



For more information

Shoulder milling cutter

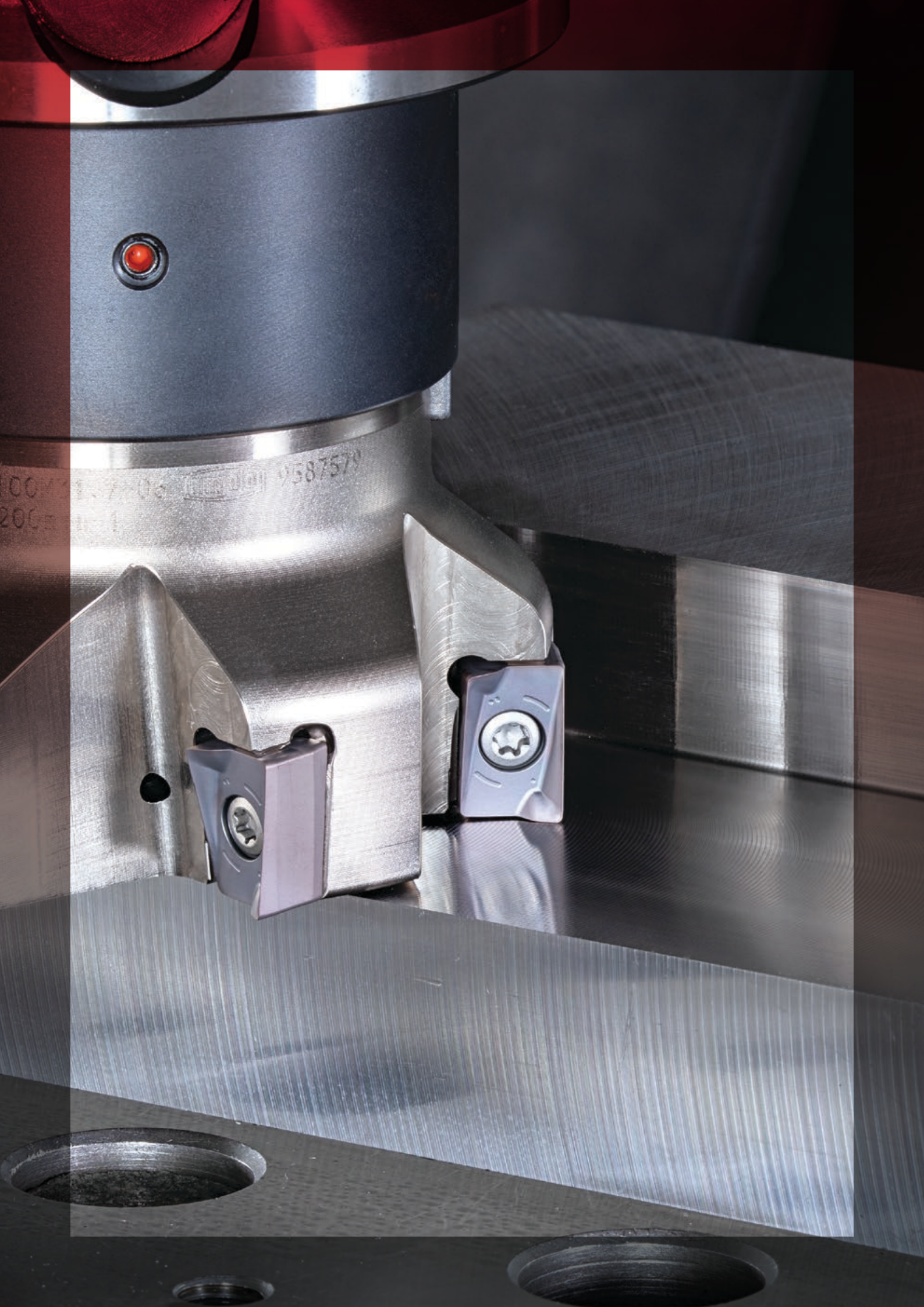
**DOREC**

Tungaloy Report No. 390-US

Shoulder cutter for high-efficiency processes —  
now offering a **new chipbreaker and grades**









# DOREC

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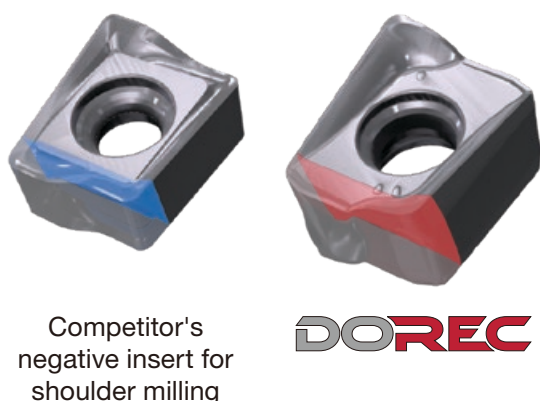


Maximum efficiency and reliability



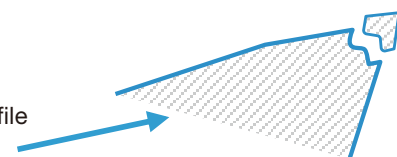
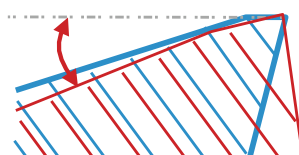
## Economical double-sided inserts with 4 effective cutting edges

### ■ Superior cutting edge integrity



Obtuse cutting edge

— **DOREC**  
— Competitor's insert profile



Obtuse cutting edge does not fracture!

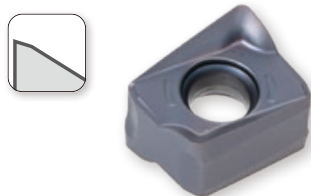
### ■ Higher feed-per-tooth capability

|              | Feed per tooth: $f_z$ (ipt) |       |       |                 |       |       |       |
|--------------|-----------------------------|-------|-------|-----------------|-------|-------|-------|
|              | 0.004                       | 0.006 | 0.008 | 0.010           | 0.012 | 0.014 | 0.016 |
| Competitor   | ○                           | ○     | ○     | x : Tool damage |       |       |       |
| <b>DOREC</b> | ○                           | ○     | ○     | ○               | ○     | ○     | ○     |

Cutter : TPQ11R050M22.0-06 (ø50 mm, CICT = 6)  
 Insert : LQMU110708PXER-MJ  
 Grade : AH3135  
 Material : S55C / C55 (200HB)  
 Cutting Speed : 656 sfm  
**Cutting depth : 0.157"**  
 Cutting width : 1.67"  
 Coolant : Dry  
 Machine : Vertical M/C, 22 kW

### ■ New ML chipbreaker

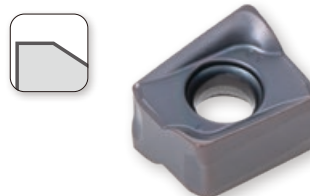
**New** ML



#### Light cutting geometry

- (reduces cutting force by about 30% over MJ chipbreaker)
- A large rake angle for light cutting action and chatter resistance
- First choice in stainless steel and heat resistant alloys

MJ

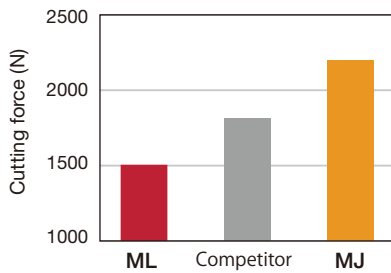


#### Balanced geometry for edge integrity and toughness

- Superior chipping resistance thanks to strong cutting edge design
- First choice in steel and cast iron

## ■ Cutting force (ML and MJ chipbreakers)

### M SUS304 / X5CrNi18-9

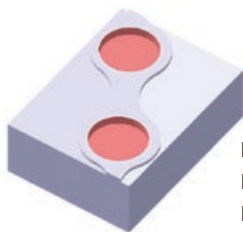


Cutter : EPQ11R025M25.0-02  
 (ø25 mm, CICT = 1)  
 Insert : LQMU110708PXER-ML AH3135  
 Cutting speed :  $V_c = 525$  sfm  
 Feed per tooth :  $f_z = 0.004$  ipt  
 Depth of cut :  $a_p = 0.118$ "  
 Width of cut :  $a_e = 0.591$ "  
 Coolant : Dry  
 Machine : Vertical M/C, BT50

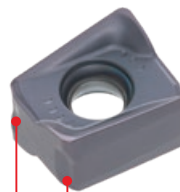
## ■ PXER insert (Size 11)

### ■ Better machining efficiency by high-feed helical interpolation

Comparison of M.R.R.



Helical interpolation  
 Material: S55C / C55 (200HB)  
 Machine: Ver MC, BT50



Unique clearance design enables 3D milling

| Cutting conditions                           | DOREC                                | Competitor                      |
|----------------------------------------------|--------------------------------------|---------------------------------|
| Cutter                                       | EPQ11R032M32.0-03 (ø32 mm, CICT = 3) | ø32 mm, CICT = 3                |
| Insert                                       | LQMU110708PXER-MJ AH3135             | 2-edged inserts, P30 equivalent |
| Cutting speed: $V_c$ (sfm)                   | 656                                  |                                 |
| Depth of cut: $a_p$ (in)                     | 0.079" (pitch of a helix)            |                                 |
| Feed per tooth: $f_z$ (ipt)                  | 0.016                                | 0.008                           |
| Metal removal rate: Q (in <sup>3</sup> /min) | 60.16                                | 30.08                           |
| Width of cut: $a_e$ (in)                     | ø2.44", Hole making                  |                                 |

## ■ Available in the new grades

### Tungaloy's PVD and CVD grades optimized for each material groups

#### AH3225 P

- 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

#### AH8015 K S H

- PVD coated grades with high wear and chipping resistance
- Demonstrates incredible tool life in the machining of heat resistance alloys

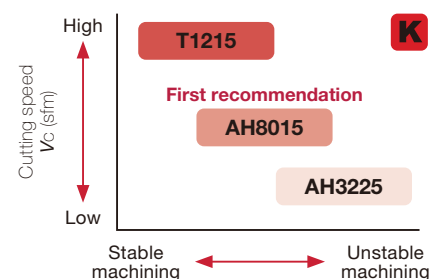
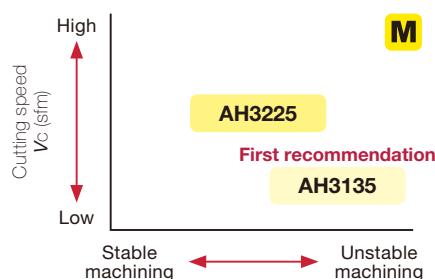
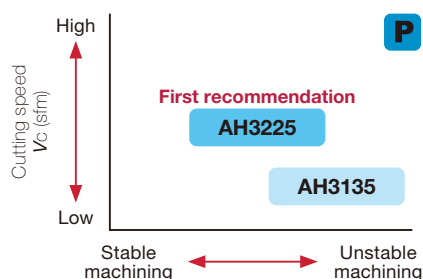
#### AH3135 M

- PVD grade for high fracture resistance
- Most suitable for steel and stainless steel in general cutting parameters

#### T1215 K

- CVD grade with outstanding wear and chipping resistance
- Best for cast iron at high-speed machining

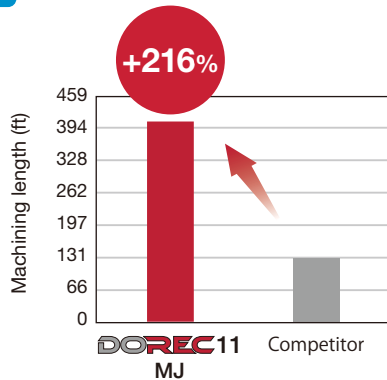
## ■ Application areas



## Cutting performance

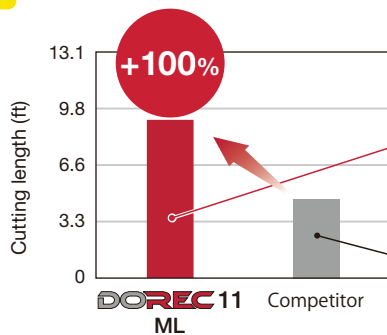
### ■ Tool life

#### P S55C / C55



Cutter : EPQ11R025M25.0-02 (ø25 mm, CICT = 1)  
 Insert : LQMU110708PXER-MJ AH3225  
 Cutting speed :  $V_c = 591$  sfm  
 Feed per tooth :  $f_z = 0.008$  ipt  
 Depth of cut :  $a_p = 0.12$ "  
 Width of cut :  $a_e = 0.591$ "  
 Coolant : Dry  
 Machine : Vertical M/C, BT50

#### M SUS304 / X5CrNi18-9



#### DOREC11 ML chipbreaker



No chipping

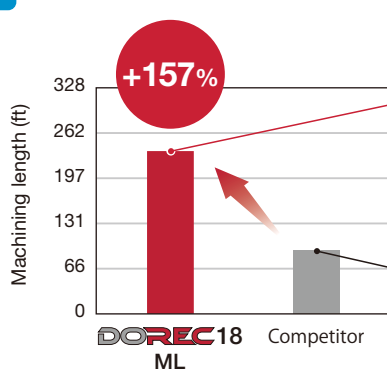
Competitor



Chipping

Cutter : EPQ11R025M25.0-02 (ø25 mm, CICT = 1)  
 Insert : LQMU110708PXER-ML AH3135  
 Cutting speed :  $V_c = 394$  sfm  
 Feed per tooth :  $f_z = 0.004$  ipt  
 Depth of cut :  $a_p = 0.118$ "  
 Width of cut :  $a_e = 0.591$ "  
 Coolant : Wet  
 Machine : Vertical M/C, BT50  
 Performed with only one insert on the cutter

#### P S55C / C55

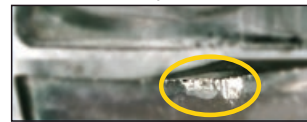


#### DOREC18 ML chipbreaker



No chipping

Competitor

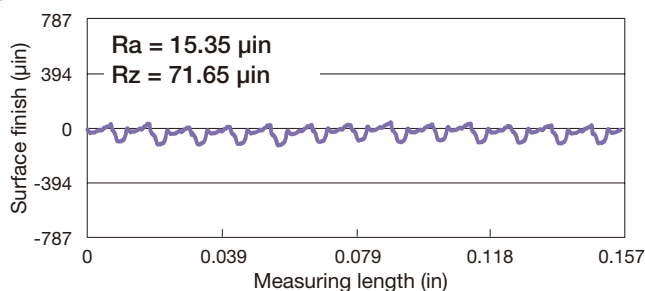


Chipping

Cutter : TPQ18R080M27.0E05 (ø80 mm, CICT = 5)  
 Insert : LQMU180808PNER-ML AH3225  
 Cutting speed :  $V_c = 591$  sfm  
 Feed per tooth :  $f_z = 0.008$  ipt  
 Depth of cut :  $a_p = 0.472$ "  
 Width of cut :  $a_e = 0.591$ "  
 Coolant : Dry  
 Machine : Vertical M/C, BT50  
 Performed with only one insert on the cutter

### ■ Surface finish

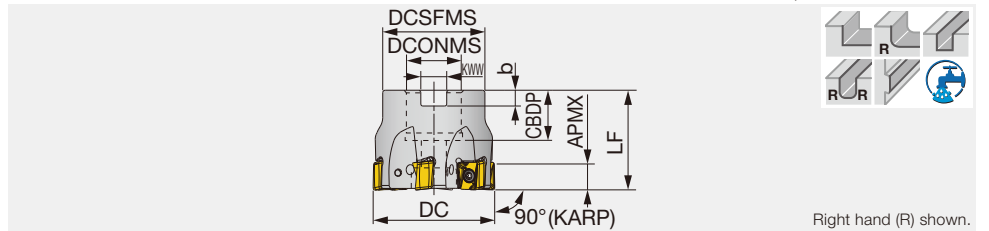
#### P S55C / C55 (200HB)



Cutter : TPQ18R050M22.0E03 (ø50 mm, CICT = 3)  
 Insert : LQMU1808008PNER-MJ  
 Grade : AH725  
 Cutting speed :  $V_c = 492$  sfm  
 Feed per tooth :  $f_z = 0.004$  ipt  
 Depth of cut :  $a_p = 0.394$ "  
 Width of cut :  $a_e = 1.97$ "  
 Coolant : Wet  
 Machine : Vertical M/C, BT50

## TPQ11,18

### Square shoulder mill, with screw clamp system



| Inch              | APMX  | DC    | CICT | DCSFMS | LF    | DCONMS | CBDP  | KWW   | b     | Wt(lb) | Air hole | Insert      |
|-------------------|-------|-------|------|--------|-------|--------|-------|-------|-------|--------|----------|-------------|
| TPQ11R200U0075A06 | 0.354 | 2.000 | 6    | 1.693  | 1.575 | 0.750  | 0.787 | 0.320 | 0.187 | 0.880  | With     | LQMU1107... |
| TPQ11R250U0075A07 | 0.354 | 2.500 | 7    | 1.693  | 1.575 | 0.750  | 0.787 | 0.320 | 0.187 | 1.320  | With     | LQMU1107... |
| TPQ11R300U0100A10 | 0.354 | 3.000 | 10   | 2.165  | 1.969 | 1.000  | 1.024 | 0.383 | 0.219 | 2.310  | With     | LQMU1107... |
| TPQ11R400U0150A12 | 0.354 | 4.000 | 12   | 3.150  | 1.969 | 1.500  | 1.496 | 0.633 | 0.375 | 4.410  | With     | LQMU1107... |
| TPQ18R200U0075A03 | 0.630 | 2.000 | 3    | 1.772  | 1.575 | 0.750  | 0.750 | 0.320 | 0.187 | 0.880  | With     | LQMU1808... |
| TPQ18R250U0100A04 | 0.630 | 2.500 | 4    | 2.165  | 1.969 | 1.000  | 1.024 | 0.383 | 0.219 | 1.760  | With     | LQMU1808... |
| TPQ18R300U0100A05 | 0.630 | 3.000 | 5    | 2.165  | 1.969 | 1.000  | 1.024 | 0.383 | 0.219 | 2.430  | With     | LQMU1808... |
| TPQ18R400U0150A06 | 0.630 | 4.000 | 6    | 3.150  | 1.969 | 1.500  | 1.496 | 0.633 | 0.375 | 3.750  | With     | LQMU1808... |
| TPQ18R500U0150A08 | 0.630 | 5.000 | 8    | 3.150  | 2.480 | 1.500  | 1.693 | 0.626 | 0.394 | 6.170  | With     | LQMU1808... |
| TPQ18R600U0200A09 | 0.630 | 6.000 | 9    | 3.937  | 2.480 | 2.000  | 1.811 | 0.758 | 0.437 | 9.040  | Without  | LQMU1808... |

#### SPARE PARTS

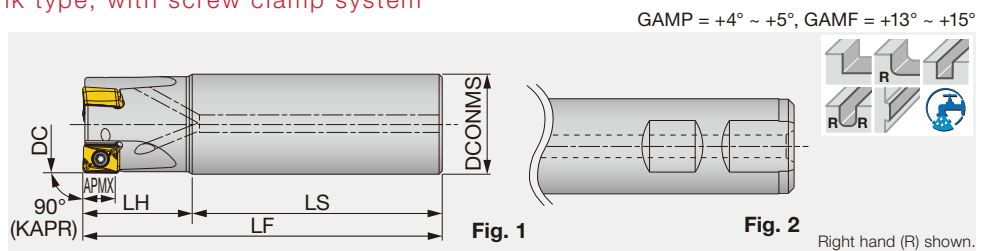


|                                                          |              |        |           |                 |
|----------------------------------------------------------|--------------|--------|-----------|-----------------|
| ...TPQ11R200..., TPQ11R250<br>...TPQ18R200..., TPQ18R250 | CSTB-3.5L115 | SW6-SD | BLDT10/S7 | (C0.375X1.125H) |
| ...TPQ11R300..., TPQ18R300                               | CSTB-3.5L115 | SW6-SD | BLDT10/S7 | (C0.500X1.375H) |
| ...TPQ11R400..., TPQ18R400<br>...TPQ18R500               | CSTB-3.5L115 | SW6-SD | BLDT10/S7 | (TMBA-0.750H)   |
| TPQ18R600U0200A09                                        | CSTB-3.5L115 | SW6-SD | BLDT10/S7 | -               |

\*Recommended clamping torque : CSTB-3.5L115 = 1.84 lbs · ft, SR14-591 = 3.69 lbs · ft

## EPQ11

### Square shoulder endmill, shank type, with screw clamp system



| Inch              | APMX  | DC    | CICT | DCONMS | LS    | LH    | LF    | WT(lb) | Air hole | Insert   | Shank type |
|-------------------|-------|-------|------|--------|-------|-------|-------|--------|----------|----------|------------|
| EPQ11R100U0100W02 | 0.354 | 1.000 | 2    | 1.000  | 2.280 | 1.220 | 3.500 | 0.750  | With     | LQMU1107 | Fig. 2     |
| EPQ11R125U0125W03 | 0.354 | 1.250 | 3    | 1.250  | 2.500 | 1.500 | 4.000 | 1.540  | With     | LQMU1107 | Fig. 2     |
| EPQ11R150U0125W04 | 0.354 | 1.500 | 4    | 1.250  | 2.250 | 1.750 | 4.000 | 1.650  | With     | LQMU1107 | Fig. 2     |

#### SPARE PARTS



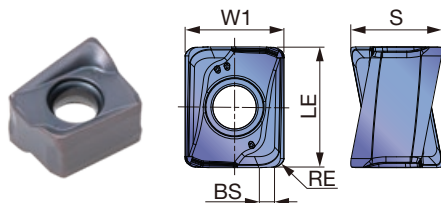
| Designation | Clamping screw | Grip 1 | Grip 2 | Torx bit  | Wrench |
|-------------|----------------|--------|--------|-----------|--------|
| EPQ11...    | CSTB-3.5L115   | SW6-SD | -      | BLDT10/S7 | T-10D  |

Recommended clamping torque : CSTB-3.5L115 = 2.5 N·m, SR 14-591 = 5 N·m

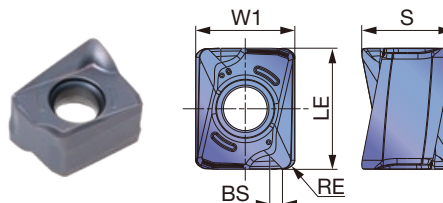
## INSERTS

**New**

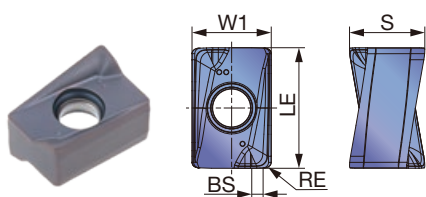
LQMU11-PXER-MJ (for general purpose)



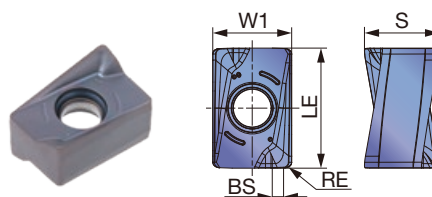
LQMU11-PXER-ML (for low cutting force)



LQMU11/18-PNER-MJ (for general purpose)



LQMU18-PNER-ML (for low cutting force)



|                         |   |   |   |   |   |  |   |  |
|-------------------------|---|---|---|---|---|--|---|--|
| <b>P</b> Steel          | ★ | ☆ |   |   |   |  | ☆ |  |
| <b>M</b> Stainless      | ☆ | ★ |   |   |   |  | ☆ |  |
| <b>K</b> Cast iron      |   |   | ★ | ☆ | ☆ |  |   |  |
| <b>N</b> Non-ferrous    |   |   |   |   |   |  |   |  |
| <b>S</b> Superalloys    |   | ☆ | ★ |   | ☆ |  | ☆ |  |
| <b>H</b> Hard materials |   |   | ★ |   |   |  | ☆ |  |

★ : First choice  
☆ : Second choice

| Designation                  | RE     | APMX  | Coated |        |        |       |       |       |       | LE    | S     | W1    | BS    |
|------------------------------|--------|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
|                              |        |       | AH3225 | AH3135 | AH8015 | T1215 | AH120 | AH140 | AH725 |       |       |       |       |
| <b>New</b> LQMU110704PXER-MJ | 0.0157 | 0.354 | ★      | ★      | ★      |       |       |       |       | 0.433 | 0.331 | 0.354 | 0.059 |
| LQMU110704PNER-MJ            | 0.0157 | 0.354 |        |        |        |       | ●     | ●     | ●     | 0.433 | 0.331 | 0.354 | 0.059 |
| LQMU110708PXER-MJ            | 0.0314 | 0.354 | ●      | ●      | ●      | ●     | ●     |       |       | 0.433 | 0.327 | 0.354 | 0.043 |
| LQMU110708PNER-MJ            | 0.0314 | 0.354 |        |        |        |       | ●     | ●     | ●     | 0.433 | 0.327 | 0.354 | 0.043 |
| <b>New</b> LQMU110716PXER-MJ | 0.0629 | 0.354 | ★      |        | ★      |       |       |       |       | 0.433 | 0.319 | 0.354 | 0.012 |
| LQMU110716PNER-MJ            | 0.0629 | 0.354 |        |        |        |       | ●     | ●     | ●     | 0.433 | 0.323 | 0.354 | 0.012 |
| <b>New</b> LQMU110720PXER-MJ | 0.0787 | 0.354 | ★      |        | ★      |       |       |       |       | 0.433 | 0.319 | 0.354 | -     |
| LQMU110720PNER-MJ            | 0.0787 | 0.354 |        |        |        |       | ●     |       |       | 0.433 | 0.319 | 0.354 | -     |
| <b>New</b> LQMU110704PXER-ML | 0.0157 | 0.354 | ★      | ★      | ★      |       |       |       |       | 0.433 | 0.331 | 0.354 | 0.059 |
| <b>New</b> LQMU110708PXER-ML | 0.0315 | 0.354 | ●      | ●      | ●      | ●     |       |       |       | 0.433 | 0.327 | 0.354 | 0.043 |
| LQMU180804PNER-MJ            | 0.0157 | 0.630 | ●      | ●      | ●      |       | ●     | ●     | ●     | 0.689 | 0.429 | 0.453 | 0.079 |
| LQMU180808PNER-MJ            | 0.0314 | 0.630 | ●      | ●      | ●      | ●     | ●     | ●     | ●     | 0.689 | 0.429 | 0.453 | 0.063 |
| LQMU180816PNER-MJ            | 0.0629 | 0.630 |        |        | ●      |       | ●     | ●     | ●     | 0.689 | 0.429 | 0.453 | 0.031 |
| LQMU180824PNER-MJ            | 0.0944 | 0.630 |        |        |        |       | ●     | ●     | ●     | 0.689 | 0.421 | 0.453 | -     |
| LQMU180804PNER-ML            | 0.0157 | 0.630 | ●      | ●      | ●      |       |       |       |       | 0.689 | 0.429 | 0.453 | 0.079 |
| LQMU180808PNER-ML            | 0.0315 | 0.630 | ●      | ●      | ●      | ●     |       |       |       | 0.689 | 0.429 | 0.453 | 0.063 |

● : New product  
★ : Will be released in August 2024  
● : Line up



## STANDARD CUTTING CONDITIONS

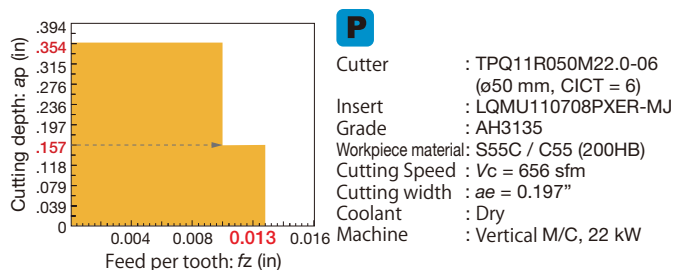
| ISO                                                | Workpiece material                                      |                                            | Hardness          | Priority            | Chipbreaker       | Grade     | Cutting speed<br>Vc (sfm) | Feed per tooth*<br>fz (ipt) |               |
|----------------------------------------------------|---------------------------------------------------------|--------------------------------------------|-------------------|---------------------|-------------------|-----------|---------------------------|-----------------------------|---------------|
| P                                                  | Low carbon steel<br>S15C, etc. C15E4, etc.              |                                            | - 200 HB          | First choice        | MJ                | AH3225    | 328 - 820                 | 0.004 - 0.010               |               |
|                                                    |                                                         |                                            |                   | Low cutting force   | ML                | AH3225    | 328 - 820                 | 0.004 - 0.010               |               |
|                                                    | High carbon steel<br>S45C, S55C, etc.<br>C45, C55, etc. |                                            | 200 - 300 HB      | First choice        | MJ                | AH3225    | 328 - 755                 | 0.004 - 0.008               |               |
|                                                    |                                                         |                                            |                   | Low cutting force   | ML                | AH3225    | 328 - 755                 | 0.004 - 0.008               |               |
|                                                    | Alloy steel<br>SCM440, SCr415, etc.<br>42CrMo4, etc.    |                                            | - 300 HB          | First choice        | MJ                | AH3225    | 328 - 755                 | 0.004 - 0.008               |               |
|                                                    |                                                         |                                            |                   | Low cutting force   | ML                | AH3225    | 328 - 755                 | 0.004 - 0.008               |               |
| M                                                  | Tool steel<br>SKD11, etc.<br>X153CrMoV12, etc.          |                                            | 30 - 40 HRC       | First choice        | MJ                | AH3225    | 328 - 591                 | 0.004 - 0.008               |               |
|                                                    |                                                         |                                            |                   | Low cutting force   | ML                | AH3225    | 328 - 591                 | 0.004 - 0.008               |               |
|                                                    | Stainless steel<br>SUS304, etc.<br>X5CrNi18-9, etc.     |                                            | - 200 HB          | First choice        | ML                | AH3135    | 295 - 591                 | 0.004 - 0.010               |               |
|                                                    |                                                         |                                            |                   | Fracture resistance | MJ                | AH3135    | 295 - 591                 | 0.004 - 0.010               |               |
|                                                    | K                                                       | Grey cast iron<br>FC250, etc.<br>250, etc. |                   | 150 - 250 HB        | First choice      | MJ        | AH8015                    | 459 - 820                   | 0.004 - 0.010 |
|                                                    |                                                         |                                            |                   |                     | Low cutting force | ML        | AH8015                    | 459 - 820                   | 0.004 - 0.010 |
| Wear resistance                                    |                                                         |                                            |                   |                     | MJ                | T1215     | 656 - 1312                | 0.004 - 0.010               |               |
| Ductile cast iron<br>FCD400, etc.<br>450-10S, etc. |                                                         | 150 - 250 HB                               | First choice      | MJ                  | AH8015            | 361 - 656 | 0.004 - 0.010             |                             |               |
|                                                    |                                                         |                                            | Low cutting force | ML                  | AH8015            | 361 - 656 | 0.004 - 0.010             |                             |               |
|                                                    |                                                         |                                            | Wear resistance   | MJ                  | T1215             | 492 - 984 | 0.004 - 0.010             |                             |               |
| S                                                  | Titanium alloy<br>Ti-6Al-4V, etc.                       |                                            | -                 | First choice        | ML                | AH3135    | 98 - 197                  | 0.003 - 0.008               |               |
|                                                    |                                                         |                                            |                   | Fracture resistance | MJ                | AH3135    | 98 - 197                  | 0.003 - 0.008               |               |
|                                                    | Superalloys<br>Inconel 718, etc.                        |                                            | -                 | First choice        | ML                | AH8015    | 66 - 164                  | 0.002 - 0.006               |               |
|                                                    |                                                         |                                            |                   | Fracture resistance | MJ                | AH8015    | 66 - 164                  | 0.002 - 0.006               |               |
| H                                                  | Hardened steel                                          | SKD61, etc.<br>X40CrMoV5-1, etc.           | 40 - 50 HRC       | First choice        | MJ                | AH8015    | 148 - 230                 | 0.003 - 0.006               |               |
|                                                    |                                                         | SKD11, etc.<br>X153CrMoV12, etc.           | 50 - 60 HRC       | First choice        | MJ                | AH8015    | 148 - 213                 | 0.002 - 0.004               |               |

\*Please read "Note when using LQMU11 inserts" on below before setting feed per tooth.

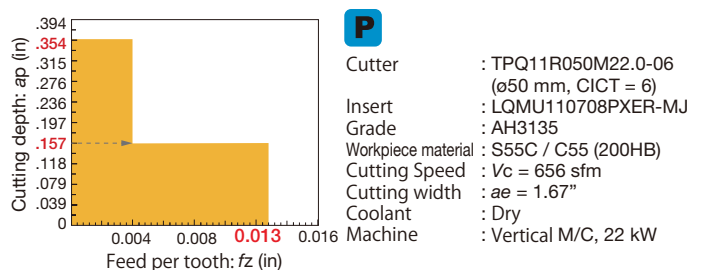
## NOTE WHEN USING LQMU11 INSERTS

Maximum feed rate per tooth varies depending on the cutting depth and width. Use proper feed rate as described below. Tool may be damaged if the parameters are not properly set.

### Applicable feed rate (for ae < 10% of tool diameter)

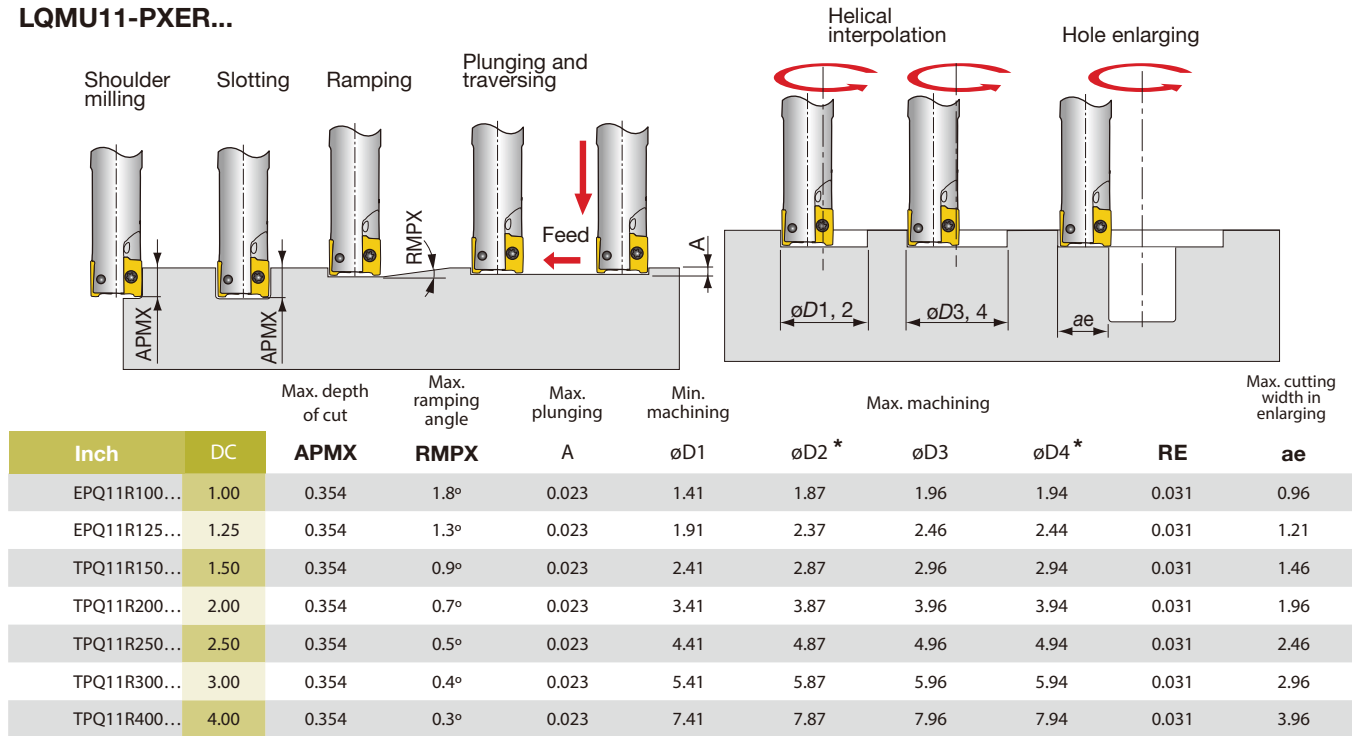


### Applicable feed rate (for ae > 10% of tool diameter)



## APPLICATION RANGE

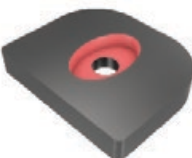
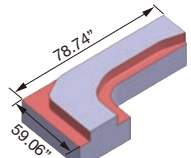
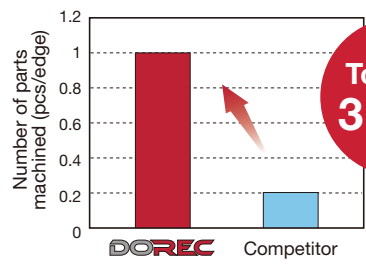
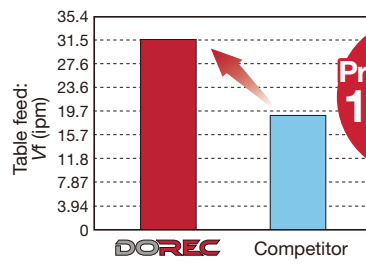
### LQMU11-PXER...

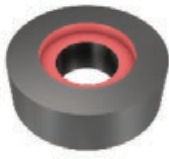
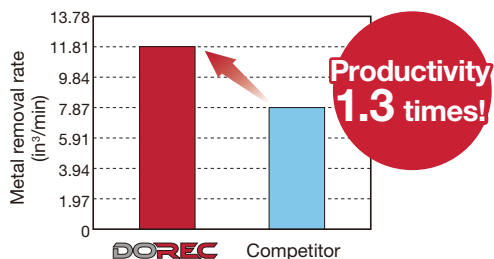
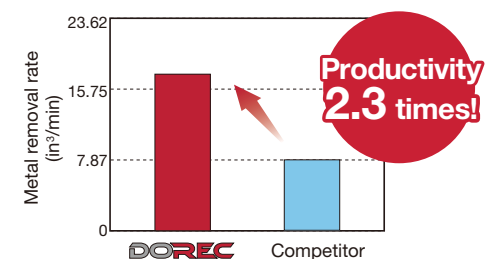
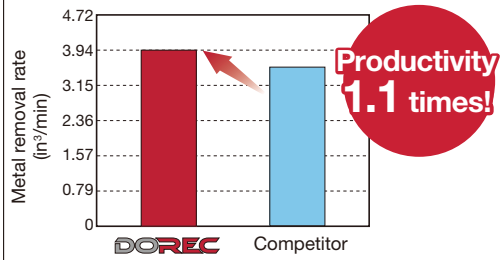
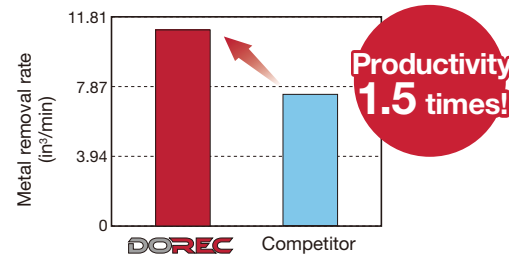


\*For a flat bottom

Note: Corner RE for dimensions of ØD2 and ØD4: RE = 0.031

## PRACTICAL EXAMPLES

| Workpiece type     |                           | Flange sheet                                                                                                                                                                                                                                                         | Press mold                                                                                                                                                                        |
|--------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cutter             |                           | TPQ11R080M27.0E10 (ø80 mm, CICT = 10)                                                                                                                                                                                                                                | TPQ18R080M25.4-05 (ø80 mm, CICT = 5)                                                                                                                                              |
| Insert             |                           | LQMU110708PXER-MJ                                                                                                                                                                                                                                                    | LQMU180816PNER-MJ                                                                                                                                                                 |
| Grade              |                           | AH3135                                                                                                                                                                                                                                                               | AH120                                                                                                                                                                             |
| Workpiece material |                           | Martensitic stainless steel                                                                                                                                                                                                                                          | FC250 / GG25 / 250 (180HB)                                                                                                                                                        |
|                    |                           |  <b>M</b>                                                                                                                                                                         |  <b>K</b>                                                                                    |
| Cutting conditions | Cutting speed : Vc (sfm)  | 591                                                                                                                                                                                                                                                                  | 656                                                                                                                                                                               |
|                    | Feed per tooth : fz (ipt) | 0.006                                                                                                                                                                                                                                                                | 0.079                                                                                                                                                                             |
|                    | Feed speed : Vf (ipm)     | 42.28                                                                                                                                                                                                                                                                | 31.49                                                                                                                                                                             |
|                    | Depth of cut : ap (in)    | 0.0394 (at 0.0394" helix pitch)                                                                                                                                                                                                                                      | 0.472                                                                                                                                                                             |
|                    | Width of cut : ae (in)    | 1.969                                                                                                                                                                                                                                                                | 0.787 - 2.362                                                                                                                                                                     |
|                    | Machining                 | Hole enlargement by helical interpolation                                                                                                                                                                                                                            | Shoulder milling                                                                                                                                                                  |
|                    | Coolant                   | Dry                                                                                                                                                                                                                                                                  | Dry                                                                                                                                                                               |
|                    | Machine                   | Vertical M/C, BT50                                                                                                                                                                                                                                                   | Vertical M/C, BT50                                                                                                                                                                |
| Results            |                           |  <p>Competitor's positive round inserts repetitively fractured. DoRec insert's multifunctional geometry provided stable machining thanks to its strong cutting edge geometry.</p> |  <p>Superior edge integrity enabled machining at higher feed rates, improving cycle time.</p> |

| Workpiece type     |                           | Eccentric countersink                                                                                                                                                                                                                                                                                                                 | Mold part                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cutter             |                           | EPQ11R032M32.0-03 (ø32 mm, CICT = 3)                                                                                                                                                                                                                                                                                                  | TPQ11R080M25.4-10 (ø80 mm, CICT = 10)                                                                                                                                                                                                                                       |
| Insert             |                           | LQMU110708PXER-MJ                                                                                                                                                                                                                                                                                                                     | LQMU110708PXER-ML                                                                                                                                                                                                                                                           |
| Grade              |                           | AH3135<br>SUS304                                                                                                                                                                                                                                                                                                                      | AH8015<br>FC250 / 250                                                                                                                                                                                                                                                       |
| Workpiece material |                           |  <b>M</b>                                                                                                                                                                                                                                            |  <b>K</b>                                                                                                                                                                                |
| Cutting conditions | Cutting speed : Vc (sfm)  | 492                                                                                                                                                                                                                                                                                                                                   | 574                                                                                                                                                                                                                                                                         |
|                    | Feed per tooth : fz (ipt) | 0.018 (Competitor: fz = 0.012)                                                                                                                                                                                                                                                                                                        | 0.005                                                                                                                                                                                                                                                                       |
|                    | Feed speed : Vf (ipm)     | 78.7 (Competitor: Vf = 53.1)                                                                                                                                                                                                                                                                                                          | 35.6                                                                                                                                                                                                                                                                        |
|                    | Depth of cut : ap (in)    | 0.039 (at 0.039" helix pitch)                                                                                                                                                                                                                                                                                                         | 0.059                                                                                                                                                                                                                                                                       |
|                    | Width of cut : ae (in)    | 0.591                                                                                                                                                                                                                                                                                                                                 | 1.969                                                                                                                                                                                                                                                                       |
|                    | Machining                 | Hole enlargement, helical interpolation                                                                                                                                                                                                                                                                                               | Face milling                                                                                                                                                                                                                                                                |
|                    | Coolant                   | External supply                                                                                                                                                                                                                                                                                                                       | Dry                                                                                                                                                                                                                                                                         |
|                    | Machine                   | Vertical M/C, BT40                                                                                                                                                                                                                                                                                                                    | Vertical M/C, BT50                                                                                                                                                                                                                                                          |
| Results            |                           |  <p>Competitor's inserts fractured at high feed rates, and repetitive notch wears shortened the tool life. DoRec inserts enabled stable machining at higher feed rates thanks to its superior cutting edge integrity, extending tool life 1.3x.</p> |  <p>DoRec with ML chipbreaker inserts significantly reduced chatter when machining the thin-walled component. As the result, increased cutting data and 2.3 times productivity gain.</p> |
| Workpiece type     |                           | Machine part                                                                                                                                                                                                                                                                                                                          | Machine part                                                                                                                                                                                                                                                                |
| Cutter             |                           | EPQ11R040M32.0-04 (ø40 mm, CICT = 4)                                                                                                                                                                                                                                                                                                  | EPQ18R050M32.0W04 (ø50 mm, CICT = 4)                                                                                                                                                                                                                                        |
| Insert             |                           | LQMU110708PXER-ML                                                                                                                                                                                                                                                                                                                     | LQMU180808PNER-ML                                                                                                                                                                                                                                                           |
| Grade              |                           | AH3225<br>SACM645 / 41CrAlMo74                                                                                                                                                                                                                                                                                                        | AH8015<br>FC200 / 200                                                                                                                                                                                                                                                       |
| Workpiece material |                           |  <b>P</b>                                                                                                                                                                                                                                          |  <b>K</b>                                                                                                                                                                              |
| Cutting conditions | Cutting speed : Vc (sfm)  | 577                                                                                                                                                                                                                                                                                                                                   | 387                                                                                                                                                                                                                                                                         |
|                    | Feed per tooth : fz (ipt) | 0.002                                                                                                                                                                                                                                                                                                                                 | 0.984                                                                                                                                                                                                                                                                       |
|                    | Feed speed : Vf (ipm)     | 13.2                                                                                                                                                                                                                                                                                                                                  | 29.5                                                                                                                                                                                                                                                                        |
|                    | Depth of cut : ap (in)    | 0.039                                                                                                                                                                                                                                                                                                                                 | 0.059                                                                                                                                                                                                                                                                       |
|                    | Width of cut : ae (in)    | 1.18                                                                                                                                                                                                                                                                                                                                  | 0.98                                                                                                                                                                                                                                                                        |
|                    | Machining                 | Shoulder milling                                                                                                                                                                                                                                                                                                                      | Face milling                                                                                                                                                                                                                                                                |
|                    | Coolant                   | Dry                                                                                                                                                                                                                                                                                                                                   | Dry                                                                                                                                                                                                                                                                         |
|                    | Overhang length (in)      | -                                                                                                                                                                                                                                                                                                                                     | 8.27                                                                                                                                                                                                                                                                        |
| Machine            |                           | Vertical M/C, BT40                                                                                                                                                                                                                                                                                                                    | Horizontal M/C, HSK A100                                                                                                                                                                                                                                                    |
| Results            |                           |  <p>DoRec with ML chipbreaker inserts eliminated burr formation, allowing the use of increased cutting data. As the result, 1.1 times productivity boost.</p>                                                                                      |  <p>DoRec's light-cutting ML chipbreaker eliminated chatter in a 8.27" long overhang setup. This allowed higher parameters, achieving 1.5 times productivity increase.</p>              |



# 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](http://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](http://www.tungaloy.com/ca)

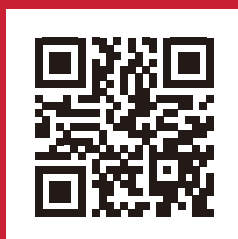
## Mexico

C Los Arellano 113, Parque Industrial Siglo XXI

Aguascalientes, AGS, Mexico 20290

Phone: +52-449-929-5410 Fax: +52-449-929-5411

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