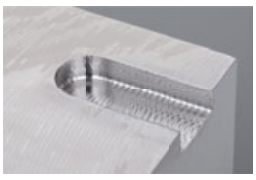




## Use AddDoFeed for solid end mill to control chatter

| Endmilling applications prone to chatter | ADDDOFEED will... |
|---|---|
| Long overhang (≥ 4xD), Grooving  | ✓ Control chatter thanks to high feed insert geometry<br>✓ Increase productivity thanks to controlled chatter<br>✓ Stabilize machining and increase tool life<br>✓ Reduced tool costs and streamlined tool management thanks to indexable tooling |
| Corner radius with multiple edge contacts  | |

### Chatter comparison: AddDoFeed vs. solid endmill



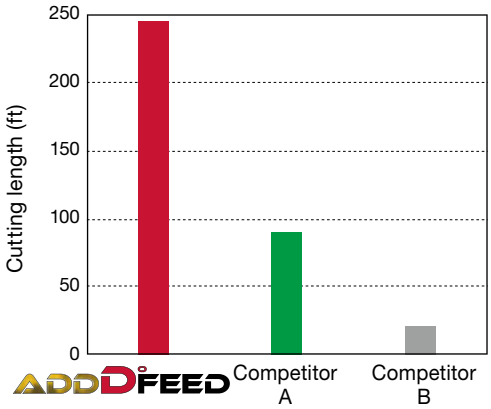
ADDDOFEED

**Competitor Solid endmill**

| | |
|---|---|
| Cutter | : ø0.500" long type, CICT = 2 (Competitor: ø0.500", CICT = 4) |
| Overhang length | : 2.000" |
| Cutting speed | : *Vc* = **656** sfm (Competitor: 394 sfm) |
| Feed per tooth | : *fz* = **0.047** ipt (Competitor: 0.002 ipt) |
| Feed speed | : *Vf* = **471** ipm (Competitor: 25.197 ipm) |
| Depth of cut | : *ap* = 0.01" (Competitor: 0.197") |
| Width of cut | : *ae* = 0.5" |
| Metal removal rate | : *Q* = 2.36 $in^3$/min |

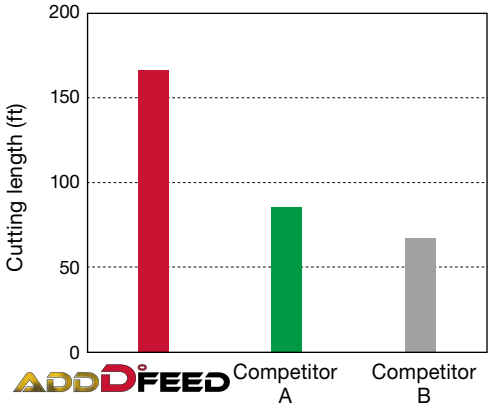
## CUTTING PERFORMANCE

### M 304 (190HB)




Cutter : EXN02R050U0050-02 (ø0.500", CICT = 2)
Insert : LNMU0202ZER-MM AH130
Tool overhang : 1.200"
Cutting speed : *Vc* = 591 sfm
Feed per tooth : *fz* = 0.012 ipt
Depth of cut : *ap* = 0.012"
Width of cut : *ae* = 0.386"
Coolant : Wet
Machine : Vertical M/C, CAT40

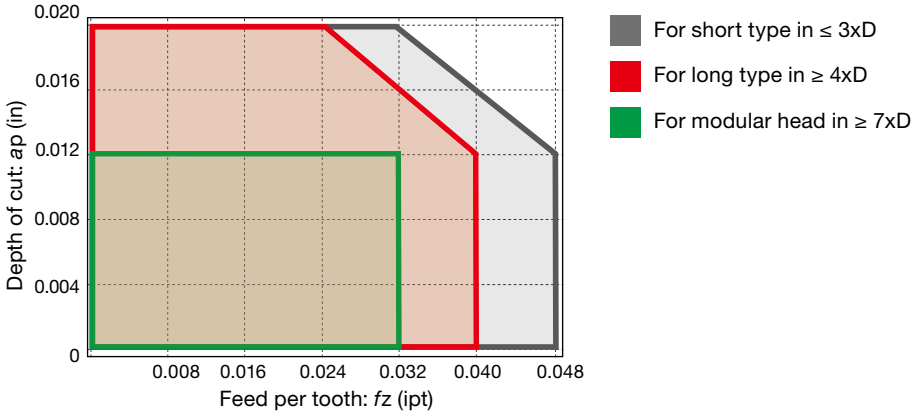
### H H13 (52HRC)




Cutter : EXN02R050U0050-02 (ø0.500", CICT = 2)
Insert : LNMU0202ZER-MM AH8015
Tool overhang : 1.000"
Cutting speed : *Vc* = 394 sfm
Feed per tooth : *fz* = 0.020 ipt
Depth of cut : *ap* = 0.012"
Width of cut : *ae* = 0.386"
Coolant : Dry
Machine : Vertical M/C, CAT40

## APPLICATION

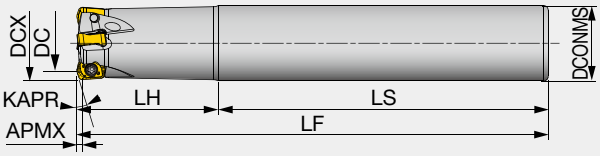
### P



## EXN02

High feed endmill, shank type, for 4-corner double sided inserts

GAMP = +6°, GAMF = +5° ~ +11°




| Inch | APMX | DCX | CICT | DC | DCONMS | LF | LH | LS | KAPR | WT (kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXN02R037U0037-01 | 0.020 | 0.375 | 1 | 0.212 | 0.375 | 3.000 | 0.750 | 2.250 | 17° | 0.090 | With | LNMU02… |
| EXN02R037U0037-01L | 0.020 | 0.375 | 1 | 0.212 | 0.375 | 3.500 | 1.250 | 2.250 | 17° | 0.090 | With | LNMU02… |
| EXN02R050U0050-02 | 0.020 | 0.500 | 2 | 0.335 | 0.500 | 3.000 | 0.750 | 2.250 | 17° | 0.150 | With | LNMU02… |
| EXN02R050U0050-02L | 0.020 | 0.500 | 2 | 0.335 | 0.500 | 4.250 | 2.000 | 2.250 | 17° | 0.200 | With | LNMU02… |
| EXN02R062U0062-03L | 0.020 | 0.625 | 3 | 0.460 | 0.625 | 4.500 | 2.000 | 2.500 | 17° | 0.330 | With | LNMU02… |
| EXN02R062U0062-04 | 0.020 | 0.625 | 4 | 0.460 | 0.625 | 4.000 | 1.500 | 2.500 | 17° | 0.310 | With | LNMU02… |
| EXN02R075U0075-04L | 0.020 | 0.750 | 4 | 0.585 | 0.750 | 6.500 | 3.500 | 3.000 | 17° | 0.640 | With | LNMU02… |
| EXN02R075U0075-05 | 0.020 | 0.750 | 5 | 0.585 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 0.510 | With | LNMU02… |
| EXN02R100U0100-06L | 0.020 | 1.000 | 6 | 0.835 | 1.000 | 7.000 | 4.000 | 3.000 | 17° | 1.280 | With | LNMU02… |
| EXN02R100U0100-07 | 0.020 | 1.000 | 7 | 0.835 | 1.000 | 5.500 | 2.500 | 3.000 | 17° | 1.040 | With | LNMU02… |

### SPARE PARTS

| Designation | Clamping screw | Wrench |
|---|---|---|
| EXN02R037U… | CSPB-1.8FL4.3 | IP-6DB |
| EXN02R050U… | CSPB-1.8FL4.3 | IP-6DB |
| EXN02R062U… | CSPB-1.8FL4.3 | IP-6DB |
| EXN02R075U… | CSPB-1.8FL4.3 | IP-6DB |
| EXN02R100U… | CSPB-1.8FL4.3 | IP-6DB |

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

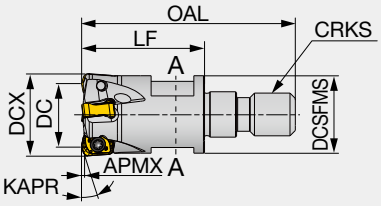
*Recommended clamping torque：CSPB-1.8FL4.3 = 0.37 lbf·ft

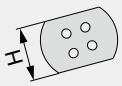
TUNGFLEX

## HXN02

High feed endmill, modular type (TungFlex)

GAMP = +6°, GAMF = +5° ~ +11°




A-A cross section

| Metric | APMX | DCX | CICT | DC | DCSFMS | OAL | LF | H | KAPR | CRKS | WT(kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HXN02R008MM06-01 | 0.5 | 8 | 1 | 3.95 | 9.5 | 33.5 | 19 | 7 | 17° | M6 | 0.01 | With | LNMU02... |
| HXN02R010MM06-02 | 0.5 | 10 | 2 | 5.85 | 9.5 | 31.5 | 17 | 7 | 17° | M6 | 0.01 | With | LNMU02... |
| HXN02R012MM06-02 | 0.5 | 12 | 2 | 7.8 | 10 | 31.5 | 17 | 7 | 17° | M6 | 0.01 | With | LNMU02... |
| HXN02R016MM08-04 | 0.5 | 16 | 4 | 11.8 | 14.5 | 40 | 23 | 10 | 17° | M8 | 0.03 | With | LNMU02... |
| HXN02R020MM10-05 | 0.5 | 20 | 5 | 15.8 | 17.8 | 49 | 30 | 15 | 17° | M10 | 0.06 | With | LNMU02... |
| HXN02R025MM12-07 | 0.5 | 25 | 7 | 20.8 | 23 | 52 | 30 | 17 | 17° | M12 | 0.1 | With | LNMU02... |

### SPARE PARTS

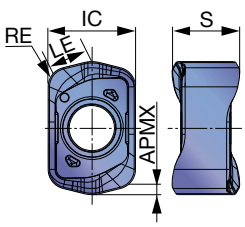
| Designation | Clamping screw | Wrench |
|---|---|---|
| HXN02R008... | CSPB-1.8FL3.6 | IP-6DB |
| HXN02R010... | CSPB-1.8FL4.3 | IP-6DB |
| HXN02R012... | CSPB-1.8FL4.3 | IP-6DB |
| HXN02R016... | CSPB-1.8FL4.3 | IP-6DB |
| HXN02R020... | CSPB-1.8FL4.3 | IP-6DB |
| HXN02R025... | CSPB-1.8FL4.3 | IP-6DB |

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

*Recommended clamping torque (N·m): CSPB-1.8FL3.6, CSPB-1.8FL4.3 = 0.5

## INSERT

### LNMU02-MM (for general purpose)




| | | | | |
|---|---|---|---|---|
| P | Steel | | ★ | ☆ |
| M | Stainless | ★ | ☆ | |
| K | Cast iron | | ☆ | ★ |
| N | Non-ferrous | | | |
| S | Superalloy | ★ | | ★ |
| H | Hard materials | | ☆ | ★ |

★ : First choice
☆ : Second choice

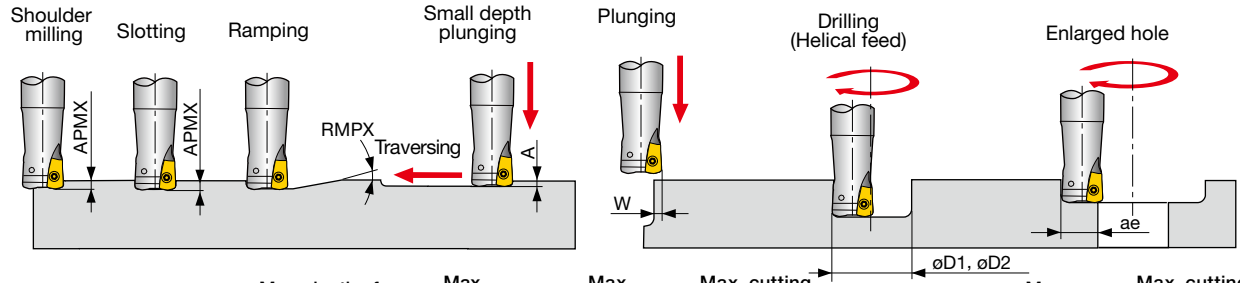
| Designation | RE | APMX | Coated AH130 | Coated AH3225 | Coated AH8015 | LE | IC | S |
|---|---|---|---|---|---|---|---|---|
| LNMU0202ZER-MM | 0.035 | 0.020 | ● | ● | ● | 0.070 | 0.157 | 0.122 |

● : Line up

## STANDARD CUTTING CONDITIONS

| ISO | Workpiece materials | | Hardness | Priority | Grades | Cutting speed *Vc* (sfm) | Feed per tooth *fz* (ipt) |
|---|---|---|---|---|---|---|---|
| P | Carbon steels 1045, 1055, etc. | | - 300HB | First choice | AH3225 | 330 - 980 | 0.008 - 0.047 |
| | | | - 300HB | For wear resistance | AH8015 | 330 - 980 | 0.008 - 0.047 |
| | Alloy steels 4140, etc. | | - 300HB | First choice | AH3225 | 330 - 980 | 0.008 - 0.047 |
| | | | - 300HB | For wear resistance | AH8015 | 330 - 980 | 0.008 - 0.047 |
| | Prehardened steels NAK80, PX5, etc. | | 30 - 40HRC | First choice | AH8015 | 330 - 660 | 0.008 - 0.031 |
| | | | 30 - 40HRC | For impact resistance | AH3225 | 330 - 660 | 0.008 - 0.031 |
| M | Stainless steels 304SS, etc. | | - 200HB | First choice | AH130 | 330 - 490 | 0.008 - 0.031 |
| K | Gray cast irons class25, etc. | | 150 - 250HB | First choice | AH8015 | 330 - 980 | 0.008 - 0.047 |
| | | | 150 - 250HB | For impact resistance | AH3225 | 330 - 980 | 0.008 - 0.047 |
| | Ductile cast irons 80-50-06, etc. | | 150 - 250HB | First choice | AH8015 | 260 - 660 | 0.008 - 0.047 |
| | | | 150 - 250HB | For impact resistance | AH3225 | 260 - 660 | 0.008 - 0.047 |
| S | Titanium alloy Ti-6Al-4V, etc. | | - 40HRC | First choice | AH130 | 100 - 200 | 0.008 - 0.028 |
| | | | - 40HRC | For wear resistance | AH8015 | 100 - 200 | 0.008 - 0.028 |
| | Heat resistant alloy Inconel, Hastelloy, etc. | | - 40HRC | First choice | AH8015 | 70 - 160 | 0.004 - 0.012 |
| | | | - 40HRC | For impact resistance | AH3225 | 70 - 160 | 0.004 - 0.012 |
| H | Hardened steel | H13, etc. | 40 - 50HRC | First choice | AH8015 | 260 - 490 | 0.004 - 0.020 |
| | | | 40 - 50HRC | For impact resistance | AH3225 | 260 - 490 | 0.004 - 0.020 |
| | | D2, etc. | 50~60HRC | First choice | AH8015 | 160 - 230 | 0.004 - 0.012 |

## APPLICATION RANGE




| Inch | DCX | Max. depth of cut APMX | Max. ramping angle RMPX | Max. plunging depth A | Max. cutting width in plunging W | Min. machining øD1 | Max. machining øD2 | Max. cutting width in enlarged hole ae |
|---|---|---|---|---|---|---|---|---|
| EXN02R037U... | 0.375 | 0.020 | 3.100 | 0.006 | 0.079 | 0.509 | 0.635 | 0.289 |
| EXN02R050U... | 0.500 | 0.020 | 1.780 | 0.006 | 0.079 | 0.760 | 0.886 | 0.413 |
| EXN02R062U... | 0.625 | 0.020 | 1.230 | 0.006 | 0.079 | 1.011 | 1.137 | 0.539 |
| EXN02R075U... | 0.750 | 0.020 | 0.950 | 0.006 | 0.079 | 1.262 | 1.388 | 0.664 |
| EXN02R100U... | 1.000 | 0.020 | 0.640 | 0.006 | 0.079 | 1.756 | 1.882 | 0.913 |

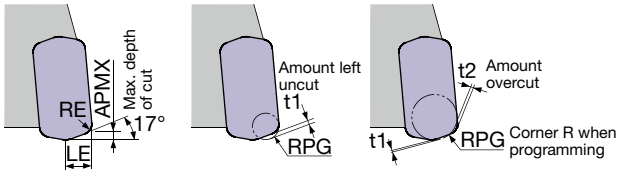
| Metric | DCX | Max. depth of cut APMX | Max. ramping angle RMPX | Max. plunging depth A | Max. cutting width in plunging W | Min. machining øD1 | Max. machining øD2 | Max. cutting width in enlarged hole ae |
|---|---|---|---|---|---|---|---|---|
| HXN02R008... | 8 | 0.5 | 0.5 | 0.03 | 2 | 11.5 | 13.2 | 5.87 |
| HXN02R010... | 10 | 0.5 | 2.8 | 0.15 | 2 | 13.8 | 17 | 7.82 |
| HXN02R012... | 12 | 0.5 | 1.9 | 0.15 | 2 | 17.8 | 21 | 9.81 |
| HXN02R016... | 16 | 0.5 | 1.2 | 0.15 | 2 | 25.8 | 29 | 13.8 |
| HXN02R020... | 20 | 0.5 | 0.88 | 0.15 | 2 | 33.8 | 37 | 17.8 |
| HXN02M025... | 25 | 0.5 | 0.66 | 0.15 | 2 | 43.8 | 47 | 22.8 |

**Tool dia.: DCX (in), Number of revolutions: *n* (rpm), Feed speed: *Vf* (ipm), Max. depth of cut: *ap* = 0.002", Number of teeth: CICT**

| ø0.375", CICT = 1 | | ø0.500", CICT = 2 | | ø0.625" | | | ø0.750" | | | ø1.000" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *n* | *Vf* | *n* | *Vf* | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | |
| | | | | | CICT = 3 | CICT = 4 | | CICT = 4 | CICT = 5 | | CICT = 6 | CICT = 7 |
| 6,720 | 190 | 5,040 | 290 | 4,030 | 340 | 460 | 3,360 | 380 | 480 | 2,520 | 430 | 500 |
| | | | | | *Vc* = 660 sfm, *fz* = 0.028 ipt | | | | | | | |
| 6,720 | 190 | 5,040 | 290 | 4,030 | 340 | 460 | 3,360 | 380 | 480 | 2,520 | 430 | 500 |
| | | | | | *Vc* = 660 sfm, *fz* = 0.028 ipt | | | | | | | |
| 4,990 | 100 | 3,740 | 150 | 3,000 | 180 | 240 | 2,500 | 200 | 250 | 1,870 | 230 | 270 |
| | | | | | *Vc* = 490 sfm, *fz* = 0.020 ipt | | | | | | | |
| 4,180 | 90 | 3,130 | 130 | 2,510 | 160 | 210 | 2,090 | 170 | 210 | 1,570 | 190 | 220 |
| | | | | | *Vc* = 410 sfm, *fz* = 0.020 ipt | | | | | | | |
| 6,720 | 190 | 5,040 | 290 | 4,030 | 340 | 460 | 3,360 | 380 | 480 | 2,520 | 430 | 500 |
| | | | | | *Vc* = 660 sfm, *fz* = 0.028 ipt | | | | | | | |
| 4,990 | 140 | 3,740 | 210 | 3,000 | 260 | 340 | 2,500 | 280 | 350 | 1,870 | 320 | 370 |
| | | | | | *Vc* = 490 sfm, *fz* = 0.028 ipt | | | | | | | |
| 1,530 | 40 | 1,150 | 50 | 920 | 60 | 80 | 760 | 70 | 80 | 570 | 70 | 80 |
| | | | | | *Vc* = 150 sfm, *fz* = 0.020 ipt | | | | | | | |
| 1,220 | 10 | 920 | 20 | 730 | 20 | 30 | 610 | 20 | 30 | 460 | 30 | 30 |
| | | | | | *Vc* = 120 sfm, *fz* = 0.008 ipt | | | | | | | |
| 3,870 | 50 | 2,900 | 70 | 2,320 | 90 | 120 | 1,940 | 100 | 120 | 1,450 | 110 | 130 |
| | | | | | *Vc* = 380 sfm, *fz* = 0.012 ipt | | | | | | | |
| 2,040 | 20 | 1,530 | 30 | 1,220 | 30 | 40 | 1,020 | 40 | 50 | 760 | 40 | 50 |
| | | | | | *Vc* = 200 sfm, *fz* = 0.008 ipt | | | | | | | |

## TOOL GEOMETRY ON PROGRAMMING

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 0.030". If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).




| Max. depth of cut APMX (in) | Corner radius RE (in) | LE (in) | Corner R when programming RPG | Amount left uncut t1 (in) | Amount overcut t2 (in) |
|---|---|---|---|---|---|
| **0.020** | **0.035** | **0.079** | **0.030** | **0.014** | **0** |
| 0.020 | 0.035 | 0.079 | 0.050 | 0.008 | 0.001 |
| 0.020 | 0.035 | 0.079 | 0.075 | 0.001 | 0.010 |

*Recommended

DOFEED

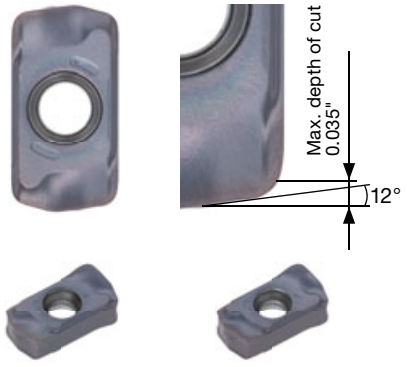
Insert size 03

# Popular DoFeed 03 series now offers UER inserts with small approach angle for higher performance

## Two different types of inserts fit the same cutter body

New

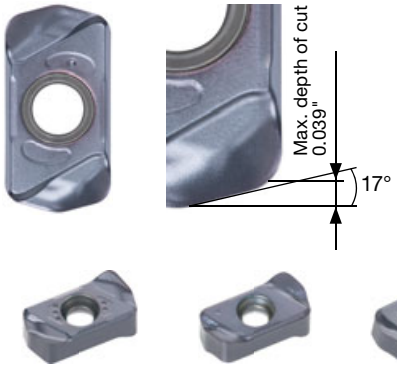
**LNMU0303UER insert**
**for long tool life and reduced vibration**




**MJ Chipbreaker**
- General machining
- Ideal for machining steel, cast iron, and hardened steel

**ML Chipbreaker**
- Low cutting force
- Suitable for machining steel, stainless steel, and difficult-to-cut materials

**LNM/GU0303ZER insert**
**for low cutting forces**




**MJ Chipbreaker**
General machining

**ML Chipbreaker**
Low cutting force

**MS Chipbreaker**
For stainless steel

**MH Chipbreaker**
Robust cutting edges

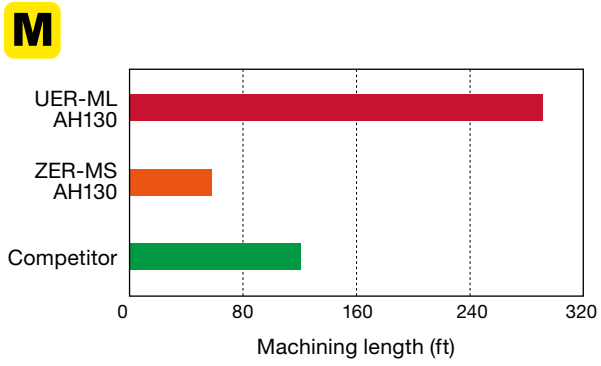
**UER insert**

| Approach angle | Benefits | Applications |
|---|---|---|
| 12° | Extended tool life | Work materials; Hardened steel, stainless steel, and heat-resistant alloys |
| | Controlled chatter | Machining with long overhang |

**ZER insert**

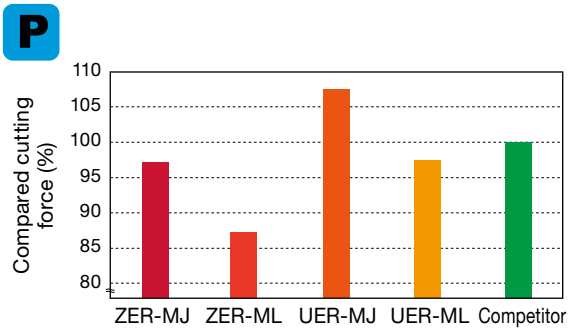
| Approach angle | Benefits | Applications |
|---|---|---|
| 17° | Low cutting forces | Low rigidity, machines and components |
| | No chip re-cutting | Pocketing or slotting |

### Tool life comparison in S17400




Tool dia. : ø0.750", CICT = 1
Cutting speed : *Vc* = 492 sfm

### Cutting force comparison in 1050



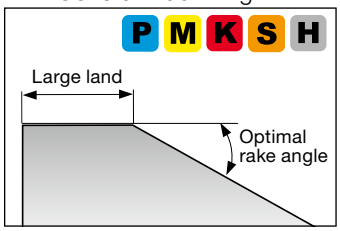

Feed per tooth : *fz* = 0.031 ipt
Depth of cut : *ap* = 0.020"

**UER inserts create thin chips and extend tool life especially during machining of difficult materials.**

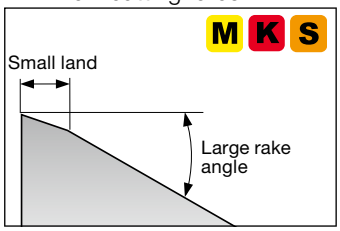
**ZER inserts reduce cutting forces by as much as 10% over the competitors.**

## CHIPBREAKERS

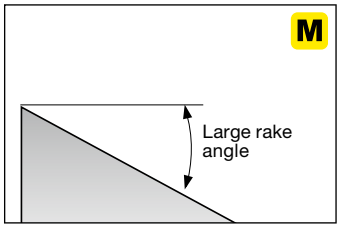
**MJ** General machining



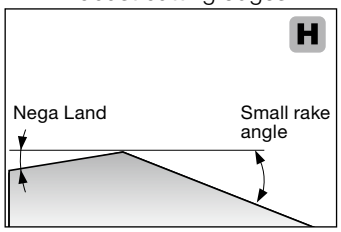

**ML** Low cutting force



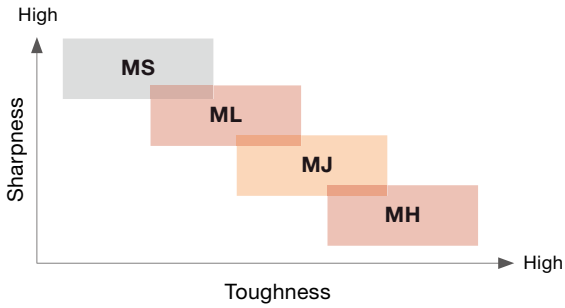

**MS** For stainless steel




**MH** Robust cutting edges

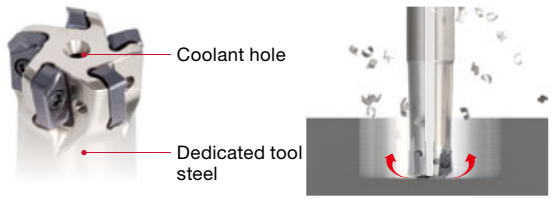



### ■ Chipbreaker characteristics

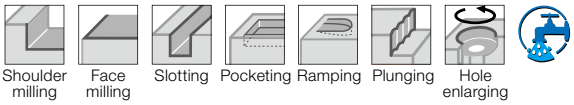



## Available in 3 body types (E/HXN03)

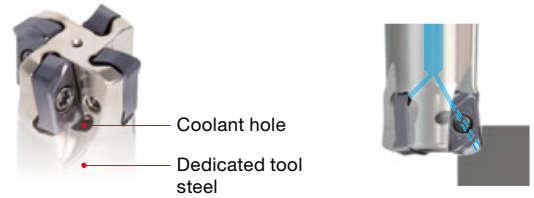
### Premium body / Center-through coolant



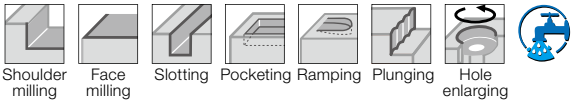

- Effectively evacuates chips
- Most suitable for pocket milling




### Premium body / Optimal coolant supply

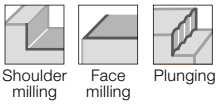



- Coolant goes to the edge directly for effective cooling
- Suitable for the machining of difficult-to-cut materials or small-width cutting




### ECO body (Metric only)


- High-economical bodies due to no coolant-hole



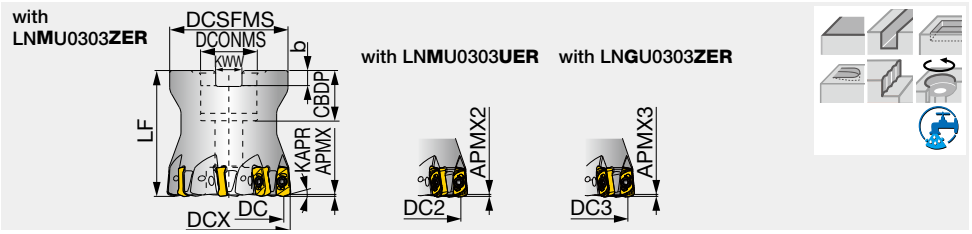
DOFEED

Insert size 03

## TXN03

High feed mill, for 4-corner double sided inserts

GAMP = +6°,GAMF = +12° ~ 13°




| Inch | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | DCSFMS | DCONMS | CBDP | LF | b | KWW | KAPR | KAPR2* | KAPR3* | WT (lb) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TXN03R150U0050A05 | 0.039 | 0.035 | 0.039 | 1.500 | 5 | 1.323 | 1.291 | 1.327 | 1.460 | 0.500 | 0.750 | 1.575 | 0.160 | 0.252 | 17° | 12° | 17° | 0.530 | With | LN*U03... |
| TXN03R150U0050A06 | 0.039 | 0.035 | 0.039 | 1.500 | 6 | 1.323 | 1.291 | 1.327 | 1.380 | 0.500 | 0.600 | 1.575 | 0.160 | 0.252 | 17° | 12° | 17° | 0.510 | With | LN*U03... |
| TXN03R200U0075A05 | 0.039 | 0.035 | 0.039 | 2.000 | 5 | 1.717 | 1.685 | 1.720 | 1.693 | 0.750 | 0.750 | 1.969 | 0.197 | 0.315 | 17° | 12° | 17° | 1.100 | With | LN*U03... |
| TXN03R200U0075A08 | 0.039 | 0.035 | 0.039 | 2.000 | 8 | 1.717 | 1.685 | 1.720 | 1.693 | 0.750 | 0.750 | 1.969 | 0.197 | 0.315 | 17° | 12° | 17° | 1.100 | With | LN*U03... |
| TXN03R200U0075A10 | 0.039 | 0.035 | 0.039 | 2.000 | 10 | 1.717 | 1.685 | 1.720 | 1.693 | 0.750 | 0.750 | 1.969 | 0.197 | 0.315 | 17° | 12° | 17° | 1.100 | With | LN*U03... |

*KAPR2 : with LNMU0303UER
*KAPR3 : with LNGU0303ZER

### SPARE PARTS




| Designation | Clamping screw | Lubricant | Shell locking bolt | Wrench |
|---|---|---|---|---|
| TXN03R150U0050A05 | CSPB-2.5L080 | M-1000 | CM8X30H | IP-8D |
| TXN03R150U0050A06 | CSPB-2.5 | M-1000 | CM8X30H | IP-8D |
| TXN03R200U... | CSPB-2.5L080 | M-1000 | CM10X30H | IP-8D |

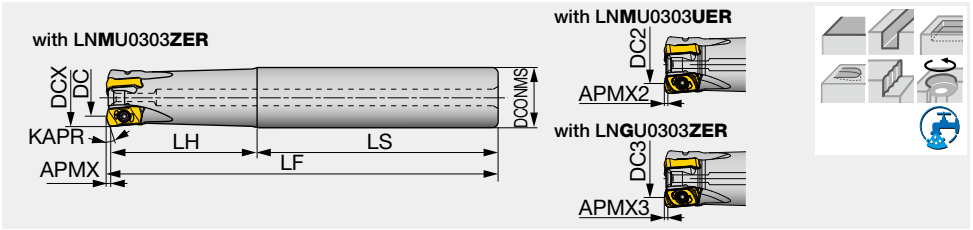
*Recommended clamping torque：CSPB-2.5/CSPB-2.5L080 = 0.96 lbs·ft

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

## EXN03

High feed endmill, shank type, with center through coolant hole, for 4-corner double sided inserts

GAMP = +6°, GAMF = +5° ~ +11°




| Inch | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | DCONMS | LF | LH | LS | KAPR | KAPR2* | KAPR3* | WT(lb) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXN03R062U0062-02(1) | 0.039 | 0.035 | 0.039 | 0.625 | 2 | 0.373 | 0.342 | 0.381 | 0.625 | 4.000 | 1.250 | 2.750 | 15° | 10° | 15° | 0.310 | With | LN*U03... |
| EXN03R062U0062-02L(1) | 0.039 | 0.035 | 0.039 | 0.625 | 2 | 0.373 | 0.342 | 0.381 | 0.625 | 6.000 | 2.000 | 4.000 | 15° | 10° | 15° | 0.460 | With | LN*U03... |
| EXN03R068U0062-02(1) | 0.039 | 0.035 | 0.039 | 0.688 | 2 | 0.432 | 0.401 | 0.436 | 0.625 | 4.000 | 1.250 | 2.750 | 17° | 12° | 17° | 0.310 | With | LN*U03... |
| EXN03R068U0062-02L(1) | 0.039 | 0.035 | 0.039 | 0.688 | 2 | 0.432 | 0.401 | 0.436 | 0.625 | 6.000 | 1.000 | 5.000 | 17° | 12° | 17° | 0.490 | With | LN*U03... |
| EXN03R075U0075-02(2) | 0.039 | 0.035 | 0.039 | 0.750 | 2 | 0.494 | 0.463 | 0.498 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 12° | 17° | 0.550 | With | LN*U03... |
| EXN03R075U0075-03(2) | 0.039 | 0.035 | 0.039 | 0.750 | 3 | 0.494 | 0.463 | 0.498 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 12° | 17° | 0.550 | With | LN*U03... |
| EXN03R075U0075-03L(2) | 0.039 | 0.035 | 0.039 | 0.750 | 3 | 0.494 | 0.463 | 0.498 | 0.750 | 6.500 | 3.500 | 3.000 | 17° | 12° | 17° | 0.710 | With | LN*U03... |
| EXN03R087U0075-02(2) | 0.039 | 0.035 | 0.039 | 0.875 | 2 | 0.619 | 0.588 | 0.623 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 12° | 17° | 0.570 | With | LN*U03... |
| EXN03R087U0075-03(2) | 0.039 | 0.035 | 0.039 | 0.875 | 3 | 0.619 | 0.588 | 0.623 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 12° | 17° | 0.570 | With | LN*U03... |
| EXN03R087U0075-03L(2) | 0.039 | 0.035 | 0.039 | 0.875 | 3 | 0.619 | 0.588 | 0.623 | 0.750 | 6.500 | 1.250 | 5.250 | 17° | 12° | 17° | 0.750 | With | LN*U03... |
| EXN03R100U0100-04(2) | 0.039 | 0.035 | 0.039 | 1.000 | 4 | 0.744 | 0.713 | 0.748 | 1.000 | 5.500 | 2.500 | 3.000 | 17° | 12° | 17° | 1.080 | With | LN*U03... |
| EXN03R100U0100-04L(2) | 0.039 | 0.035 | 0.039 | 1.000 | 4 | 0.744 | 0.713 | 0.748 | 1.000 | 7.000 | 4.000 | 3.000 | 17° | 12° | 17° | 1.340 | With | LN*U03... |
| EXN03R100U0100-05(1) | 0.039 | 0.035 | 0.039 | 1.000 | 5 | 0.744 | 0.713 | 0.748 | 1.000 | 5.500 | 2.500 | 3.000 | 17° | 12° | 17° | 1.080 | With | LN*U03... |
| EXN03R112U0100-04(2) | 0.039 | 0.035 | 0.039 | 1.125 | 4 | 0.869 | 0.838 | 0.873 | 1.000 | 5.500 | 2.500 | 3.000 | 17° | 12° | 17° | 1.120 | With | LN*U03... |
| EXN03R112U0100-04L(2) | 0.039 | 0.035 | 0.039 | 1.125 | 4 | 0.869 | 0.838 | 0.873 | 1.000 | 7.000 | 1.500 | 5.500 | 17° | 12° | 17° | 1.460 | With | LN*U03... |
| EXN03R112U0100-05(2) | 0.039 | 0.035 | 0.039 | 1.125 | 5 | 0.869 | 0.838 | 0.873 | 1.000 | 5.500 | 2.500 | 3.000 | 17° | 12° | 17° | 1.120 | With | LN*U03... |
| EXN03R125U0125-05(2) | 0.039 | 0.035 | 0.039 | 1.250 | 5 | 0.994 | 0.963 | 0.998 | 1.250 | 6.000 | 3.000 | 3.000 | 17° | 12° | 17° | 1.870 | With | LN*U03... |
| EXN03R125U0125-05L(2) | 0.039 | 0.035 | 0.039 | 1.250 | 5 | 0.994 | 0.963 | 0.998 | 1.250 | 8.000 | 5.000 | 3.000 | 17° | 12° | 17° | 2.430 | With | LN*U03... |
| EXN03R125U0125-06(1) | 0.039 | 0.035 | 0.039 | 1.250 | 6 | 0.994 | 0.963 | 0.998 | 1.250 | 6.000 | 3.000 | 3.000 | 17° | 12° | 17° | 1.850 | With | LN*U03... |

*KAPR2 : with LNMU0303UER
*KAPR3 : with LNGU0303ZER
Clamping screws used for (1) and (2) above are different. See below for the part codes.

### SPARE PARTS



| Designation | Clamping screw | Lubricant | Wrench |
|---|---|---|---|
| EXN03... | (1) CSPB-2.5<br>(2) CSPB-2.5L080 | M-1000 | IP-8D |

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

*Recommended clamping torque : CSPB-2.5/CSPB-2.5L080 = 0.96 lbs·ft

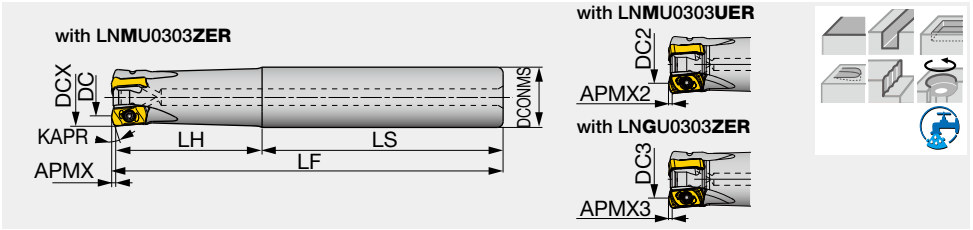
DOFEED

Insert size 03

## EXN03-C

High feed endmill, shank type, with coolant directly to the tool tips, for 4-corner double sided inserts

GAMP = +6°,GAMF = +5° ~ +11°




| Inch | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | DCONMS | LF | LH | LS | KAPR | KAPR2* | KAPR3* | WT(lb) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXN03R075U0075-03-C(2) | 0.039 | 0.035 | 0.039 | 0.750 | 3 | 0.495 | 0.464 | 0.498 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 12° | 17° | 0.66 | With | LN*U03... |
| EXN03R087U0075-03-C(2) | 0.039 | 0.035 | 0.039 | 0.875 | 3 | 0.621 | 0.590 | 0.623 | 0.750 | 5.000 | 2.000 | 3.000 | 17° | 12° | 17° | 0.66 | With | LN*U03... |
| EXN03R100U0100-05-C(1) | 0.039 | 0.035 | 0.039 | 1.000 | 5 | 0.746 | 0.715 | 0.748 | 1.000 | 5.500 | 2.500 | 3.000 | 17° | 12° | 17° | 1.1 | With | LN*U03... |
| EXN03R125U0125-06-C(1) | 0.039 | 0.035 | 0.039 | 1.250 | 6 | 0.997 | 0.966 | 0.997 | 1.250 | 6.000 | 3.000 | 3.000 | 17° | 12° | 17° | 1.76 | With | LN*U03... |
| EXN03R150U0125-06-C(2) | 0.039 | 0.035 | 0.039 | 1.500 | 6 | 1.248 | 1.217 | 1.247 | 1.250 | 6.000 | 3.000 | 3.000 | 17° | 12° | 17° | 1.96 | With | LN*U03... |

| Metric | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | DCONMS | LF | LH | LS | KAPR | KAPR2* | KAPR3* | WT(kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXN03R016M16.0-02-C(1) | 1 | 0.9 | 1 | 16 | 2 | 9.6 | 8.8 | 9.8 | 16 | 100 | 30 | 70 | 15° | 10° | 15° | 0.2 | With | LN*U03... |
| EXN03R016M16.0-02L-C(1) | 1 | 0.9 | 1 | 16 | 2 | 9.6 | 8.8 | 9.8 | 16 | 150 | 50 | 100 | 15° | 10° | 15° | 0.2 | With | LN*U03... |
| EXN03R020M20.0-03-C(2) | 1 | 0.9 | 1 | 20 | 3 | 13.5 | 12.7 | 13.6 | 20 | 130 | 50 | 80 | 17° | 12° | 17° | 0.3 | With | LN*U03... |
| EXN03R020M20.0-03L-C(2) | 1 | 0.9 | 1 | 20 | 3 | 13.5 | 12.7 | 13.6 | 20 | 160 | 80 | 80 | 17° | 12° | 17° | 0.3 | With | LN*U03... |
| EXN03R020M20.0-04-C(1) | 1 | 0.9 | 1 | 20 | 4 | 13.5 | 12.7 | 13.6 | 20 | 130 | 50 | 80 | 17° | 12° | 17° | 0.3 | With | LN*U03... |
| EXN03R025M25.0-04-C(2) | 1 | 0.9 | 1 | 25 | 4 | 18.5 | 17.7 | 18.6 | 25 | 140 | 60 | 80 | 17° | 12° | 17° | 0.5 | With | LN*U03... |
| EXN03R025M25.0-04L-C(2) | 1 | 0.9 | 1 | 25 | 4 | 18.5 | 17.7 | 18.6 | 25 | 180 | 100 | 80 | 17° | 12° | 17° | 0.6 | With | LN*U03... |
| EXN03R025M25.0-05-C(1) | 1 | 0.9 | 1 | 25 | 5 | 18.5 | 17.7 | 18.6 | 25 | 140 | 60 | 80 | 17° | 12° | 17° | 0.5 | With | LN*U03... |
| EXN03R032M32.0-05-C(2) | 1 | 0.9 | 1 | 32 | 5 | 25.5 | 24.7 | 25.6 | 32 | 150 | 70 | 80 | 17° | 12° | 17° | 0.8 | With | LN*U03... |
| EXN03R032M32.0-05L-C(2) | 1 | 0.9 | 1 | 32 | 5 | 25.5 | 24.7 | 25.6 | 32 | 200 | 120 | 80 | 17° | 12° | 17° | 1.1 | With | LN*U03... |
| EXN03R032M32.0-06-C(1) | 1 | 0.9 | 1 | 32 | 6 | 25.5 | 24.7 | 25.6 | 32 | 150 | 70 | 80 | 17° | 12° | 17° | 0.8 | With | LN*U03... |
| EXN03R040M32.0-06-C(2) | 1 | 0.9 | 1 | 40 | 6 | 33.6 | 32.8 | 33.7 | 32 | 150 | 45 | 105 | 17° | 12° | 17° | 1 | With | LN*U03... |
| EXN03R040M32.0-06L-C(2) | 1 | 0.9 | 1 | 40 | 6 | 33.6 | 32.8 | 33.7 | 32 | 220 | 45 | 175 | 17° | 12° | 17° | 1.4 | With | LN*U03... |

*KAPR2 : with LNMU0303UER
*KAPR3 : with LNGU0303ZER
Clamping screws used for (1) and (2) above are different. See below for the part codes.

### SPARE PARTS



| Designation | Clamping screw | Lubricant | Wrench |
|---|---|---|---|
| EXN03... | (1) CSPB-2.5<br>(2) CSPB-2.5L080 | M-1000 | IP-8D |

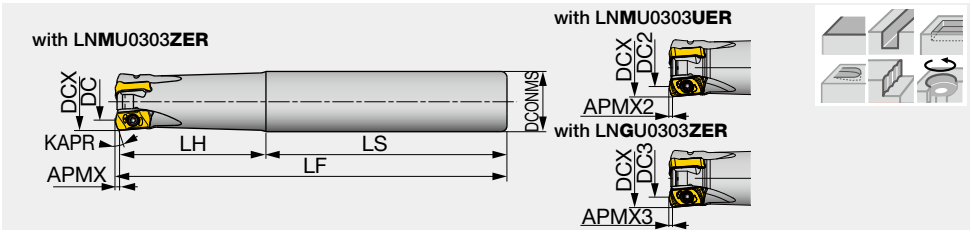
| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

*Recommended clamping torque : CSPB-2.5/CSPB-2.5L080 = 0.96 lbs·ft, 1.3 N·m

## EXN03-N

### High feed endmill (Eco), shank type, for double sided inserts

GAMP = +6°, GAMF = +5° ~ +11°




| Metric | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | DCONMS | LF | LH | LS | KAPR | KAPR2* | KAPR3* | WT(kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXN03R016M16.0-02N(1) | 1 | 0.9 | 1 | 16 | 2 | 9.6 | 8.8 | 9.8 | 16 | 100 | 30 | 70 | 15° | 10° | 15° | 0.2 | Without | LN*U03... |
| EXN03R020M20.0-03N(2) | 1 | 0.9 | 1 | 20 | 3 | 13.5 | 12.7 | 13.6 | 20 | 130 | 50 | 80 | 17° | 12° | 17° | 0.3 | Without | LN*U03... |
| EXN03R025M25.0-04N(2) | 1 | 0.9 | 1 | 25 | 4 | 18.5 | 17.7 | 18.6 | 25 | 140 | 60 | 80 | 17° | 12° | 17° | 0.5 | Without | LN*U03... |
| EXN03R032M32.0-05N(2) | 1 | 0.9 | 1 | 32 | 5 | 25.5 | 24.7 | 25.6 | 32 | 150 | 70 | 80 | 17° | 12° | 17° | 0.8 | Without | LN*U03... |

*KAPR2 : with LNMU0303UER
*KAPR3 : with LNGU0303ZER
Clamping screws used for (1) and (2) above are different. See below for the part codes.

### SPARE PARTS



| Designation | Clamping screw | Lubricant | Wrench |
|---|---|---|---|
| EXN03... | (1) CSPB-2.5<br>(2) CSPB-2.5L080 | M-1000 | IP-8D |

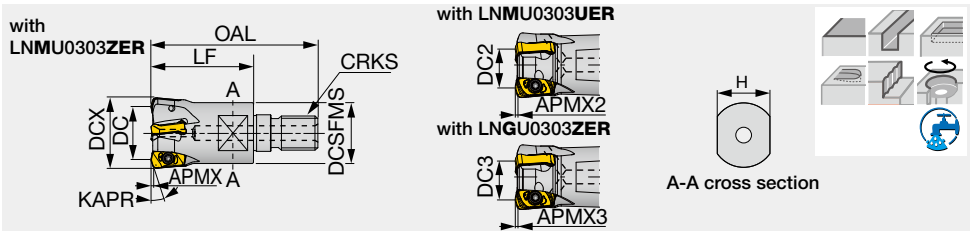
| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

*Recommended clamping torque : CSPB-2.5/CSPB-2.5L080 = 1.3 N·m

## HXN03

### High feed endmill, modular type (TungFlex)

GAMP= +6°,GAMF= +5° ~ +11°




| Metric | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | OAL | LF | H | DCSFMS | KAPR | KAPR2* | KAPR3* | CRKS | WT(kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HXN03R016MM08-02(1) | 1 | 0.9 | 1 | 16 | 2 | 9.6 | 8.8 | 9.8 | 42 | 25 | 10 | 12.8 | 15° | 10° | 15° | M8 | 0.03 | With | LN*U03... |
| HXN03R018MM08-02(1) | 1 | 0.9 | 1 | 18 | 2 | 11.5 | 10.7 | 11.7 | 42 | 25 | 10 | 14.5 | 17° | 12° | 17° | M8 | 0.04 | With | LN*U03... |
| HXN03R020MM10-03(2) | 1 | 0.9 | 1 | 20 | 3 | 13.5 | 12.7 | 13.6 | 49 | 30 | 15 | 17.8 | 17° | 12° | 17° | M10 | 0.06 | With | LN*U03... |
| HXN03R020MM10-04(1) | 1 | 0.9 | 1 | 20 | 4 | 13.5 | 12.7 | 13.6 | 49 | 30 | 15 | 17.8 | 17° | 12° | 17° | M10 | 0.06 | With | LN*U03... |
| HXN03R022MM10-03(2) | 1 | 0.9 | 1 | 22 | 3 | 15.5 | 14.7 | 15.6 | 49 | 30 | 15 | 17.8 | 17° | 12° | 17° | M10 | 0.06 | With | LN*U03... |
| HXN03R022MM10-04(1) | 1 | 0.9 | 1 | 22 | 4 | 15.5 | 14.7 | 15.6 | 49 | 30 | 15 | 17.8 | 17° | 12° | 17° | M10 | 0.07 | With | LN*U03... |
| HXN03R025MM12-04(2) | 1 | 0.9 | 1 | 25 | 4 | 18.5 | 17.7 | 18.6 | 57 | 35 | 17 | 20.8 | 17° | 12° | 17° | M12 | 0.1 | With | LN*U03... |
| HXN03R025MM12-05(1) | 1 | 0.9 | 1 | 25 | 5 | 18.5 | 17.7 | 18.6 | 57 | 35 | 17 | 20.8 | 17° | 12° | 17° | M12 | 0.11 | With | LN*U03... |
| HXN03R028MM12-04(2) | 1 | 0.9 | 1 | 28 | 4 | 21.5 | 20.7 | 21.6 | 57 | 35 | 17 | 23 | 17° | 12° | 17° | M12 | 0.12 | With | LN*U03... |
| HXN03R028MM12-05(2) | 1 | 0.9 | 1 | 28 | 5 | 21.5 | 20.7 | 21.6 | 57 | 35 | 17 | 23 | 17° | 12° | 17° | M12 | 0.12 | With | LN*U03... |
| HXN03R030MM16-04(2) | 1 | 0.9 | 1 | 30 | 4 | 23.5 | 22.7 | 23.6 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.19 | With | LN*U03... |
| HXN03R030MM16-05(2) | 1 | 0.9 | 1 | 30 | 5 | 23.5 | 22.7 | 23.6 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.2 | With | LN*U03... |
| HXN03R032MM16-05(2) | 1 | 0.9 | 1 | 32 | 5 | 25.5 | 24.7 | 25.6 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.2 | With | LN*U03... |
| HXN03R032MM16-06(1) | 1 | 0.9 | 1 | 32 | 6 | 25.5 | 24.7 | 25.6 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.21 | With | LN*U03... |

*KAPR2 : with LNMU0303UER
*KAPR3 : with LNGU0303ZER
Clamping screws used for (1) and (2) above are different. See below for the part codes.

### SPARE PARTS



| Designation | Clamping screw | Lubricant | Wrench |
|---|---|---|---|
| HXN03... | (1) CSPB-2.5<br>(2) CSPB-2.5L080 | M-1000 | IP-8D |

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

*Recommended clamping torque : CSPB-2.5/CSPB-2.5L080 = 1.3 N·m

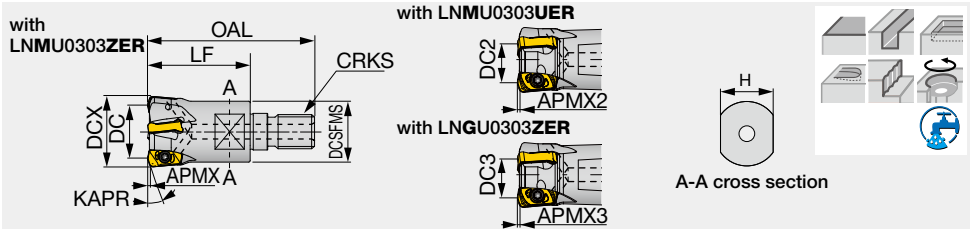
DOFEED

Insert size 03

## HXN03-C

High feed endmill, modular type, with coolant directly to the tool tips (TungFlex)

GAMP= +6°,GAMF= +5° ~ +11°




| Metric | APMX | APMX2 | APMX3 | DCX | CICT | DC | DC2 | DC3 | OAL | LF | H | DCSFMS | KAPR | KAPR2* | KAPR3* | CRKS | WT(kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HXN03R016MM08-02-C(1) | 1 | 0.9 | 1 | 16 | 2 | 9.6 | 8.8 | 9.8 | 42 | 25 | 10 | 12.8 | 15° | 10° | 15° | M8 | 0.03 | With | LN*U03... |
| HXN03R020MM10-03-C(2) | 1 | 0.9 | 1 | 20 | 3 | 13.5 | 12.7 | 13.6 | 49 | 30 | 15 | 17.8 | 17° | 12° | 17° | M10 | 0.06 | With | LN*U03... |
| HXN03R020MM10-04-C(1) | 1 | 0.9 | 1 | 20 | 4 | 13.5 | 12.7 | 13.6 | 49 | 30 | 15 | 17.8 | 17° | 12° | 17° | M10 | 0.06 | With | LN*U03... |
| HXN03R025MM12-04-C(2) | 1 | 0.9 | 1 | 25 | 4 | 18.5 | 17.7 | 18.6 | 57 | 35 | 17 | 20.8 | 17° | 12° | 17° | M12 | 0.1 | With | LN*U03... |
| HXN03R025MM12-05-C(1) | 1 | 0.9 | 1 | 25 | 5 | 18.5 | 17.7 | 18.6 | 57 | 35 | 17 | 20.8 | 17° | 12° | 17° | M12 | 0.1 | With | LN*U03... |
| HXN03R032MM16-05-C(2) | 1 | 0.9 | 1 | 32 | 5 | 25.5 | 24.7 | 25.6 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.2 | With | LN*U03... |
| HXN03R032MM16-06-C(1) | 1 | 0.9 | 1 | 32 | 6 | 25.5 | 24.7 | 25.6 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.2 | With | LN*U03... |
| HXN03R040MM16-06-C(2) | 1 | 0.9 | 1 | 40 | 6 | 33.6 | 32.8 | 33.7 | 63 | 40 | 22 | 28.8 | 17° | 12° | 17° | M16 | 0.27 | With | LN*U03... |

*KAPR2 : with LNMU0303UER
*KAPR3 : with LNGU0303ZER
Clamping screws used for (1) and (2) above are different. See below for the part codes.

### SPARE PARTS



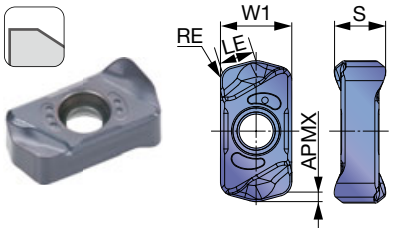
| Designation | Clamping screw | Lubricant | Wrench |
|---|---|---|---|
| HXN03... | (1) CSPB-2.5<br>(2) CSPB-2.5L080 | M-1000 | IP-8D |

*Recommended clamping torque：CSPB-2.5/CSPB-2.5L080 = 1.3 N·m

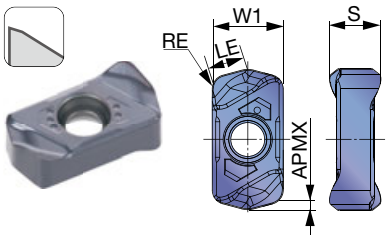
| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / -0.018" |

## INSERT

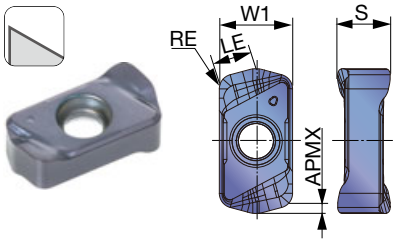
### LNMU03ZER-MJ (for general purpose)



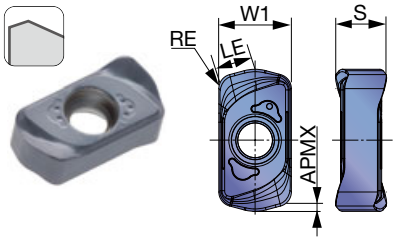

### LNMU03ZER-ML (for low cutting force)



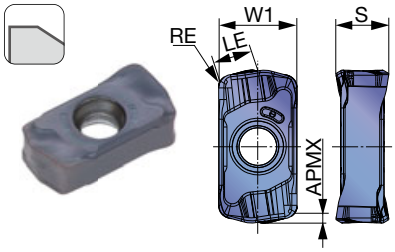

### LNMU03ZER-MS (for stainless steel)



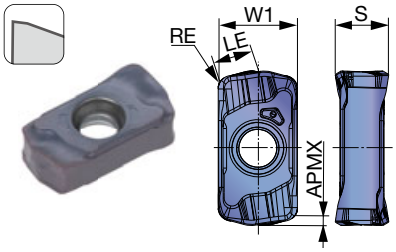

### LNGU03ZER-MH (Robust cutting edges)




### LNMU03UER-MJ (for general purpose, low approach angle)




### LNMU03UER-ML (for low cutting force, low approach angle)




| | | AH130 | AH3225 | AH725 | AH120 | AH8015 | AH8005 |
|---|---|---|---|---|---|---|---|
| P | Steel | | ★ | | | | |
| M | Stainless | ★ | ☆ | | | | |
| K | Cast iron | | ☆ | ★ | ☆ | | |
| N | Non-ferrous | | | | | | |
| S | Titanium | ★ | ☆ | | | | |
| S | Inconel | | | ☆ | | ★ | |
| H | Hard materials | | | ☆ | | ★ | ☆ |

★ : First choice
☆ : Second choice

| Designation | RE | APMX | Coated | | | | | | LE | W1 | S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AH130 | AH3225 | AH725 | AH120 | AH8015 | AH8005 | | | |
| LNMU0303ZER-MJ | 0.047 | 0.039 | ● | ● | ● | ● | ● | | 0.126 | 0.236 | 0.169 |
| LNMU0303ZER-ML | 0.047 | 0.039 | ● | ● | ● | | ● | | 0.126 | 0.236 | 0.169 |
| LNMU0303ZER-MS | 0.047 | 0.039 | ● | ● | | | | | 0.126 | 0.236 | 0.169 |
| LNGU0303ZER-MH | 0.047 | 0.039 | | | | | ● | ● | 0.126 | 0.236 | 0.169 |
| LNMU0303UER-MJ | 0.039 | 0.035 | ● | ● | | | ● | | 0.122 | 0.236 | 0.161 |
| LNMU0303UER-ML | 0.039 | 0.035 | ● | ● | | | ● | | 0.122 | 0.236 | 0.161 |

● : New product
● : Line up

DOFEED

Insert size 03

## STANDARD CUTTING CONDITIONS

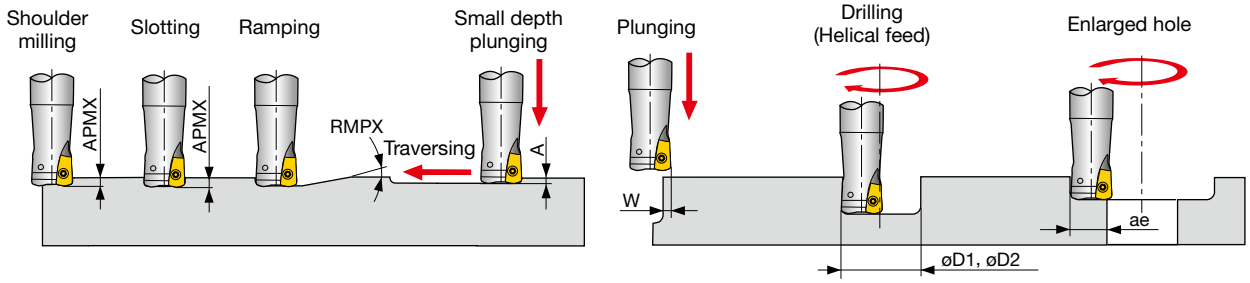
### ZER type

| ISO | Workpiece material | Hardness | Priority | Grade | Chip-breaker | Cutting speed Vc (sfm) | Feed per tooth: fz (ipt) Tool dia.: DCX (in) ø0.625~ø0.875 | ø1.000~ø2.000 | Plunging | ø0.625", CICT = 2 n | Vf | ø0.688", CICT = 2 n | Vf | ø0.75 n | Vf CICT = 2 | Vf CICT = 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steels (S45C / C45, S55C / C55, etc.) | - 300HB | First choice | AH3225 | MJ | 330 - 980 | 0.020 - 0.047 | 0.020 - 0.059 | 0.004 | 4,030 | 250 | 3,660 | 227 | 3,360 | 208 | 312 |
| | | | | | | | | | | Vc = 660 sfm, fz = 0.031 ipt | | | | | | |
| | Alloy steels (SCM440 / 42CrMo4, etc.) | - 300HB | First choice | AH3225 | MJ | 330 - 980 | 0.020 - 0.047 | 0.020 - 0.059 | 0.004 | 4,030 | 250 | 3,660 | 227 | 3,360 | 208 | 312 |
| | | | | | | | | | | Vc = 660 sfm, fz = 0.031 ipt | | | | | | |
| | Prehardened steels (NAK80, PX5, etc.) | 30 - 40HRC | First choice | AH3225 | MJ | 330 - 660 | 0.020 - 0.039 | 0.020 - 0.039 | 0.004 | 2,990 | 167 | 2,720 | 152 | 2,500 | 140 | 210 |
| | | | | | | | | | | Vc = 490 sfm, fz = 0.028 ipt | | | | | | |
| | | 30 - 40HRC | for wear resistance | AH8015 | MJ | 330 - 660 | 0.020 - 0.039 | 0.020 - 0.039 | 0.004 | 2,990 | 167 | 2,720 | 152 | 2,500 | 140 | 210 |
| | | | | | | | | | | Vc = 490 sfm, fz = 0.028 ipt | | | | | | |
| M | Austenitic stainless steels (SUS304 / X5CrNi18-9, etc.) | - 200HB | First choice | AH130 | MS | 260 - 490 | 0.012 - 0.031 | 0.012 - 0.031 | 0.004 | 2,380 | 95 | 2,170 | 87 | 1,990 | 80 | 119 |
| | | | | | | | | | | Vc = 390 sfm, fz = 0.02 ipt | | | | | | |
| | Precipitation hardening stainless steels (SUS630 / X5CrNiCuNb16-4) | 28HRC - (H1150) | First choice | AH130 | MS | 260 - 490 | 0.008 - 0.020 | 0.008 - 0.020 | 0.004 | 2,380 | 57 | 2,170 | 52 | 1,990 | 48 | 72 |
| | | | for wear resistance | AH3225 | MS | | | | | Vc = 390 sfm, fz = 0.012 ipt | | | | | | |
| | | 40HRC - (H900) | First choice | AH3225 | ML | 260 - 390 | 0.004 - 0.012 | 0.004 - 0.012 | 0.004 | 2,020 | 32 | 1,830 | 29 | 1,680 | 27 | 40 |
| | | | for impact resistance | AH3225 | MJ | | | | | Vc = 330 sfm, fz = 0.008 ipt | | | | | | |
| K | Gray cast irons (FC250 / GG25 / 250, etc.) | 150 - 250HB | First choice | AH725 | MJ | 330 - 980 | 0.020 - 0.047 | 0.020 - 0.059 | 0.004 | 4,030 | 250 | 3,660 | 227 | 3,360 | 208 | 312 |
| | | | | | | | | | | Vc = 660 sfm, fz = 0.031 ipt | | | | | | |
| | Ductile cast irons (FCD400, etc.) | 150 - 250HB | First choice | AH725 | MJ | 260 - 660 | 0.020 - 0.047 | 0.020 - 0.059 | 0.004 | 2,990 | 185 | 2,720 | 169 | 2,500 | 155 | 233 |
| | | | | | | | | | | Vc = 490 sfm, fz = 0.031 ipt | | | | | | |
| S | Titanium alloy (Ti-6Al-4V, etc.) | - 40HRC | First choice | AH130 | ML | 100 - 200 | 0.012-0.028 | 0.012-0.028 | 0.003 | 790 | 25 | 720 | 23 | 660 | 21 | 32 |
| | | | for impact resistance | AH130 | MJ | | | | | Vc = 130 sfm, fz = 0.016 ipt | | | | | | |
| | Heat-resistant alloy (Inconel, Hastelloy, etc.) | - 40HRC | First choice | AH8015 | ML | 70 - 160 | 0.004 - 0.012 | 0.004 - 0.012 | 0.002 | 610 | 10 | 560 | 9 | 510 | 8 | 12 |
| | | | for impact resistance | AH725 | ML | | | | | Vc = 100 sfm, fz = 0.008 ipt | | | | | | |
| H | Hot mold steel (SKD61 / X40CrMoV5-1, etc.) | 40 - 55HRC | First choice | AH8015 | MH | 260 - 490 | 0.004 - 0.020 | 0.004 - 0.020 | 0.002 | 2,390 | 57 | 2,170 | 52 | 1,990 | 48 | 72 |
| | | | Low resistance | AH8015 | MJ | | 0.004 - 0.012 | 0.004 - 0.012 | | Vc = 390 sfm, fz = 0.012 ipt | | | | | | |
| | Hot mold steel of D.T.C materials (DAC**, DH**, DIEVER, etc) | 40 - 55HRC | First choice | AH8015 | MJ | 160 - 330 | 0.004 - 0.012 | 0.004 - 0.012 | 0.002 | 1,590 | 25 | 1,440 | 23 | 1,320 | 21 | 32 |
| | | | for impact resistance | AH8015 | MH | | 0.004 - 0.020 | 0.004 - 0.020 | | Vc = 260 sfm, fz = 0.008 ipt | | | | | | |
| | Cold mold steels (SKD11 / X153CrMoV12, etc.) | 55 - 60HRC | First choice | AH8005 | MH | 160 - 230 | 0.002 - 0.008 | 0.001 - 0.004 | 0.001 | 1,220 | 12 | 1,110 | 11 | 1,020 | 10 | 15 |
| | | | | | | | | | | Vc = 200 sfm, fz = 0.005 ipt | | | | | | |
| | | 55 - 60HRC | for impact resistance | AH8015 | MH | 160 - 230 | 0.002 - 0.004 | 0.002 - 0.008 | 0.001 | 1,220 | 5 | 1,110 | 4 | 1,020 | 4 | 6 |
| | | | | | | | | | | Vc = 200 sfm, fz = 0.002 ipt | | | | | | |

- When chips stay in the cutting zone during slotting or pocketing, use air blast to remove chips from the work area.

- Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed.

## APPLICATION RANGE




| Designation | DCX | Max. depth of cut APMX | Max. ramping angle RMPX | Max. plunging depth A | Max. cutting width in plunging W | Min. machinable hole dia. øD1 | Max. machinable hole dia. øD2 | Max. cutting width in enlarged hole ae |
|---|---|---|---|---|---|---|---|---|
| EXN03R062U0062... | 0.625 | 0.039 | 1.7° | 0.012 | 0.118 | 0.897 | 1.181 | 0.492 |
| EXN03R068U0062... | 0.688 | 0.039 | 1.7° | 0.012 | 0.118 | 0.991 | 1.339 | 0.571 |
| EXN03R075U0075... | 0.750 | 0.039 | 1.2° | 0.012 | 0.118 | 1.132 | 1.496 | 0.650 |
| EXN03R087U0075... | 0.875 | 0.039 | 1° | 0.012 | 0.118 | 1.371 | 1.654 | 0.728 |
| EXN03R100U0100... | 1.000 | 0.039 | 0.9° | 0.012 | 0.118 | 1.610 | 1.890 | 0.846 |
| EXN03R112U0100... | 1.125 | 0.039 | 0.8° | 0.012 | 0.118 | 1.857 | 2.126 | 0.965 |
| EXN03R125U0125... | 1.250 | 0.039 | 0.7° | 0.012 | 0.118 | 2.104 | 2.441 | 1.122 |
| TXN03R150U0075... | 1.500 | 0.039 | 0.5° | 0.012 | 0.118 | 2.750 | 3.070 | 1.437 |
| TXN03R200U0075... | 2.000 | 0.039 | 0.4° | 0.012 | 0.118 | 3.540 | 3.858 | 1.830 |

Note: For DCX above ø1.300", slot milling, ramping or contouring is not recommended as chips may be re-cut

**Tool dia.: DCX (in), Number of revolutions: *n* (rpm), Feed speed: *Vf* (ipm), Max. depth of cut: *ap* = 0.004"**

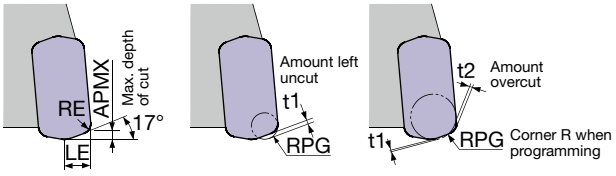
| ø0.875 | | | ø1 | | | ø1.125 | | | ø1.25 | | | ø1.5 | | | ø2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | |
| | CICT = 2 | CICT = 3 | | CICT = 4 | CICT = 5 | | CICT = 4 | CICT = 5 | | CICT = 5 | CICT = 6 | | CICT = 5 | CICT = 6 | | CICT = 5 | CICT = 8 | CICT = 10 |
| 2,880 | 230 | 346 | 2,520 | 403 | 504 | 2,240 | 358 | 448 | 2,020 | 404 | 485 | 1,680 | 336 | 403 | 1,260 | 252 | 403 | 504 |
| *Vc* = 660 sfm, *fz* = 0.04 ipt | | | | | | | | | | | | | | | | | | |
| 2,880 | 230 | 346 | 2,520 | 403 | 504 | 2,240 | 358 | 448 | 2,020 | 404 | 485 | 1,680 | 336 | 403 | 1,260 | 252 | 403 | 504 |
| *Vc* = 660 sfm, *fz* = 0.04 ipt | | | | | | | | | | | | | | | | | | |
| 2,140 | 120 | 180 | 1,870 | 209 | 262 | 1,660 | 186 | 232 | 1,500 | 210 | 252 | 1,250 | 175 | 210 | 940 | 132 | 211 | 263 |
| *Vc* = 490 sfm, *fz* = 0.028 ipt | | | | | | | | | | | | | | | | | | |
| 2,140 | 120 | 180 | 1,870 | 209 | 262 | 1,660 | 186 | 232 | 1,500 | 210 | 252 | 1,250 | 175 | 210 | 940 | 132 | 211 | 263 |
| *Vc* = 490 sfm, *fz* = 0.028 ipt | | | | | | | | | | | | | | | | | | |
| 1,700 | 68 | 102 | 1,490 | 119 | 149 | 1,320 | 106 | 132 | 1,190 | 119 | 143 | 990 | 99 | 119 | 740 | 74 | 118 | 148 |
| *Vc* = 390 sfm, *fz* = 0.02 ipt | | | | | | | | | | | | | | | | | | |
| 1,700 | 41 | 61 | 1,490 | 72 | 89 | 1,320 | 63 | 79 | 1,190 | 71 | 86 | 990 | 59 | 71 | 740 | 44 | 71 | 89 |
| *Vc* = 390 sfm, *fz* = 0.012 ipt | | | | | | | | | | | | | | | | | | |
| 1,440 | 23 | 35 | 1,260 | 40 | 50 | 1,120 | 36 | 45 | 1,010 | 40 | 48 | 840 | 34 | 40 | 630 | 25 | 40 | 50 |
| *Vc* = 330 sfm, *fz* = 0.008 ipt | | | | | | | | | | | | | | | | | | |
| 2,880 | 230 | 346 | 2,520 | 403 | 504 | 2,240 | 358 | 448 | 2,020 | 404 | 485 | 1,680 | 336 | 403 | 1,260 | 252 | 403 | 504 |
| *Vc* = 660 sfm, *fz* = 0.04 ipt | | | | | | | | | | | | | | | | | | |
| 2,140 | 171 | 257 | 1,870 | 299 | 374 | 1,660 | 266 | 332 | 1,500 | 300 | 360 | 1,250 | 250 | 300 | 940 | 188 | 301 | 376 |
| *Vc* = 490 sfm, *fz* = 0.04 ipt | | | | | | | | | | | | | | | | | | |
| 570 | 23 | 34 | 500 | 40 | 50 | 440 | 35 | 44 | 400 | 40 | 48 | 330 | 33 | 40 | 250 | 25 | 40 | 50 |
| *Vc* = 130 sfm, *fz* = 0.02 ipt | | | | | | | | | | | | | | | | | | |
| 440 | 7 | 11 | 380 | 12 | 15 | 340 | 11 | 14 | 310 | 12 | 15 | 250 | 10 | 12 | 190 | 8 | 12 | 15 |
| *Vc* = 100 sfm, *fz* = 0.008 ipt | | | | | | | | | | | | | | | | | | |
| 1,700 | 41 | 61 | 1,490 | 72 | 89 | 1,320 | 63 | 79 | 1,190 | 71 | 86 | 990 | 59 | 71 | 740 | 44 | 71 | 89 |
| *Vc* = 390 sfm, *fz* = 0.012 ipt | | | | | | | | | | | | | | | | | | |
| 1,140 | 18 | 27 | 990 | 32 | 40 | 880 | 28 | 35 | 790 | 32 | 38 | 660 | 26 | 32 | 500 | 20 | 32 | 40 |
| *Vc* = 260 sfm, *fz* = 0.008 ipt | | | | | | | | | | | | | | | | | | |
| 870 | 7 | 10 | 760 | 12 | 15 | 680 | 11 | 14 | 610 | 12 | 15 | 510 | 10 | 12 | 380 | 8 | 12 | 15 |
| *Vc* = 200 sfm, *fz* = 0.004 ipt | | | | | | | | | | | | | | | | | | |
| 870 | 3 | 5 | 760 | 6 | 8 | 680 | 5 | 7 | 610 | 6 | 7 | 510 | 5 | 6 | 380 | 4 | 6 | 8 |
| *Vc* = 200 sfm, *fz* = 0.002 ipt | | | | | | | | | | | | | | | | | | |

- The above table shows the conditions for standard shank type cutters. When using long shank type cutters, the number of teeth may be different. In this case, the cutting conditions should be changed by referring to: "The usage of standard and long shanks" shown in previous page.

- Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally.

## TOOL GEOMETRY ON PROGRAMMING

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 0.060".
If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).




LNMU0303ZER...

| Max. depth of cut APMX (in) | Corner radius RE (in) | LE (in) | Corner R when programming RPG | Amount left uncut t1 (in) | Amount overcut t2 (in) |
|---|---|---|---|---|---|
| 0.039 | 0.047 | 0.118 | 0.039 | 0.018 | - |
| 0.039 | 0.047 | 0.118 | 0.060 | 0.014 | - |
| 0.039 | 0.047 | 0.118 | 0.079 | 0.008 | 0.004 |
| 0.039 | 0.047 | 0.118 | 0.098 | 0.003 | 0.011 |

LNGU0303ZER...

| Max. depth of cut APMX (in) | Corner radius RE (in) | LE (in) | Corner R when programming RPG | Amount left uncut t1 (in) | Amount overcut t2 (in) |
|---|---|---|---|---|---|
| 0.039 | 0.047 | 0.118 | 0.039 | 0.018 | - |
| 0.039 | 0.047 | 0.118 | 0.060 | 0.014 | - |
| 0.039 | 0.047 | 0.118 | 0.079 | 0.008 | 0.004 |
| 0.039 | 0.047 | 0.118 | 0.098 | 0.003 | 0.011 |

Note: Each value in table is calculated theoretically at the maximum condition

DOFEED

Insert size 03

## STANDARD CUTTING CONDITIONS

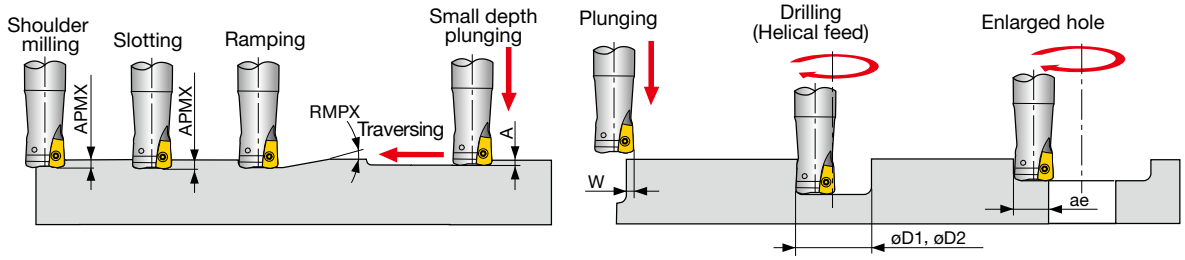
### UER type

| ISO | Workpiece material | Hardness | Priority | Grade | Chip-breaker | Cutting speed Vc (sfm) | Feed per tooth: fz (ipt) Tool dia.: DCX (in) ø0.630 ~ ø0.875 | ø1.000 ~ ø2.000 | Plunging | ø0.625", CICT = 2 n | Vf | ø0.709", CICT = 2 n | Vf | ø0.787" n | Vf CICT = 3 | Vf CICT = 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steels 1045, 1055, etc. | - 300HB | First choice | AH3225 | MJ | 330 - 980 | 0.020 - 0.046 | 0.020 - 0.060 | 0.004 | 4030 | 330 | 3670 | 300 | 3360 | 270 | 410 |
| | | | Low resistance | | ML | | | | | | Vc = 660 sfm, fz = 0.040 ipt | | | | | |
| | Alloy steels 4140, etc. | - 300HB | First choice | AH3225 | MJ | 330 - 980 | 0.020 - 0.046 | 0.020 - 0.060 | 0.004 | 4030 | 330 | 3670 | 300 | 3360 | 270 | 410 |
| | | | Low resistance | | ML | | | | | | Vc = 660 sfm, fz = 0.040 ipt | | | | | |
| | Prehardened steels NAK80, PX5, etc. | 30 - 40HRC | First choice | AH8015 | MJ | 330 - 660 | 0.020 - 0.040 | 0.020 - 0.040 | 0.004 | 3060 | 190 | 2780 | 170 | 2550 | 160 | 230 |
| | | | for impact resistance | AH3225 | MJ | | | | | | Vc = 500 sfm, fz = 0.030 ipt | | | | | |
| M | Austenitic stainless steels 304SS, etc. | - 200HB | First choice | AH130 | ML | 260 - 490 | 0.012 - 0.040 | 0.012 - 0.040 | 0.004 | 2320 | 130 | 2110 | 110 | 1940 | 110 | 160 |
| | | | for impact resistance | | MJ | | | | | | Vc = 380 sfm, fz = 0.026 ipt | | | | | |
| | Precipitation hardening stainless steels 17-4 PH, etc. | 28HRC - | First choice | AH130 | ML | 260 - 490 | 0.012 - 0.030 | 0.012 - 0.030 | 0.004 | 2320 | 100 | 2110 | 90 | 1940 | 80 | 120 |
| | | | for impact resistance | | MJ | | | | | | Vc = 380 sfm, fz = 0.020 ipt | | | | | |
| | | 40HRC - | First choice | AH130 | ML | 260 - 390 | 0.012 - 0.020 | 0.012 - 0.020 | 0.004 | 2020 | 70 | 1830 | 60 | 1680 | 60 | 90 |
| | | | for impact resistance | | MJ | | | | | | Vc = 330 sfm, fz = .0016 ipt | | | | | |
| K | Gray cast irons Class 25, etc. | 150 - 250HB | First choice | AH8015 | MJ | 330 - 980 | 0.012 - 0.046 | 0.020 - 0.060 | 0.004 | 4030 | 330 | 3670 | 300 | 3360 | 270 | 410 |
| | | | for impact resistance | AH3225 | MJ | | | | | | Vc = 660 sfm, fz = 0.040 ipt | | | | | |
| | Ductile cast irons 60-40-18, etc. | 150 - 250HB | First choice | AH8015 | MJ | 260 - 660 | 0.012 - 0.046 | 0.020 - 0.060 | 0.004 | 4030 | 330 | 3670 | 300 | 3360 | 190 | 290 |
| | | | for impact resistance | AH3225 | MJ | | | | | | Vc = 460 sfm, fz = 0.040 ipt | | | | | |
| S | Titanium alloy Ti-6Al-4V, etc. | - 40HRC | First choice | AH130 | MJ | 100 - 200 | 0.012 - 0.030 | 0.012 - 0.030 | 0.003 | 920 | 40 | 830 | 40 | 760 | 40 | 50 |
| | | | for wear resistance | AH8015 | MJ | | | | | | Vc = 150 sfm, fz = 0.020 ipt | | | | | |
| | Heat-resistant alloy Inconel, Hastelloy, etc. | - 40HRC | First choice | AH8015 | ML | 70 - 160 | 0.012 - 0.020 | 0.012 - 0.020 | 0.002 | 730 | 30 | 670 | 30 | 610 | 20 | 30 |
| | | | for impact resistance | | MJ | | | | | | Vc = 120 sfm, fz = 0.016 ipt | | | | | |
| H | Hot mold steel H-13, etc. | 40~50HRC | First choice | AH8015 | MJ | 260 - 490 | 0.004 - 0.020 | 0.004 - 0.020 | 0.002 | 2320 | 60 | 2110 | 60 | 1940 | 50 | 70 |
| | | | for impact resistance | AH3225 | MJ | | | | | | Vc = 380 sfm, fz = 0.012 ipt | | | | | |
| | Hot mold steel of D.T.C materials DAC**, DH**, DIEVER, etc. | 40~50HRC | First choice | AH8015 | MJ | 160 - 330 | 0.004 - 0.020 | 0.004 - 0.020 | 0.002 | 1530 | 40 | 1390 | 40 | 1270 | 40 | 50 |
| | | | for impact resistance | AH3225 | MJ | | | | | | Vc = 250 sfm, fz = 0.012 ipt | | | | | |
| | Cold mold steels D2, etc. | 50~60HRC | First choice | AH8005 | MJ | 160 - 230 | 0.004 - 0.012 | 0.004 - 0.012 | 0.001 | 1220 | 20 | 1110 | 20 | 1020 | 20 | 30 |
| | | | | | | | | | | | Vc = 200 sfm, fz = 0.008 ipt | | | | | |

- When chips stay in the cutting zone during slotting or pocketing, use air blast to remove chips from the work area

- Tool overhang length must be as short as possible to avoid chatter. When the tool overhang length is long, decrease the number of revolutions and feed

## APPLICATION RANGE




| Inch | DCX | Max. depth of cut APMX | Max. ramping angle RMPX | Max. plunging depth A | Max. cutting width in plunging W | Min.machinable hole dia. øD1 | Max.machinable hole dia. øD2 | Max. cutting width in enlarged hole ae |
|---|---|---|---|---|---|---|---|---|
| EXN03R062U0062... | 0.625 | 0.035 | Not possible | Not possible | 0.15 | Not possible | Not possible | 0.480 |
| EXN03R068U0062... | 0.688 | 0.035 | 1.7° | 0.011 | 0.15 | 0.991 | 1.339 | 0.560 |
| EXN03R075U0075... | 0.750 | 0.035 | 1.4° | 0.011 | 0.15 | 1.132 | 1.496 | 0.638 |
| EXN03R087U0075... | 0.875 | 0.035 | 1.2° | 0.011 | 0.15 | 1.371 | 1.654 | 0.716 |
| EXN03R100U0100... | 1.000 | 0.035 | 1° | 0.011 | 0.15 | 1.610 | 1.890 | 0.835 |
| EXN03R112U0100... | 1.125 | 0.035 | 0.7° | 0.011 | 0.15 | 1.857 | 2.126 | 0.953 |
| EXN03R125U0125... | 1.250 | 0.035 | 0.7° | 0.011 | 0.15 | 2.104 | 2.441 | 1.110 |
| TXN03R150U0075... | 1.500 | 0.035 | 0.5° | 0.011 | 0.15 | 2.750 | 3.070 | 1.425 |
| TXN03R200U0075... | 2.000 | 0.035 | 0.4° | 0.011 | 0.15 | 3.540 | 3.858 | 1.819 |

· For DCX above ø1.300", slot milling, ramping or contouring is not recommended as chips may be re-cut.

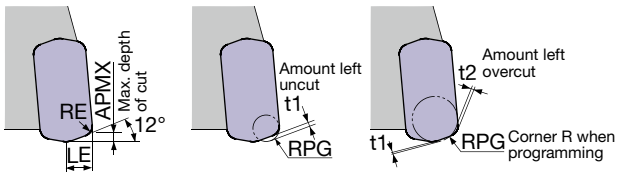
**Tool dia.: DCX (in), Number of revolutions: *n* (rpm), Feed speed: *Vf* (ipm), Max. depth of cut: *ap* = 0.020"**

| ø0.875" | | | ø1.000" | | | ø1.125" | | | ø1.250" | | | ø1.500" | | | ø2.000" | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | |
| | CICT = 2 | CICT = 3 | | CICT = 4 | CICT = 5 | | CICT = 4 | CICT = 5 | | CICT = 5 | CICT = 6 | | CICT = 5 | CICT = 6 | | CICT = 5 | CICT = 8 | CICT = 10 |
| 2880 | 240 | 350 | 2520 | 410 | 510 | 2240 | 360 | 450 | 2020 | 410 | 490 | 1680 | 340 | 410 | 1260 | 260 | 410 | 510 |
| | | | | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | | | | | | |
| 2880 | 240 | 350 | 2520 | 410 | 510 | 2240 | 360 | 450 | 2020 | 410 | 490 | 1680 | 340 | 410 | 1260 | 260 | 410 | 510 |
| | | | | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | | | | | | |
| 2180 | 140 | 200 | 1910 | 230 | 290 | 1700 | 210 | 260 | 1530 | 230 | 280 | 1270 | 200 | 230 | 960 | 150 | 240 | 290 |
| | | | | | | | | | | *Vc* = 500 sfm, *fz* = 0.030 ipt | | | | | | | | |
| 1660 | 90 | 130 | 1450 | 160 | 190 | 1290 | 140 | 170 | 1160 | 160 | 190 | 970 | 130 | 160 | 730 | 100 | 160 | 190 |
| | | | | | | | | | | *Vc* = 380 sfm, *fz* = 0.026 ipt | | | | | | | | |
| 1660 | 70 | 100 | 1450 | 120 | 150 | 1290 | 110 | 130 | 1160 | 120 | 140 | 970 | 100 | 120 | 730 | 80 | 120 | 150 |
| | | | | | | | | | | *Vc* = 380 sfm, *fz* = 0.020 ipt | | | | | | | | |
| 1440 | 50 | 70 | 1260 | 90 | 110 | 1120 | 80 | 90 | 1010 | 90 | 100 | 840 | 70 | 90 | 630 | 60 | 90 | 110 |
| | | | | | | | | | | *Vc* = 330 sfm, *fz* = .0016 ipt | | | | | | | | |
| 2880 | 240 | 350 | 2520 | 410 | 510 | 2240 | 360 | 450 | 2020 | 410 | 490 | 1680 | 340 | 410 | 1260 | 260 | 410 | 510 |
| | | | | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | | | | | | |
| 2010 | 170 | 250 | 1760 | 290 | 360 | 1560 | 250 | 320 | 1410 | 290 | 340 | 1170 | 240 | 290 | 880 | 180 | 290 | 360 |
| | | | | | | | | | | *Vc* = 460 sfm, *fz* = 0.040 ipt | | | | | | | | |
| 650 | 30 | 40 | 570 | 50 | 60 | 510 | 50 | 60 | 460 | 50 | 60 | 380 | 40 | 50 | 290 | 30 | 50 | 60 |
| | | | | | | | | | | *Vc* = 150 sfm, *fz* = 0.020 ipt | | | | | | | | |
| 520 | 20 | 30 | 460 | 30 | 40 | 410 | 30 | 40 | 370 | 30 | 40 | 310 | 30 | 30 | 230 | 20 | 30 | 40 |
| | | | | | | | | | | *Vc* = 120 sfm, *fz* = 0.016 ipt | | | | | | | | |
| 1660 | 40 | 60 | 1450 | 70 | 90 | 1290 | 70 | 80 | 1160 | 70 | 90 | 970 | 60 | 70 | 730 | 50 | 80 | 90 |
| | | | | | | | | | | *Vc* = 380 sfm, *fz* = 0.012 ipt | | | | | | | | |
| 1090 | 30 | 40 | 960 | 50 | 60 | 850 | 50 | 60 | 760 | 50 | 60 | 640 | 40 | 50 | 480 | 30 | 50 | 60 |
| | | | | | | | | | | *Vc* = 250 sfm, *fz* = 0.012 ipt | | | | | | | | |
| 870 | 20 | 30 | 760 | 30 | 40 | 680 | 30 | 30 | 610 | 30 | 30 | 510 | 30 | 30 | 380 | 20 | 30 | 40 |
| | | | | | | | | | | *Vc* = 200 sfm, *fz* = 0.008 ipt | | | | | | | | |

- The above table shows the conditions for standard shank type cutters. When using long shank type cutters, the number of teeth may be different. In this case, the cutting conditions should be changed by referring to: “The usage of standard and long shanks” shown in previous page
- Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally

## TOOL GEOMETRY ON PROGRAMMING

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 0.059". If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).




**LNMU0303UER...**

| Max. depth of cut APMX (in) | Corner radius RE (in) | LE (in) | Corner R when programming RPG | Amount left uncut t1 (in) | Amount left overcut t2 (in) |
|---|---|---|---|---|---|
| 0.035 | 0.039 | 0.138 | 0.039 | 0.019 | - |
| **0.035** | **0.039** | **0.138** | **0.059** | **0.015** | **-** |
| 0.035 | 0.039 | 0.138 | 0.079 | 0.012 | 0.005 |
| 0.035 | 0.039 | 0.138 | 0.098 | 0.008 | 0.012 |

Each value in table is calculated theoretically at the maximum condition.
*Recommended

DOFEED

Insert size 06

# For machining of medium- and large-sized components

## Ultimate solution to typical machining challenges in exotic materials such as low productivity and short tool life

An ideal high feed cutter for machining exotic materials, DoFeed features small entry angle that, when combined with wiper inserts, provides **improved machining efficiency and tool life without compromising surface finishing quality**.

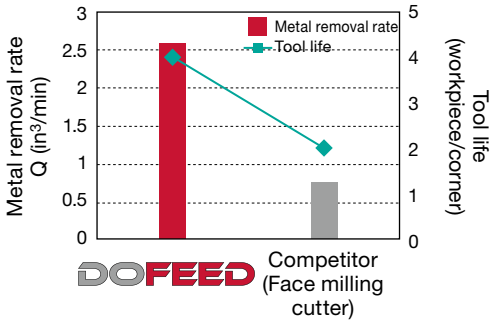
**W** Wiper insert

P M K S H

**2 cutting edges**

- To be mixed with other geometries
- The main cutting edge of the wiper has the same profile as with other chipbreaker geometry. This enables superior surface finish while maintaining the feed rate

## ■ The effect of wiper insert




S

| | |
|---|---|
| Cutter | : TXN06R250U0075A06 (ø2.500", CICT = 6) (Competitor: Face milling cutter) |
| Insert | : LNMU06X5ZER-ML<br>: LNGU06X5ZER-W（Competitor: Square, positive） |
| Grade | : AH130 (ML), AH725 (W),（Competitor: PVD, S30） |
| Workpiece material | : Titanium alloy (43HRC) |
| Cutting speed | : *Vc* = **125** sfm（Competitor: 82 sfm） |
| Feed per tooth | : *fz* = **0.025** ipt (Competitor: 0.006 ipt) |
| Feed speed | : *Vf* = **28.937** ipm (Competitor: 4.528 ipm) |
| Depth of cut | : *ap* = 0.049" (Competitor: 0.098") |
| Width of cut | : *ae* = 1.772" |
| Coolant | : Wet (External coolant) |

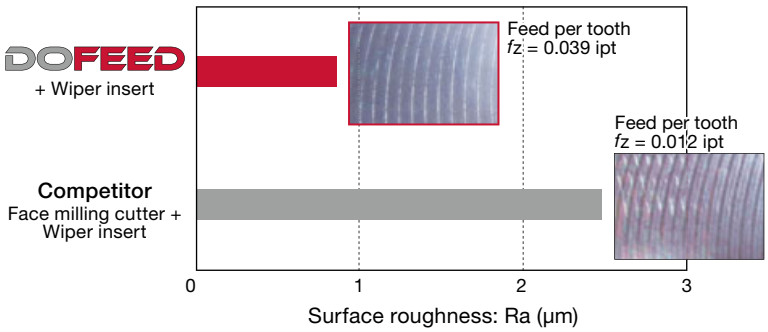
## CUTTING PERFORMANCE

**P** 1055


Wiper insert
**LNGU06X5ZER-W**

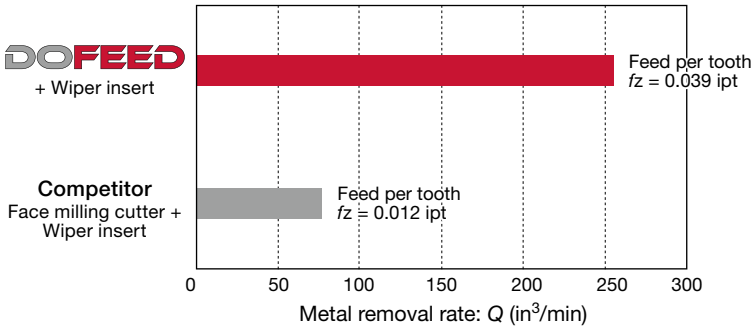
### ■ Comparison of surface finish

**Excellent surface finish!**




### ■ Comparison of metal removal rate

**Tripled metal removal rate!**




| | |
|---|---|
| Cutter | : TXN06R300U0100A05 (ø3", CICT = 5) |
| Insert | : LNMU06X5ZER-ML AH725 x 3 inserts |
| | : LNGU06X5ZER-W AH725 x 2 inserts |
| Cutting speed | : *V*c = 492 sfm |
| Depth of cut | : *a*p = 0.059" |
| Width of cut | : *a*e = 2.362" |
| Coolant | : Dry |
| Machine | : Vertical M/C, CAT50 |

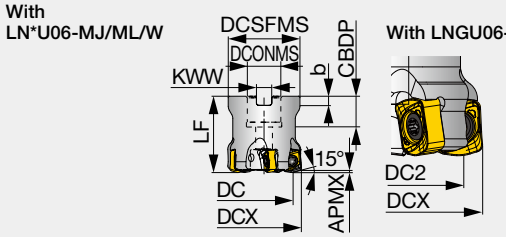
DOFEED

Insert size 06

## TXN06

High feed mill, for 4-corner double sided inserts

GAMP = +10°, GAMF = +2° ~ +6°




| Inch | APMX | DCX | CICT | DC1 | DC2 | DCSFMS | LF | DCONMS | CBDP | KWW | b | WT (kg) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TXN06R200U0075A04 | 0.059 | 2.000 | 4 | 1.513 | 1.485 | 1.850 | 1.969 | 0.750 | 0.750 | 0.315 | 0.197 | 0.970 | With | LN*U06... |
| TXN06R200U0075A05 | 0.059 | 2.000 | 5 | 1.513 | 1.485 | 1.850 | 1.969 | 0.750 | 0.750 | 0.315 | 0.197 | 0.990 | With | LN*U06... |
| TXN06R250U0075A04 | 0.059 | 2.500 | 4 | 2.012 | 1.983 | 2.323 | 1.969 | 0.750 | 0.750 | 0.315 | 0.197 | 1.740 | With | LN*U06... |
| TXN06R250U0075A06 | 0.059 | 2.500 | 6 | 2.012 | 1.983 | 2.323 | 1.969 | 0.750 | 0.750 | 0.315 | 0.197 | 1.760 | With | LN*U06... |
| TXN06R300U0100A05 | 0.059 | 3.000 | 5 | 2.512 | 2.481 | 2.835 | 2.480 | 1.000 | 1.049 | 0.374 | 0.236 | 3.130 | With | LN*U06... |
| TXN06R300U0100A07 | 0.059 | 3.000 | 7 | 2.512 | 2.481 | 2.835 | 2.480 | 1.000 | 1.049 | 0.374 | 0.236 | 3.280 | With | LN*U06... |
| TXN06R400U0150A06 | 0.059 | 4.000 | 6 | 3.512 | 3.481 | 3.819 | 2.480 | 1.500 | 1.610 | 0.626 | 0.394 | 4.850 | With | LN*U06... |
| TXN06R400U0150A10 | 0.059 | 4.000 | 10 | 3.512 | 3.481 | 3.819 | 2.480 | 1.500 | 1.610 | 0.626 | 0.394 | 4.850 | With | LN*U06... |
| TXN06R500U0150A08 | 0.059 | 5.000 | 8 | 4.512 | 4.481 | 3.819 | 2.480 | 1.500 | 1.610 | 0.626 | 0.394 | 7.050 | With | LN*U06... |
| TXN06R500U0150A12 | 0.059 | 5.000 | 12 | 4.512 | 4.481 | 3.819 | 2.480 | 1.500 | 1.610 | 0.626 | 0.394 | 7.280 | With | LN*U06... |
| TXN06R600U0200A10 | 0.059 | 6.000 | 10 | 5.512 | 5.480 | 4.331 | 2.480 | 2.000 | 1.496 | 0.748 | 0.433 | 9.480 | With | LN*U06... |
| TXN06R600U0200A14 | 0.059 | 6.000 | 14 | 5.512 | 5.480 | 4.331 | 2.480 | 2.000 | 1.496 | 0.748 | 0.433 | 9.260 | With | LN*U06... |

### SPARE PARTS




| Designation | Clamping screw | Grip | Lubricant | Torx bit |
|---|---|---|---|---|
| TXN06R200U - 500U | CSPB-5 | H-TB2W | M-1000 | BLD IP20/S7 |
| TXN06R600U... | CSPB-5 | H-TB2W | M-1000 | BLD IP20/M7 |

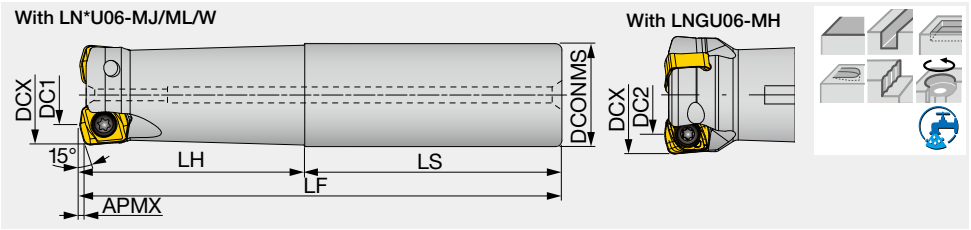
*Recommended clamping torque: CSPB-5 = 3.69 lbf·ft

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / 0.022" |

## EXN06

High feed endmill, shank type, for 4-corner double sided inserts

GAMP = +10°, GAMF = -2° ~ +6°




| Inch | APMX | DCX | CICT | DC | DC2 | DCONMS | LF | LH | LS | WT(lb) | Air hole | Insert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXN06R125U0125W02 | 0.059 | 1.250 | 2 | 0.766 | 0.745 | 1.250 | 5.281 | 3.000 | 2.281 | 1.540 | With | LN*U06... |
| EXN06R125U0125-02L | 0.059 | 1.250 | 2 | 0.766 | 0.745 | 1.250 | 8.000 | 5.000 | 3.000 | 2.360 | With | LN*U06... |
| EXN06R150U0125W03 | 0.059 | 1.500 | 3 | 1.014 | 0.989 | 1.250 | 5.781 | 3.500 | 2.281 | 1.830 | With | LN*U06... |
| EXN06R150U0125-03L | 0.059 | 1.500 | 3 | 1.014 | 0.989 | 1.250 | 10.000 | 2.000 | 8.000 | 3.310 | With | LN*U06... |

### SPARE PARTS



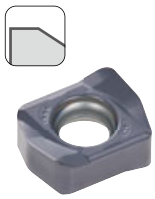
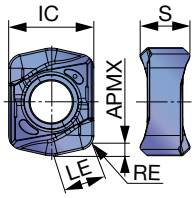
| Designation | Clamping screw | Lubricant | Wrench |
|---|---|---|---|
| EXN06 | CSPB-5 | M-1000 | IP-20D |

| Tool diameter tolerance | |
|---|---|
| Tool diameter | 0 / 0.022" |

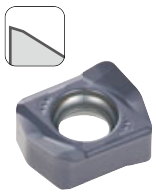
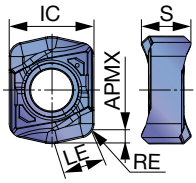
*Recommended clamping torque: CSPB-5 = 3.69 lbf·ft

## INSERT

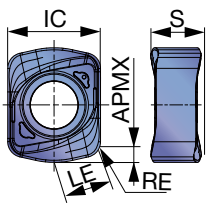
### LNMU06-MJ (for general purpose)

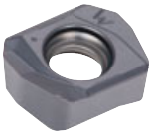
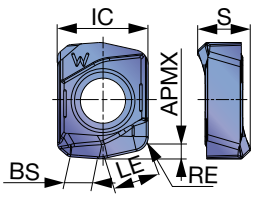

### LNMU06-ML (for low cutting force)


### LNGU06-MH (Robust cutting edges)


### LNMU06-W (Wiper, 2 cutting edge)


| | | Coated | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Steel | | ★ | | | | | | | | | |
| M | Stainless | ★ | ☆ | | | | | | | | | |
| K | Cast iron | | ☆ | ☆ | ★ | | | | | | | |
| N | Non-ferrous | | | | | | | | | | | |
| S | Superalloys | ★ | ☆ | ☆ | | ★ | | | | | | |
| H | Hard materials | | | ☆ | | ★ | ☆ | | | | | |

★ : First choice
☆ : Second choice

| Designation | RE | APMX | AH130 | AH3225 | AH725 | AH120 | AH8015 | AH8005 | LE | IC | S | BS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LNMU06X5ZER-MJ | 0.079 | 0.059 | ● | ● | ● | ● | ● | | 0.236 | 0.472 | 0.276 | - |
| LNMU06X5ZER-ML | 0.079 | 0.059 | ● | ● | ● | ● | ● | | 0.236 | 0.472 | 0.276 | - |
| LNGU06X5ZER-MH | 0.079 | 0.059 | | | | | ● | ● | 0.236 | 0.472 | 0.276 | - |
| LNGU06X5ZER-W | 0.079 | 0.059 | | | ● | | | | 0.236 | 0.472 | 0.276 | 0.142 |

- When wiper insert (-W) is used, the value of feed per rev. (ipr) must be less than 0.142" x n. for keeping this value, the number of wiper insert (n) and feed per tooth (in/tooth) should be adjusted
- Wiper insert (-W) can be used just for face milling. It's not suitable for ramping or pocket milling

● : New product
● : Line up

# DOFEED

Insert size 06

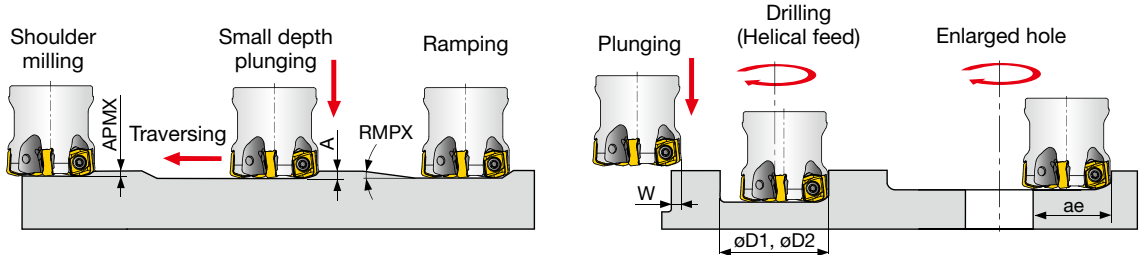
## STANDARD CUTTING CONDITIONS

| ISO | Workpiece material | Hardness | Priority | Grade | Chip-breaker | Cutting speed *Vc* (sfm) | Feed per tooth: *fz* (ipt) Tool dia.: DCX (in) ø1.25" ~ ø6" | Plunging | ø1.25", CICT = 2 *n* | ø1.25", CICT = 2 *Vf* | ø1.5", CICT = 3 *n* | ø1.5", CICT = 3 *Vf* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Carbon steels (S45C / C45, S55C / C55, etc.) | - 300HB | First choice | AH3225 | MJ | 330 - 980 | 0.020 - 0.059 | 0.006 | 2,020 | 162 | 1,680 | 202 |
| | | | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | |
| | Alloy steels (SCM440 / 42CrMo4, etc.) | - 300HB | First choice | AH3225 | MJ | 330 - 660 | 0.020 - 0.059 | 0.006 | 2,020 | 162 | 1,680 | 202 |
| | | | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | |
| | Prehardened steels (NAK80, PX5, etc.) | 30 - 40HRC | First choice | AH3225 | MJ | 330 - 660 | 0.020 - 0.047 | 0.006 | 1,500 | 93 | 1,250 | 116 |
| | | | | | | | | | *Vc* = 490 sfm, *fz* = 0.031 ipt | | | |
| | | 30 - 40HRC | for wear resistance | AH8015 | MJ | 330 - 660 | 0.020 - 0.060 | 0.006 | 1,500 | 120 | 1,250 | 150 |
| | | | | | | | | | *Vc* = 490 sfm, *fz* = 0.040 ipt | | | |
| M | Stainless steels (SUS304 / X5CrNi18-9, etc.) | - 200HB | First choice | AH130 | ML | 260 - 490 | 0.012 - 0.031 | 0.004 | 1,190 | 57 | 990 | 71 |
| | | | | | | | | | *Vc* = 390 sfm, *fz* = 0.024 ipt | | | |
| | Precipitation hardening stainless steels (SUS630 / X5CrNiCuNb16-4) | 28HRC - (H1150) | First choice | AH130 | ML | 260 - 490 | 0.008 - 0.020 | 0.004 | 1,190 | 29 | 990 | 36 |
| | | | for impact resistance | AH130 | MJ | | | | *Vc* = 390 sfm, *fz* = 0.012 ipt | | | |
| | | 40HRC - (H900) | First choice | AH130 | ML | 260 - 390 | 0.004 - 0.012 | 0.004 | 1,010 | 16 | 840 | 20 |
| | | | for impact resistance | AH130 | MJ | | | | *Vc* = 330 sfm, *fz* = 0.008 ipt | | | |
| K | Gray cast irons (FC250 / GG25 / 250, etc.) | 150 - 250HB | First choice | AH120 | MJ | 330 - 980 | 0.020 - 0.059 | 0.006 | 2,020 | 162 | 1,680 | 202 |
| | | | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | |
| | | 150 - 250HB | First choice | AH120 | MJ | 260 - 660 | 0.020 - 0.059 | 0.006 | 1,500 | 120 | 1,250 | 150 |
| | | | | | | | | | *Vc* = 490 sfm, *fz* = 0.040 ipt | | | |
| S | Titanium alloy (Ti-6Al-4V, etc.) | - 40HRC | First choice | AH130 | ML | 100 - 200 | 0.012 - 0.028 | 0.003 | 400 | 16 | 330 | 20 |
| | | | for impact resistance | AH130 | MJ | | | | *Vc* = 130 sfm, *fz* = 0.020 ipt | | | |
| | Heat-resistant alloy (Inconel, Hastelloy, etc.) | - 40HRC | First choice | AH8015 | ML | 70 - 160 | 0.004 - 0.012 | 0.002 | 310 | 5 | 250 | 6 |
| | | | for impact resistance | AH725 | ML | | | | *Vc* = 100 sfm, *fz* = 0.008 ipt | | | |
| H | Hot mold steel (SKD61 / X40CrMoV5-1, etc.) | 40 - 55HRC | First choice | AH8015 | MH | 260 - 490 | 0.004 - 0.020 | 0.002 | 1,190 | 29 | 990 | 36 |
| | | | Low resistance | AH8015 | MJ | | 0.004 - 0.012 | | *Vc* = 390 sfm, *fz* = 0.012 ipt | | | |
| | Hot mold steel of D.T.C materials (DAC**, DH**, DIEVER, etc) | 40 - 55HRC | First choice | AH8015 | MJ | 160 - 330 | 0.004 - 0.012 | 0.002 | 790 | 13 | 660 | 16 |
| | | | for impact resistance | AH8015 | MH | | 0.004 - 0.020 | | *Vc* = 260 sfm, *fz* = 0.008 ipt | | | |
| | Cold mold steels (SKD11 / X153CrMoV12, etc.) | 55 - 60HRC | First choice | AH8005 | MH | 160 - 230 | 0.002 - 0.012 | 0.001 | 610 | 5 | 510 | 6 |
| | | | | | | | | | *Vc* = 200 sfm, *fz* = 0.004 ipt | | | |
| | | 55 - 60HRC | for impact resistance | AH8015 | MH | 160 - 230 | 0.002 - 0.012 | 0.001 | 610 | 2 | 510 | 3 |
| | | | | | | | | | *Vc* = 200 sfm, *fz* = 0.002 ipt | | | |

· The above table shows the conditions for standard shank type cutters. When using long shank type cutters, the number of teeth may be different. In this case, the cutting conditions should be changed by referring to: "The usage of standard and long shanks" shown in previous page.

· Cutting conditions are generally limited by the rigidity and power of the machine and the rigidity of the workpiece. When setting the conditions, start from half of the values of the standard cutting conditions and then increase the value gradually while making sure the machine is running normally.

## APPLICATION RANGE




| Inch | DCX | Max. depth of cut APMX | Max. ramping angle RMPX | Max. plunging depth A | Max. cutting width in plunging W | Min. machinable hole dia. øD1 | Max. machinable hole dia. øD2 | Max. cutting width in enlarged hole ae |
|---|---|---|---|---|---|---|---|---|
| EXN06R125U... | ø1.250 | 0.059 | 2° | 0.020 | 0.236 | 1.830 | 2.300 | 0.970 |
| EXN06R150U... | ø1.500 | 0.059 | 1.5° | 0.020 | 0.236 | 2.330 | 2.800 | 1.220 |
| TXN06R200U... | ø2.000 | 0.059 | 0.9° | 0.020 | 0.236 | 3.330 | 3.800 | 1.720 |
| TXN06R250U... | ø2.500 | 0.059 | 0.6° | 0.020 | 0.236 | 4.330 | 4.800 | 2.220 |
| TXN06R300U... | ø3.000 | 0.059 | 0.5° | 0.020 | 0.236 | 5.330 | 5.800 | 2.720 |

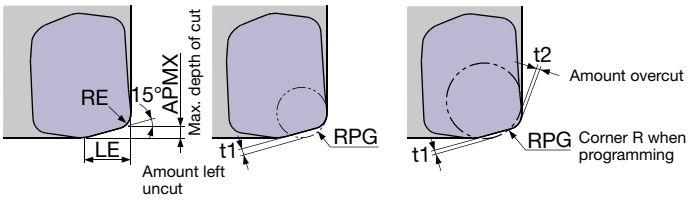
Note: For DCX above 4.000", slot milling, ramping or contouring is not recommended as chips may be re-cut.

**Tool dia.: DCX (mm), Number of revolutions: *n* ($min^{-1}$), Feed speed: *Vf* (mm/min), Max. depth of cut: *ap* = 1.5 mm, Number of teeth: CICT**

| ø2" | | | ø2.5" | | | ø3" | | | ø4" | | | ø5" | | | ø6" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | | *n* | *Vf* | |
| | CICT = 4 | CICT = 5 | | CICT = 4 | CICT = 6 | | CICT = 5 | CICT = 7 | | CICT = 6 | CICT = 10 | | CICT = 8 | CICT = 12 | | CICT = 10 | CICT = 14 |
| 1,260 | 202 | 252 | 1,010 | 162 | 242 | 840 | 168 | 235 | 630 | 151 | 252 | 500 | 160 | 240 | 420 | 168 | 235 |
| | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | | | | | | | | |
| 1,260 | 202 | 252 | 1,010 | 162 | 242 | 840 | 168 | 235 | 630 | 151 | 252 | 500 | 160 | 240 | 420 | 168 | 235 |
| | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | | | | | | | | |
| 940 | 117 | 146 | 750 | 93 | 140 | 620 | 96 | 135 | 470 | 87 | 146 | 370 | 92 | 138 | 310 | 96 | 135 |
| | | | | | | | *Vc* = 490 sfm, *fz* = 0.031 ipt | | | | | | | | | | |
| 940 | 150 | 188 | 750 | 120 | 180 | 620 | 124 | 174 | 470 | 113 | 188 | 370 | 118 | 178 | 310 | 124 | 174 |
| | | | | | | | *Vc* = 490 sfm, *fz* = 0.040 ipt | | | | | | | | | | |
| 740 | 71 | 89 | 600 | 58 | 86 | 500 | 60 | 84 | 370 | 53 | 89 | 300 | 58 | 86 | 250 | 60 | 84 |
| | | | | | | | *Vc* = 390 sfm, *fz* = 0.024 ipt | | | | | | | | | | |
| 740 | 36 | 44 | 600 | 29 | 43 | 500 | 30 | 42 | 370 | 27 | 44 | 300 | 29 | 43 | 250 | 30 | 42 |
| | | | | | | | *Vc* = 390 sfm, *fz* = 0.012 ipt | | | | | | | | | | |
| 630 | 20 | 25 | 500 | 16 | 24 | 420 | 17 | 24 | 320 | 15 | 26 | 250 | 16 | 24 | 210 | 17 | 24 |
| | | | | | | | *Vc* = 330 sfm, *fz* = 0.008 ipt | | | | | | | | | | |
| 1,260 | 202 | 252 | 1,010 | 162 | 242 | 840 | 168 | 235 | 630 | 151 | 252 | 500 | 160 | 240 | 420 | 168 | 235 |
| | | | | | | | *Vc* = 660 sfm, *fz* = 0.040 ipt | | | | | | | | | | |
| 940 | 150 | 188 | 750 | 120 | 180 | 620 | 124 | 174 | 470 | 113 | 188 | 370 | 118 | 178 | 310 | 124 | 174 |
| | | | | | | | *Vc* = 490 sfm, *fz* = 0.040 ipt | | | | | | | | | | |
| 250 | 20 | 25 | 200 | 16 | 24 | 170 | 17 | 24 | 120 | 14 | 24 | 100 | 16 | 24 | 80 | 16 | 22 |
| | | | | | | | *Vc* = 130 sfm, *fz* = 0.020 ipt | | | | | | | | | | |
| 190 | 6 | 8 | 150 | 5 | 7 | 130 | 5 | 7 | 100 | 5 | 8 | 80 | 5 | 8 | 60 | 5 | 7 |
| | | | | | | | *Vc* = 100 sfm, *fz* = 0.008 ipt | | | | | | | | | | |
| 740 | 36 | 44 | 600 | 29 | 43 | 500 | 30 | 42 | 370 | 27 | 44 | 300 | 29 | 43 | 250 | 30 | 42 |
| | | | | | | | *Vc* = 390 sfm, *fz* = 0.012 ipt | | | | | | | | | | |
| 500 | 16 | 20 | 400 | 13 | 19 | 330 | 13 | 18 | 250 | 12 | 20 | 200 | 13 | 19 | 170 | 14 | 19 |
| | | | | | | | *Vc* = 260 sfm, *fz* = 0.008 ipt | | | | | | | | | | |
| 380 | 6 | 8 | 310 | 5 | 7 | 250 | 5 | 7 | 190 | 5 | 8 | 150 | 5 | 7 | 130 | 5 | 7 |
| | | | | | | | *Vc* = 200 sfm, *fz* = 0.004 ipt | | | | | | | | | | |
| 380 | 3 | 4 | 310 | 2 | 4 | 250 | 3 | 4 | 190 | 2 | 4 | 150 | 2 | 4 | 130 | 3 | 4 |
| | | | | | | | *Vc* = 200 sfm, *fz* = 0.002 ipt | | | | | | | | | | |

## TOOL GEOMETRY ON PROGRAMMING

When programming for CAM, the tool should be considered as a radius cutter. Usually, the corner radius should be set as R = 0.118".
If a larger radius is used, overcutting will occur. The following table shows the amount left uncut (t1) and overcut (t2).




LNMU06...

| Max. depth of cut APMX (in) | Corner radius RE (in) | LE (in) | Corner R when programming RPG | Amount left uncut t1 (in) | Amount overcut t2 (in) |
|---|---|---|---|---|---|
| 0.059 | 0.079 | 0.236 | 0.079 | 0.039 | - |
| | | | 0.118 | 0.030 | - |
| | | | 0.157 | 0.021 | 0.010 |

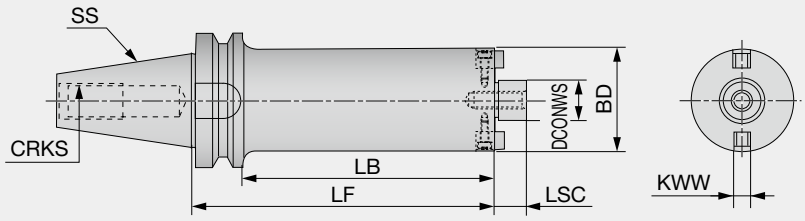
LNGU06...MH

| Max. depth of cut APMX (in) | Corner radius RE (in) | LE (in) | Corner R when programming RPG | Amount left uncut t1 (in) | Amount overcut t2 (in) |
|---|---|---|---|---|---|
| 0.059 | 0.079 | 0.236 | 0.079 | 0.035 | - |
| | | | 0.118 | 0.026 | - |
| | | | 0.157 | 0.016 | 0.010 |

Note: Each value in table is calculated theoretically at the maximum condition.

## BT50-FM

Shell mill holder, long type (BT)

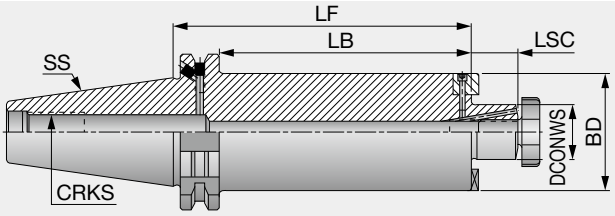



| Designation | SS | DCONWS | BD | LSC | LF | LB | CRKS | KWW | WT(kg) |
|---|---|---|---|---|---|---|---|---|---|
| BT50-FMC22-138-47 | 50 | 22 | 47 | 18 | 138 | 100 | M24 | 10 | 5.2 |
| BT50-FMC22-188-47 | 50 | 22 | 47 | 18 | 188 | 150 | M24 | 10 | 5.9 |
| BT50-FMC22-243-47 | 50 | 22 | 47 | 18 | 243 | 205 | M24 | 10 | 6.5 |
| BT50-FMC22-293-47 | 50 | 22 | 47 | 18 | 293 | 255 | M24 | 10 | 7.2 |
| BT50-FMC22-178-59 | 50 | 22 | 59 | 18 | 178 | 140 | M24 | 10 | 6.8 |
| BT50-FMC22-238-59 | 50 | 22 | 59 | 18 | 238 | 200 | M24 | 10 | 8 |
| BT50-FMC22-308-59 | 50 | 22 | 59 | 18 | 308 | 270 | M24 | 10 | 9.5 |
| BT50-FMC22-373-59 | 50 | 22 | 59 | 18 | 373 | 335 | M24 | 10 | 10.9 |
| BT50-FMA31.75-215-76 | 50 | 31.75 | 76 | 30 | 215 | 177 | M24 | 12.7 | 10 |
| BT50-FMA31.75-295-76 | 50 | 31.75 | 76 | 30 | 295 | 257 | M24 | 12.7 | 12.9 |
| BT50-FMA31.75-375-76 | 50 | 31.75 | 76 | 30 | 375 | 337 | M24 | 12.7 | 15.8 |
| BT50-FMA31.75-275-96 | 50 | 31.75 | 96 | 30 | 275 | 237 | M24 | 12.7 | 16.8 |
| BT50-FMA31.75-375-96 | 50 | 31.75 | 96 | 30 | 375 | 337 | M24 | 12.7 | 23 |

Option: Wrench for collet

## DIN69871-SEM

Shell mill holder with coolant hole, long type (DIN69871)



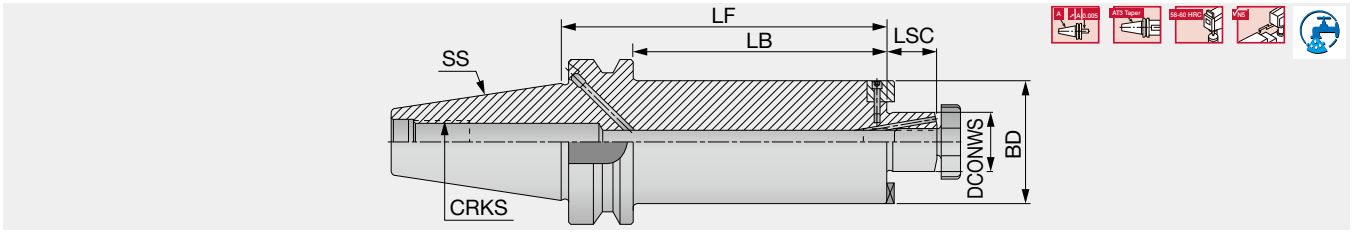

| Designation | SS | DCONWS | LSC | BD | LF | LB | CRKS |
|---|---|---|---|---|---|---|---|
| DIN6987150SEM22X48X200C | 50 | 22 | 19 | 48 | 200 | 181 | M24 |
| DIN6987150SEM22X61X300C | 50 | 22 | 19 | 61 | 300 | 281 | M24 |
| DIN6987150SEM27X61X300C | 50 | 27 | 21 | 61 | 300 | 281 | M24 |
| DIN6987150SEM32X78X370C | 50 | 32 | 24 | 78 | 370 | 351 | M24 |

- Applicable for 10 MPa coolant
- When being used as a flange-through type, the plug screw must be removed from the flange with a 2-mm hex key

Option: Wrench for center bolt

## BT-SEM-C

Shell mill holder with coolant hole, long type (BT)



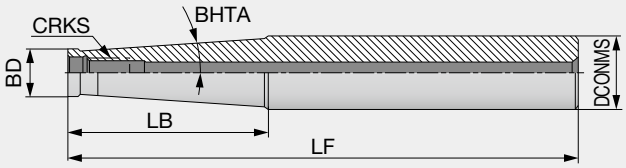

| Designation | SS | DCONWS | BD | LF | LB | LSC | CRKS |
|---|---|---|---|---|---|---|---|
| BT40SEM16X60C | 40 | 16 | 38 | 60 | 33 | 17 | M16 |
| BT40SEM16X100C | 40 | 16 | 38 | 100 | 73 | 17 | M16 |
| BT40SEM22X100C | 40 | 22 | 47 | 100 | 73 | 19 | M16 |
| BT40SEM27X100C | 40 | 27 | 58 | 100 | 73 | 21 | M16 |
| BT40SEM32X60C | 40 | 32 | 66 | 60 | 33 | 24 | M16 |
| BT50SEM16X100C | 50 | 16 | 38 | 100 | 62 | 17 | M24 |
| BT50SEM22X75C | 50 | 22 | 47 | 75 | 37 | 19 | M24 |
| BT50SEM22X48X220C | 50 | 22 | 48 | 220 | 182 | 19 | M24 |
| BT50SEM22X61X320C | 50 | 22 | 61 | 320 | 282 | 19 | M24 |
| BT50SEM25.4X60C | 50 | 25.4 | 50.4 | 60 | 22 | 22 | M24 |
| BT50SEM27X100C | 50 | 27 | 58 | 100 | 62 | 21 | M24 |
| BT50SEM27X61X320C | 50 | 27 | 61 | 320 | 282 | 21 | M24 |
| BT50SEM32X75C | 50 | 32 | 66 | 75 | 37 | 24 | M24 |
| BT50SEM32X100C | 50 | 32 | 66 | 100 | 62 | 24 | M24 |
| BT50SEM32X78X390C | 50 | 32 | 78 | 390 | 352 | 24 | M24 |

- Applicable for 10 MPa coolant
- When being used as a flange-through type, the plug screw must be removed from the flange with a 2-mm hex key

Option: Wrench for lock screw

## SM TungFlex-straight shank

Screw-clamp holder for modular heads (straight shank)




| Designation | DCONMS | BD | LF | LB | BHTA | CRKS |
|---|---|---|---|---|---|---|
| SM06-L60C10 | 10 | 9.7 | 60 | 20 | 0° | M6 |
| SM06-L105-C12 | 12 | 9.7 | 105 | 60 | 1.2° | M6 |
| SM06-L125-C16 | 16 | 9.7 | 125 | 60 | 3.3° | M6 |
| SM08-L73C16 | 16 | 13 | 73 | 25 | 0° | M8 |
| SM08-L128-C16 | 16 | 13 | 128 | 80 | 0.9° | M8 |
| SM08-L170-C20 | 20 | 13 | 170 | 66.8 | 3.3° | M8 |
| SM10-L80C20 | 20 | 18 | 80 | 30 | 0° | M10 |
| SM10-L130-C20 | 20 | 18 | 130 | 80 | 0.6° | M10 |
| SM10-L200-C25 | 25 | 19 | 200 | 57.2 | 3.3° | M10 |
| SM12-L86-C25 | 25 | 21 | 86 | 30 | 5.1° | M12 |
| SM12-L200-C32 | 32 | 21 | 200 | 78 | 4.4° | M12 |
| SM16-L95-C32 | 32 | 29 | 95 | 35 | 1.7° | M16 |
| SM16-L230-C32 | 32 | 29 | 230 | 50 | 1.8° | M16 |

- Applicable for 10 MPa coolant
- A coolant hole with all types of shanks

# TECHNICAL GUIDE FOR OPTIMUM TOOLING

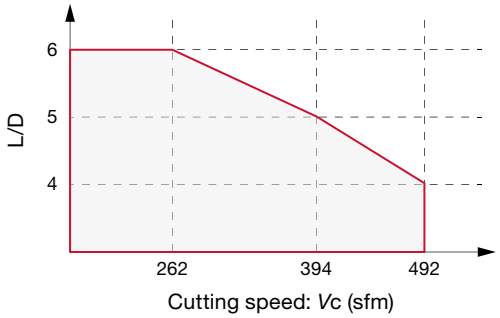
## ● For long overhang tool setup

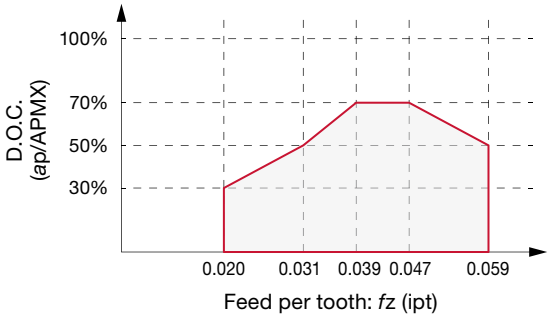
### The number of teeth

When using a tool overhang of over 4xD up to 6xD, extra care must be taken in determining the number of teeth and the cutting parameters to be used for the application.
A cutter body with **standard tooth pitch** must be selected as a minimum number of teeth are always in contact with the workpiece simultaneously for maximum tool stability.

### Cutting parameter settings

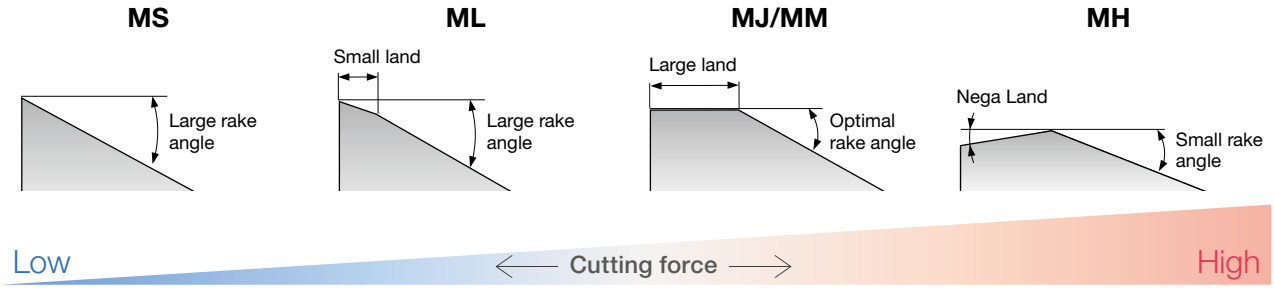
The cutting parameters must be set **within the range as described below**.
For a tool overhang of over 6xD, use a taper shank or carbide shank holder with vibration dampening for extra machining stability.




### Chipbreakers

Soft cutting inserts eliminate chatter and provide stability during machining.
Four different chipbreaker styles of **DoFeed** inserts are described below in order from the lowest cutting load to the highest.
Select a softer cutting chipbreaker when excess chatter occurs.
(All four chipbreakers are not available for all insert sizes. See the list below for chipbreaker availability for each insert size.)



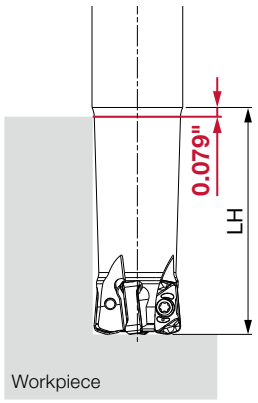

**Chipbreaker availability for each insert size**

| Insert size | MS | ML | MJ/MM | MH |
|---|---|---|---|---|
| 02 | - | - | ✓ | - |
| 03 | ✓ | ✓ | ✓ | ✓ |
| 06 | - | ✓ | ✓ | ✓ |

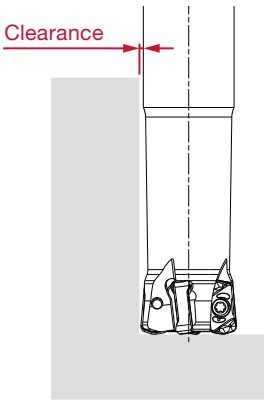
## ● Milling of shoulders located deep

Extra care must be taken for work-tool interference.
For **straight bodies**, whose cutter and shank diameters are identical, maximum axial cutting depth that allows machining without interference will be: **Head Length (LH) - 0.079"**.
To avoid tool interference with the workpiece, use reduced-shank cutter bodies or modular system tools, whose cutter diameter is larger than the shank diameter.

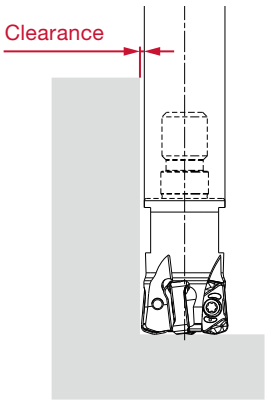
**Straight cutter body**




**Reduced shank**




**Modular tool**




## ● Insert selection for machining hard materials

The following list shows optimal insert grade and chipbreaker selections for different hardness scale ranges.

| | Hardness range of the workpiece (HRC) | Chipbreaker | | Grade | |
|---|---|---|---|---|---|
| H | - 40 | First choice | **MJ/MM** | First choice | **AH3225** |
| | | For soft cutting/ built-up edge resistance | **ML** | Wear resistance | **AH8015** |
| | 40 - 45 | First choice | **MJ/MM** | First choice | **AH3225** |
| | | For impact resistance | **MH** | Wear resistance | **AH8015** |
| | 45 - 55 | First choice | **MH** | First choice | **AH8015** |
| | | | | Wear resistance | **AH8005** |
| | 55 - 60 | First choice | **MH** | First choice | **AH8005** |
| | | | | Impact resistance | **AH8015** |

## ● Common fracture patterns and remedies

Flank wear is one of the common, and ideal, wear mode. However, most inserts end up with fracture wear due to the interrupted nature of the milling process.
Fracture wear can be caused by various factors, and the most common causes are outlined below.

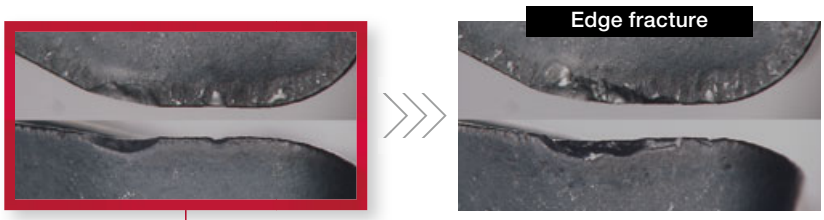
### Fracture caused by a weak cutting edge

**How to identify**

Small edge chipping or noticeable series of chippings along the cutting edge

**Common applications**

Heavy interrupted cuts; milling of rough surfaces such as cast or hot forged workpieces, welded parts, or hardened steel




**Remedies**

| | |
|---|---|
| **Insert** | Use an insert grade with higher fracture resistance (see page 6)<br>Use chipbreaker with a stronger cutting edge (see page 34) |
| **Cutting conditions** | ↓ Decrease cutting speed |

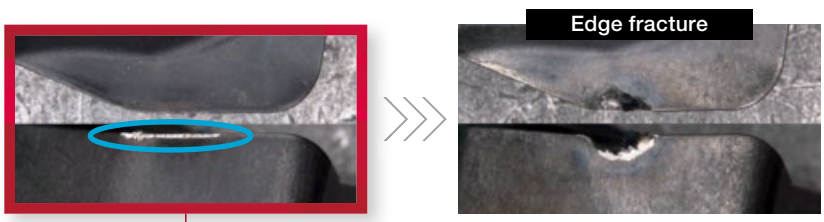
### Fracture caused when built-up edge is torn away

**How to identify**

An accumulation of material against the rake face

**Common applications**

Low speed cutting, dry milling, milling of gummy material




**Remedies**

| | |
|---|---|
| **Insert** | Use an insert grade with higher fracture resistance (see page 6)<br>Use a chipbreaker with sharp cutting edges (see page 34) |
| **Cutting conditions** | ↑ Increase cutting speed. Use coolant. |

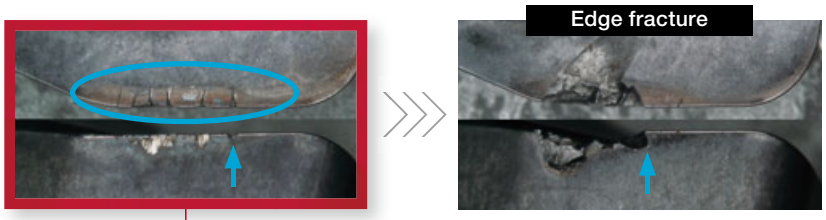
## Fracture caused by thermal cracks

### How to identify

Cracks in the tool perpendicular to the cutting edge

### Common applications

High speed cutting, milling using coolant, large diameter cutter, machining of high temp alloys




**Remedies**

| | |
|---|---|
| **Insert** | Use an insert grade with higher fracture resistance (see page 6)<br>Use a chipbreaker with sharp cutting edges (see page 34)<br>For Size 03, use UER inserts for thinner chips |
| **Cutting conditions** | ↓Decrease cutting speed. Use dry machining. |

## Fracture caused by crater wear

### How to identify

Wear appears on the rake face at a short distance from cutting edge
Typical at the depth of cut line and on the bottom cutting edges

### Common applications

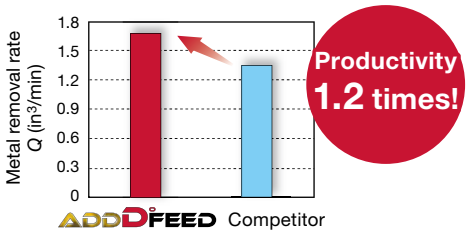
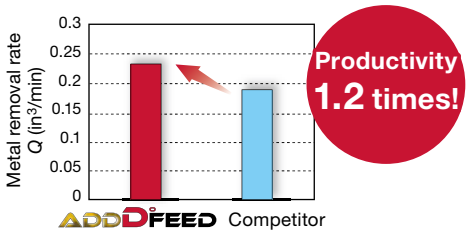
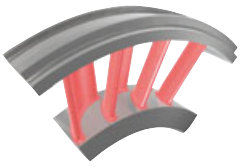
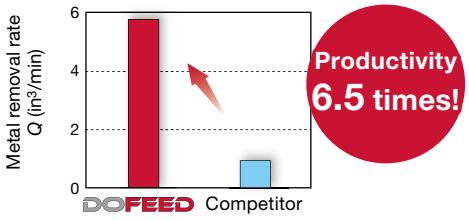
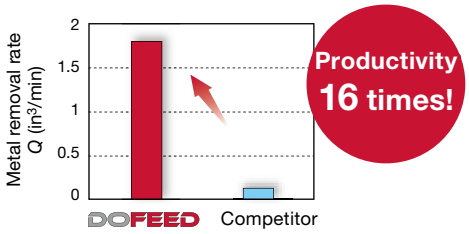
High speed cutting, high feed cutting at *fz* ≥ 0.039 in/z, machining of high-tensile steel

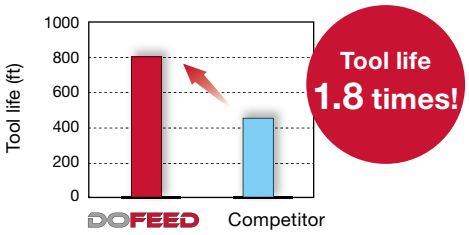
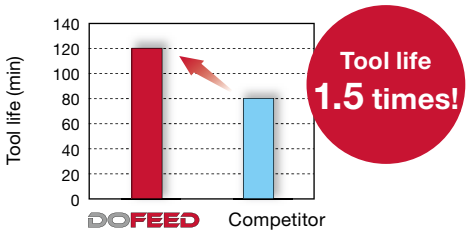

**Remedies**

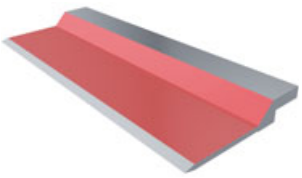
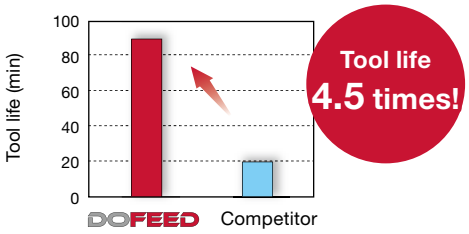
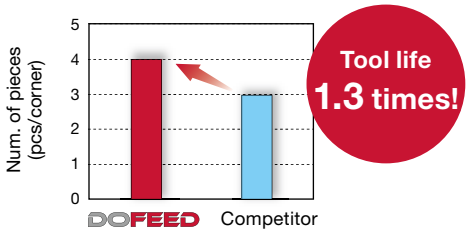
| | |
|---|---|
| **Insert** | Use an insert grade with higher wear resistance (see page 6)<br>Use a chipbreaker with sharp cutting edges (see page 34)<br>For Size 03, use UER inserts for thinner chips |
| **Cutting conditions** | ↓Decrease cutting speed. ↓Decrease feed per tooth |

# ADDDOFEED/DOFEED

## PRACTICAL EXAMPLES

| | | | |
|---|---|---|---|
| **Workpiece type** | | **Compressor shaft** | **Gas turbine component** |
| **Cutter** | | EXN02R010M10.0-02 (ø10 mm, CICT = 2) | EXN02R050U0050-02 (ø0.5", CICT = 2) |
| **Insert** | | LNMU0202ZER-MM | LNMU0202ZER-MM |
| **Grade** | | AH3225 | AH130 |
| **Workpiece material** | | 4340 | heat-resistant stainless steel |
| | |  P |  M |
| **Cutting conditions** | **Cutting speed : *Vc* (sfm)** | 160 | 200 |
| | **Feed per tooth: *fz* (ipt)** | 0.024 | 0.02 |
| | **Depth of cut : *ap* (in)** | 0.016 | 0.012 |
| | **Width of cut : *ae* (in)** | 0.394 | 0.3 |
| | **Machining** | Slotting | Shoulder milling |
| | **Coolant** | Wet | Wet |
| | **Machine** | Vertical M/C, CAT30 | Vertical M/C, CAT50 |
| **Results** | |  **AddDoFeed** eliminated chatter despite high cutting speed thanks to low cutting force, gaining productivity by 1.2 times. |  **AddDoFeed**'s small depth of cut, but much faster feed improved productivity by 1.2 times. |
| **Workpiece type** | | **Mold base** | **Turbine blade** |
| **Cutter** | | EXN03R100U0100-05 (ø1.000", CICT = 5) | EXN03R112U0100-05 (ø1.125", CICT = 5) |
| **Insert** | | LNMU0303ZER-MJ | LNMU0303ZER-ML |
| **Grade** | | AH725 | AH725 |
| **Workpiece material** | | SC360 (Cast steel) | Heat resistant cast steel |
| | |  P |  S |
| **Cutting conditions** | **Cutting speed : *Vc* (sfm)** | 460 | 230 |
| | **Feed per tooth: *fz* (ipt)** | 0.019 | 0.020 |
| | **Depth of cut : *ap* (in)** | 0.035 | 0.020 |
| | **Width of cut : *ae* (in)** | 1.000 | 1.125 |
| | **Machining** | Slot milling | Shoulder milling |
| | **Coolant** | Dry | Wet |
| | **Machine** | Horizontal M/C, CAT50 | Vertical M/C, CAT50 |
| **Results** | |  Thanks to **DoFeed**'s light cutting geometry, the MRR has improved by 650%, while maintaining the same level of, or even reduced, spindle load as the competitor's tool. Chip re-cutting has significantly reduced, while increasing the tool life by 7 times. |  Tripled cutting speed and super high feed milling offer 16 times higher productivity. |

| Workpiece type | | Die & Mold | Aircraft part |
|---|---|---|---|
| Cutter | | HXN03R025MM12-05 (ø25 mm, CICT = 5) | EXN03R100U0100-05-C (ø1", CICT = 5) |
| Insert | | LNMU0303UER-MJ | LNMU0303UER-ML |
| Grade | | AH3225 | AH130 |
| Workpiece material | | H13 (45HRC) | 15-5PH |
| | |  P |  M |
| Cutting conditions | Cutting speed : *Vc* (sfm) | 390 | 350 |
| | Feed per tooth: *fz* (ipt) | 0.016 | 0.013 |
| | Depth of cut : *ap* (in) | 0.02 | 0.03 |
| | Width of cut : *ae* (in) | - 0.98 | - 1 |
| | Machining | Contouring | Profiling |
| | Coolant | Dry | Wet |
| | Machine | Vertical M/C, HSK63 | Vertical M/C, CAT40 |
| Results | |   UER inserts in AH3225 grade provided 180% tool life increase. |   UER inserts provided 150% tool life increase in exotic material. |

| Workpiece type | | Die & Mold | Press-cutter blade |
|---|---|---|---|
| Cutter | | TXN06R250U0075A04 (ø2.500", CICT = 4) | TXN06R250U0075A06 (ø2.500", CICT = 6) |
| Insert | | LNMU06X5ZER-MJ | LNGU06X5ZER-MH |
| Grade | | AH3225 | AH8015 |
| Workpiece material | | 1045 (20 - 35 HRC) | 4140 (44HRC) |
| | |  P |  H |
| Cutting conditions | Cutting speed : *Vc* (sfm) | 650 | 390 |
| | Feed per tooth: *fz* (ipt) | 0.059 | 0.031 |
| | Depth of cut : *ap* (in) | 0.030 | 0.031 |
| | Width of cut : *ae* (in) | 1.8 | 1.5 |
| | Machining | Contouring | Face milling |
| | Coolant | Dry | Dry |
| | Machine | Vertical M/C, CAT50 | Vertical M/C |
| Results | |   AH3225 reduced the damage of the bottom cutting edge, extending tool life by 4.5 times. |   A combination of the MH chipbreaker and AH8015 reduced chipping and wear. Tool life has increased to 130%. |

# Tungaloy-NTK America Inc.


## United States

3726 N Ventura Drive, Arlington Heights, IL 60004, U.S.A.
Inside Sales: +1-888-554-8394
Technical Support: +1-888-554-8391
Fax: +1-888-554-8392
www.tungaloy.com/us

## Canada

432 Elgin St. Unit 3, Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779 Fax: +1-519-758-5791
www.tungaloy.com/ca

## Mexico

C Los Arellano 113, Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone:+52-449-929-5410 Fax:+52-449-929-5411
www.tungaloy.com/mx


Scan for instant web access

Member IMC Group Tungaloy

**tungaloy.com/us**

**follow us at:**
facebook.com/TungaloyNTK
instagram.com/tungaloyntkamerica
linkedin.com/company/tungaloyntkamerica
tiktok.com/@tungaloyntkamerica

To see Tungaloy products in action visit:

YouTube
www.youtube.com/tungaloycorporation

Distributed by:

Explore the Tungaloy world!
Tungaloy APP & SNS

FIND US ON THE CLOUD!
machiningcloud.com

AS9100 Certified
78006
2015.11.04

ISO 14001 Certified
EC97J1123
1997.11.26


Produced from Recycled paper Oct. 2024 (TJ)