

MillLine



# TUNG<sup>RI</sup>SHRED

[www.tungaloy.com](http://www.tungaloy.com)

Tungaloy Report No. 505-G

## Powerful and Efficient Rough Shoulder Milling with **New CVD Grades**



**INDUSTRY 4.0**  
*FEED the SPEED!*





ACCELERATED MACHINING

MillLine

**TUNG<sup>RI</sup>TSHRED**  
TUNGALOY



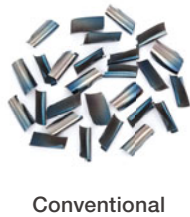
High performance cutter with chip splitters  
for improved chatter stability and efficiency in  
rough milling with long overhang

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# Long-edge roughing cutter with effective chip splitting and chatter stability

## Anti-Chatter Design

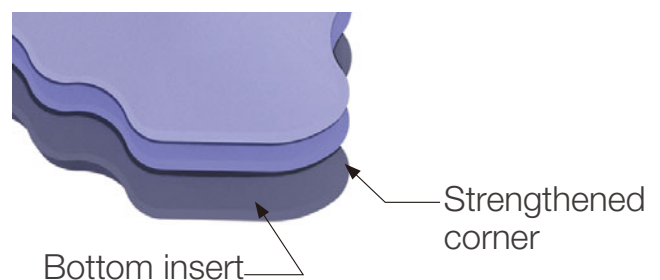
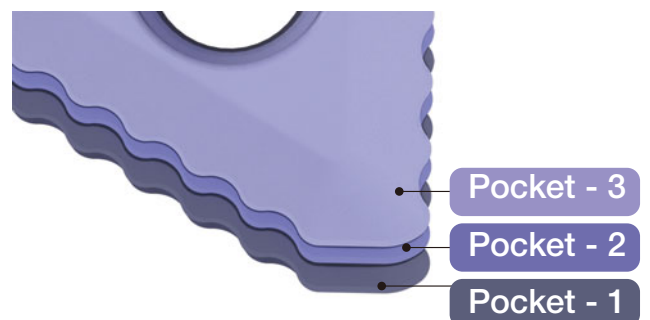
- Serrated cutting edge creates smaller chips reducing chatter.



- Insert's triangular shape ensures rigid clamping during heavy machining.

## Intelligent and User friendly design

- Each flute (adjacent pockets in radial direction) in the cutter body is offset in the Z direction. This positioning ensures that the insert in the adjacent flute removes the material left by the previous insert. Thus, the machined wall surface is close to flat.
- No specific insert positioning is required as positioning is done on the cutter.
- All cutting edges of the inserts are identical.
- Insert corner is strengthened to resist corner fracture for the bottom most insert. (the bottom most insert is a single effective corner and withstands the feed equal to feed/rev)





## Insert Varieties

2 types of inserts fit on the same cutter body providing options for roughing as well as finishing.



**TCMT-NMJ**

For roughing operation with serrated edges  
- Low cutting force

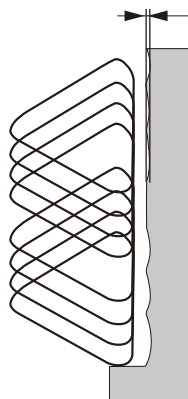


**TCGT-MJ**

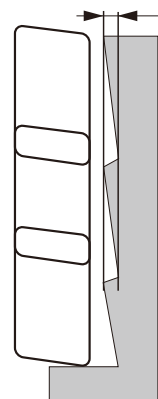
Suitable for finishing operation or general square shoulder milling.

- Low cutting force with large rake angle
- Precision-ground periphery insert and unique offset positioning of the pockets ensure minimal step on the machined wall.

Small step



Large step

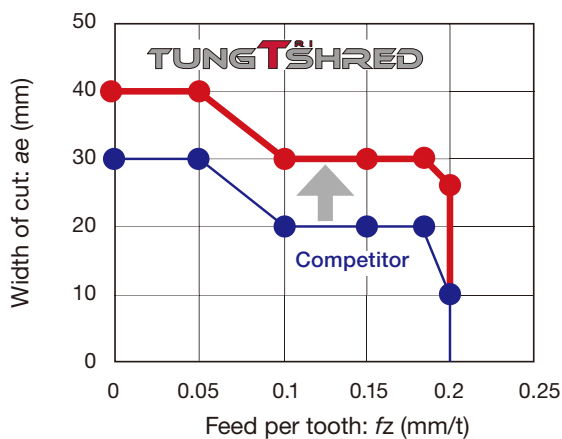


**TUNGTRI-SHRED**

Conventional,  
Competitor

## CUTTING PERFORMANCE

### Comparison of application range



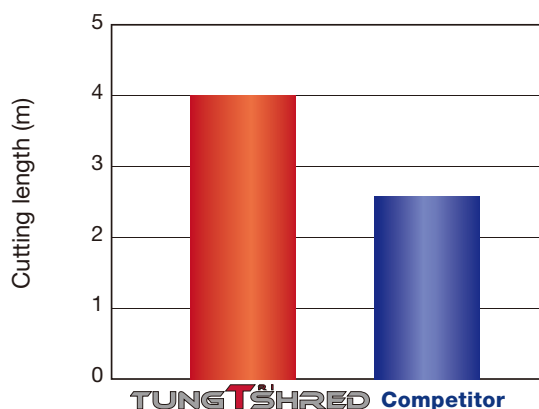
Cutter : LPTC16M080B32.0L076R04 ( $\phi D_c = 80$  mm,  $z = 4$ )  
 Insert : TCMT160620PDER-NMJ  
 Workpiece material : 42CrMo4 / SCM440H (270HB)  
 Cutting speed :  $V_c = 100$  m/min  
 Depth of cut :  $a_p = 70$  mm  
 Machine : Vertical M/C (BT50, 37 kw)

**TungTri-Shred can be applied in broader application area.**

## CUTTING PERFORMANCE

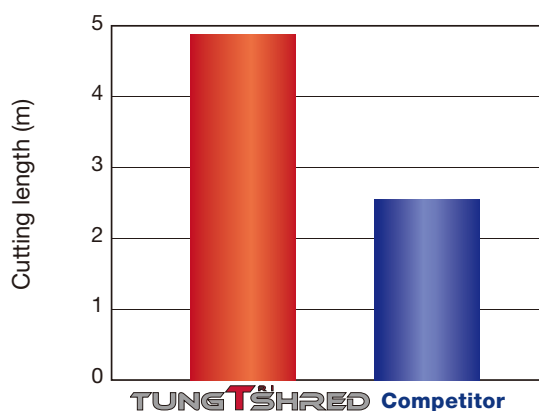
### Tool life

#### **P** Carbon steel with NMJ inserts



Cutter : LPTC16M080B32.0L076R04 ( $\phi D_c = 80$  mm,  $z = 4$ )  
 Insert : TCMT160620PDER-NMJ AH3135  
 Workpiece material : S55C / C55 (200HB)  
 Cutting speed :  $V_c = 150$  m/min  
 Feed per tooth :  $f_z = 0.18$  mm/t  
 Depth of cut :  $a_p = 10$  mm  
 Width of cut :  $a_e = 40$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT50, 30kW  
 Machining : Heavy interrupted  
 Tool life criteria : Chipping on edge

#### **P** Alloy steel with MJ inserts



Cutter : LPTC16M080B32.0L076R04 ( $\phi D_c = 80$  mm,  $z = 4$ )  
 Insert : TCGT160608PDER-MJ AH3135  
 Workpiece material : SCM440 / 42CrMo4 (270HB)  
 Cutting speed :  $V_c = 150$  m/min  
 Feed per tooth :  $f_z = 0.15$  mm/t  
 Depth of cut :  $a_p = 10$  mm  
 Width of cut :  $a_e = 40$  mm  
 Coolant : Dry  
 Machine : Vertical M/C, BT50, 30kW  
 Machining : Heavy interrupted  
 Tool life criteria : Chipping on edge

## Rich grade lineup for various materials

- A total of four grades, including two new CVD grades

### PREMIUMTEC

**AH3135**



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

**AH120**



- PVD grade with a well-balanced wear and fracture resistance
- Ideal for general machining of steel and stainless steel

**New**

**T1215**



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

**New**

**T3225**



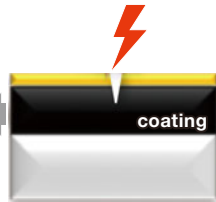
- CVD grade with excellent chipping and fracture resistance
- Most suited for steel and stainless steel at high-speed machining

### Special Surface Technology

### PREMIUMTEC

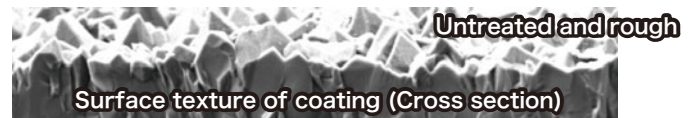


Indentation test on coating

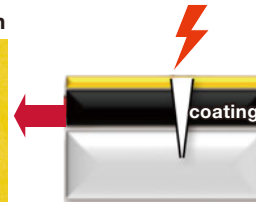


PremiumTec controls tensile residual stress and improves crack resistance.

### Conventional item

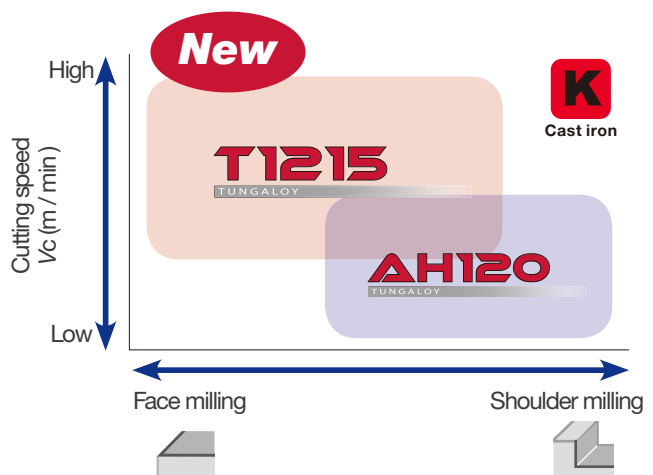
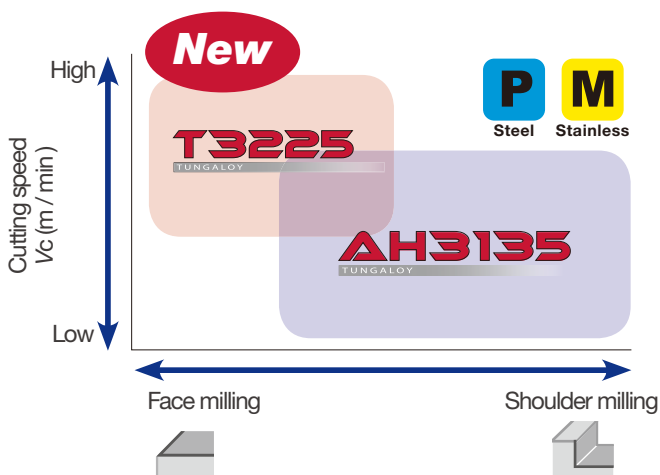


Indentation test on coating



CVD coat by nature has high tensile residual stress allowing crack propagation easily.

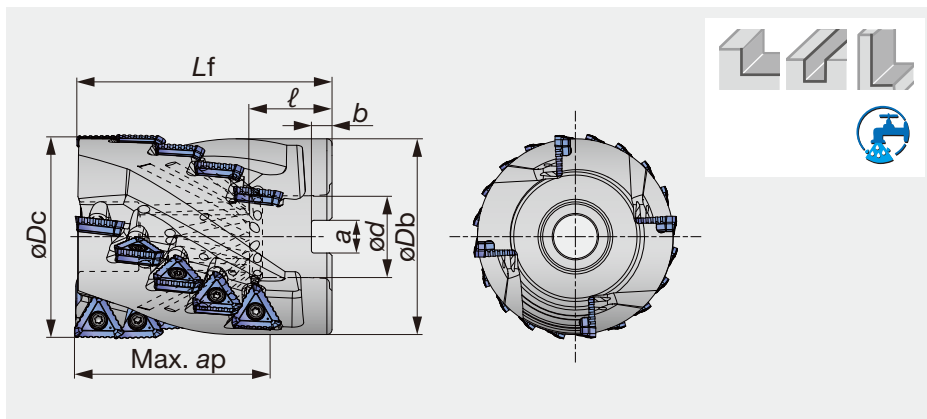
**PremiumTec technology enhances both smoothness and toughness on coating surface, improving resistance to chipping, build-up edge, and fracture.**



Square shoulder milling cutters for roughing with shred insert

## CUTTER - FOR ROUGHING - BORE TYPE

TungTri-Shred LPTC16



| Designation            | Max. ap | øDc   | Z eff | z  | øDb | Lf    | ød     | l     | a     | b    | Kg   | C.bolt           | Insert |
|------------------------|---------|-------|-------|----|-----|-------|--------|-------|-------|------|------|------------------|--------|
| LPTC16J063B25.4L061R03 | 61.0    | 63.00 | 3     | 12 | 59  | 85.0  | 25.400 | 26.00 | 9.50  | 6.00 | 1.25 | CAP-CM12X1.75X50 | TC*T16 |
| LPTC16M063B27.0L061R03 | 61.0    | 63.00 | 3     | 12 | 59  | 85.0  | 27.000 | 22.00 | 12.40 | 7.00 | 1.24 | CAP-CM12X1.75X50 | TC*T16 |
| LPTC16J080B31.7L076R04 | 76.0    | 80.00 | 4     | 20 | 76  | 100.0 | 31.750 | 32.00 | 12.70 | 8.00 | 2.44 | CM16X75          | TC*T16 |
| LPTC16M080B32.0L076R04 | 76.0    | 80.00 | 4     | 20 | 76  | 100.0 | 32.000 | 25.00 | 14.40 | 8.00 | 2.46 | CM16X75          | TC*T16 |

Note: Coolant cannot be supplied through the arbor center (through the clamping screw). Supply coolant through the flange of the arbor pilot.

### SPARE PARTS



| Clamping screw | Wrench   |        |
|----------------|----------|--------|
|                | Torx Bit | Grip   |
| TS 40B100I     | BT15S    | H-TB2W |

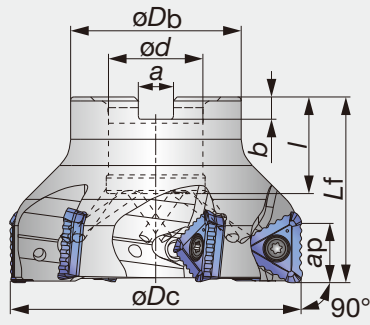
Note: recommended tightening torque for screw (TS 40B100I) : 3.5 N · m



Square shoulder milling cutters with shred insert

## CUTTER - BORE TYPE

TungTri-Shred TPTC16



| Designation        | Max. $ap$ | $\phi D_c$ | $z$ | $\phi D_b$ | $L_f$ | $\phi d$ | $\ell$ | $a$   | $b$  | Kg   | C.bolt     | Insert |
|--------------------|-----------|------------|-----|------------|-------|----------|--------|-------|------|------|------------|--------|
| TPTC16M050B22.0R04 | 16.0      | 50.00      | 4   | 41         | 40.0  | 22.000   | 20.00  | 10.40 | 6.30 | 0.29 | FSHM10-40H | TC*T16 |
| TPTC16M063B22.0R05 | 16.0      | 63.00      | 5   | 41         | 40.0  | 22.000   | 20.00  | 10.40 | 6.30 | 0.44 | CM10X30H   | TC*T16 |
| TPTC16J080B25.4R06 | 16.0      | 80.00      | 6   | 46         | 50.0  | 25.400   | 26.00  | 9.50  | 6.00 | 0.88 | CM12X30H   | TC*T16 |
| TPTC16M080B27.0R06 | 16.0      | 80.00      | 6   | 50         | 50.0  | 27.000   | 22.00  | 12.40 | 7.00 | 0.90 | CM12X30H   | TC*T16 |
| TPTC16J100B31.7R07 | 16.0      | 100.00     | 7   | 60         | 50.0  | 31.750   | 32.00  | 12.70 | 8.00 | 1.38 | TMBA-M16H  | TC*T16 |
| TPTC16M100B32.0R07 | 16.0      | 100.00     | 7   | 60         | 50.0  | 32.000   | 28.50  | 14.40 | 8.00 | 1.35 | TMBA-M16H  | TC*T16 |

### SPARE PARTS



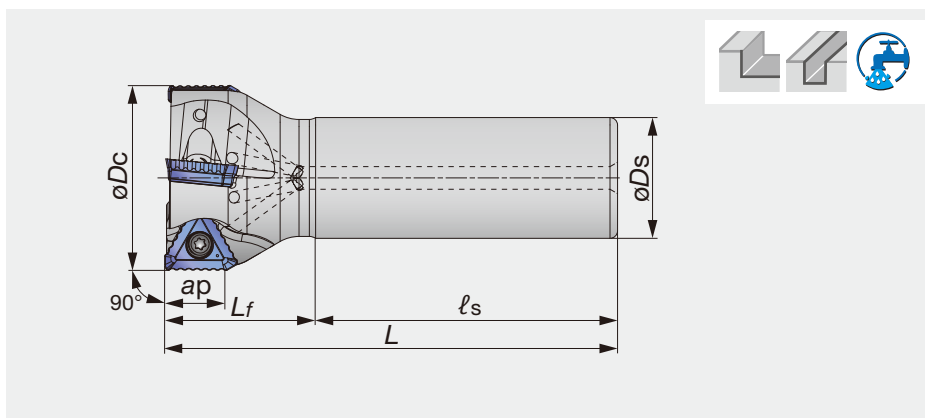
| Clamping screw | Torx Bit | Wrench      |
|----------------|----------|-------------|
| TS 40B100I     | BT15S    | Grip H-TB2W |

Note: recommended tightening torque for screw (TS 40B100I) : 3.5 N · m

Square shoulder milling cutters with shred insert

## CUTTER - SHANK TYPE

TungTri-Shred EPTC16



| Designation         | Max. $ap$ | $\phi D_c$ | $z$ | $\phi D_s$ | $\ell_s$ | $L_f$ | $L$   | Kg   | Insert |
|---------------------|-----------|------------|-----|------------|----------|-------|-------|------|--------|
| EPTC16M050C32.0R04  | 16.0      | 50.00      | 4   | 32.0       | 80.0     | 40.0  | 120.0 | 0.80 | TC*T16 |
| EPTC16M050C42.0R02L | 16.0      | 50.00      | 2   | 42.0       | 310.0    | 50.0  | 360.0 | 3.80 | TC*T16 |

### SPARE PARTS



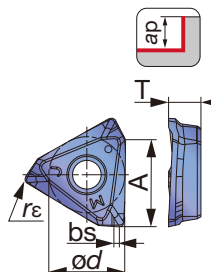
| Clamping screw | Torx Bit | Wrench |
|----------------|----------|--------|
| TS 40B100I     | BT15S    | H-TB2W |

Note: recommended tightening torque for screw (TS 40B100I) : 3.5 N · m

## INSERTS

TCGT-MJ

TCMT-NMJ



| Designation        | Max.<br>ap | A  | ød   | T   | rε  | bs | AH3135  | AH120   | New<br>T3225 | New<br>T1215 |
|--------------------|------------|----|------|-----|-----|----|---------|---------|--------------|--------------|
| TCGT160608PDER-MJ  | 16         | 16 | 13.7 | 5.8 | 0.8 | 1  | ● ● ● ● | ○ ● ● ● | ● ● ● ●      | ● ● ● ●      |
| TCMT160620PDER-NMJ | 16         | 16 | 13.3 | 5.8 | 2   | 2  | ● ● ● ● | ○ ● ● ● | ● ○ ● ●      | ● ● ● ●      |
|                    |            |    |      |     |     |    | P M K S | P M K S | P M K S      | P M K S      |

● First choice

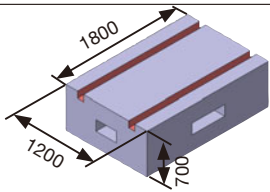
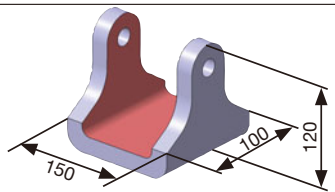
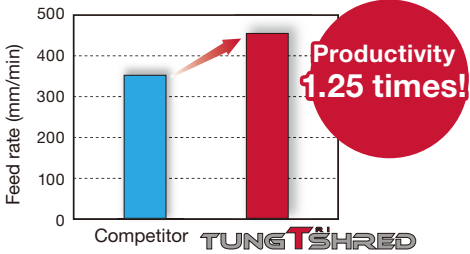
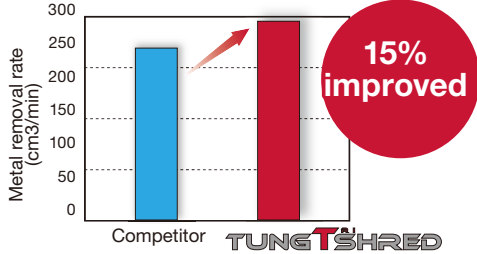
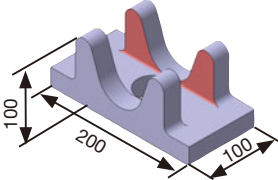
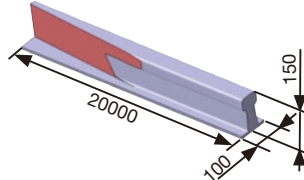
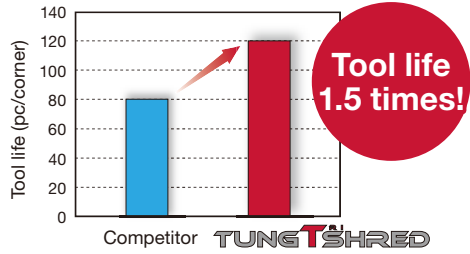
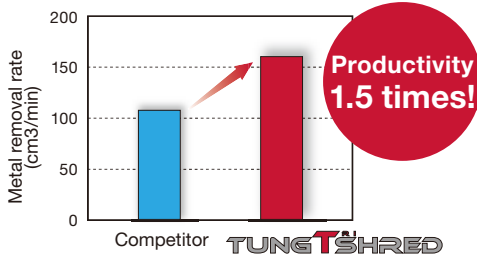
## STANDARD CUTTING CONDITIONS

| ISO      | Workpiece materials   | Hardness     | Priority            | Grade  | Chip-breaker | Cutting speed<br>Vc (m/min) | Feed per tooth<br>fz (mm/t) |
|----------|---|--------------|---------------------|--------|--------------|-----------------------------|-----------------------------|
| <b>P</b> | Low carbon steel<br>(C15, C20, etc.)  | - 300 HB     | First choice        | AH3135 | NMJ*         | 100 - 250                   | 0.08 - 0.15                 |
|          |   | - 300 HB     | For wear resistance | T3225  | NMJ*         | 100 - 300                   | 0.08 - 0.15                 |
|          |   | - 300 HB     | For finishing       | AH3135 | MJ           | 100 - 250                   | 0.08 - 0.20                 |
|          | Carbon steel and alloy steel<br>(S55C / C55, SCM440 / 42CrMo4, etc.)        | - 300 HB     | First choice        | AH3135 | NMJ*         | 100 - 230                   | 0.08 - 0.15                 |
|          |   | - 300 HB     | For wear resistance | T3225  | NMJ*         | 100 - 280                   | 0.08 - 0.15                 |
|          |   | - 300 HB     | For finishing       | AH3135 | MJ           | 100 - 230                   | 0.08 - 0.20                 |
|          | Prehardened steel<br>(NAK80, PX5, etc.)                                     | 30 - 40 HRC  | First choice        | AH3135 | NMJ*         | 100 - 180                   | 0.08 - 0.15                 |
|          |   | 30 - 40 HRC  | For wear resistance | T3225  | NMJ*         | 100 - 200                   | 0.08 - 0.15                 |
|          |   | 30 - 40 HRC  | For finishing       | AH3135 | MJ           | 100 - 180                   | 0.08 - 0.20                 |
| <b>M</b> | Stainless steel<br>(SUS304 / X5CrNi18-9,<br>SUS316 / X5CrNiMo17-12-3, etc.) | -            | First choice        | AH3135 | NMJ*         | 90 - 200                    | 0.08 - 0.15                 |
|          |   | -            | For wear resistance | T3225  | NMJ*         | 90 - 250                    | 0.08 - 0.15                 |
|          |   | -            | For finishing       | AH3135 | MJ           | 90 - 200                    | 0.08 - 0.20                 |
| <b>K</b> | Grey cast iron<br>(FC250 / 250, FC300 / 300, etc.)                          | 150 - 250 HB | First choice        | AH120  | NMJ*         | 140 - 250                   | 0.08 - 0.15                 |
|          |   | 150 - 250 HB | For wear resistance | T1215  | NMJ*         | 150 - 300                   | 0.08 - 0.15                 |
|          |   | 150 - 250 HB | For finishing       | AH120  | MJ           | 140 - 250                   | 0.08 - 0.25                 |
|          | Ductile cast iron<br>(400-15, FCD600 / 600-3, etc.)                         | 150 - 250 HB | First choice        | AH120  | NMJ*         | 140 - 250                   | 0.08 - 0.15                 |
|          |   | 150 - 250 HB | For wear resistance | T1215  | NMJ*         | 150 - 300                   | 0.08 - 0.15                 |
|          |   | 150 - 250 HB | For finishing       | AH120  | MJ           | 140 - 250                   | 0.08 - 0.25                 |
| <b>S</b> | Titanium alloys<br>(Ti-6Al-4V, etc.)  | -            | First choice        | AH120  | NMJ*         | 20 - 60                     | 0.08 - 0.15                 |
|          |   | -            | For finishing       | AH120  | MJ           | 20 - 60                     | 0.08 - 0.18                 |
|          | Heat-resistant alloys<br>(Inconel718, etc.)                                 | -            | First choice        | AH120  | NMJ*         | 20 - 40                     | 0.08 - 0.13                 |
|          |   | -            | For finishing       | AH120  | MJ           | 20 - 40                     | 0.08 - 0.15                 |

\* When using the -NMJ chipbreaker, do not feed higher than 0.15 mm/t.

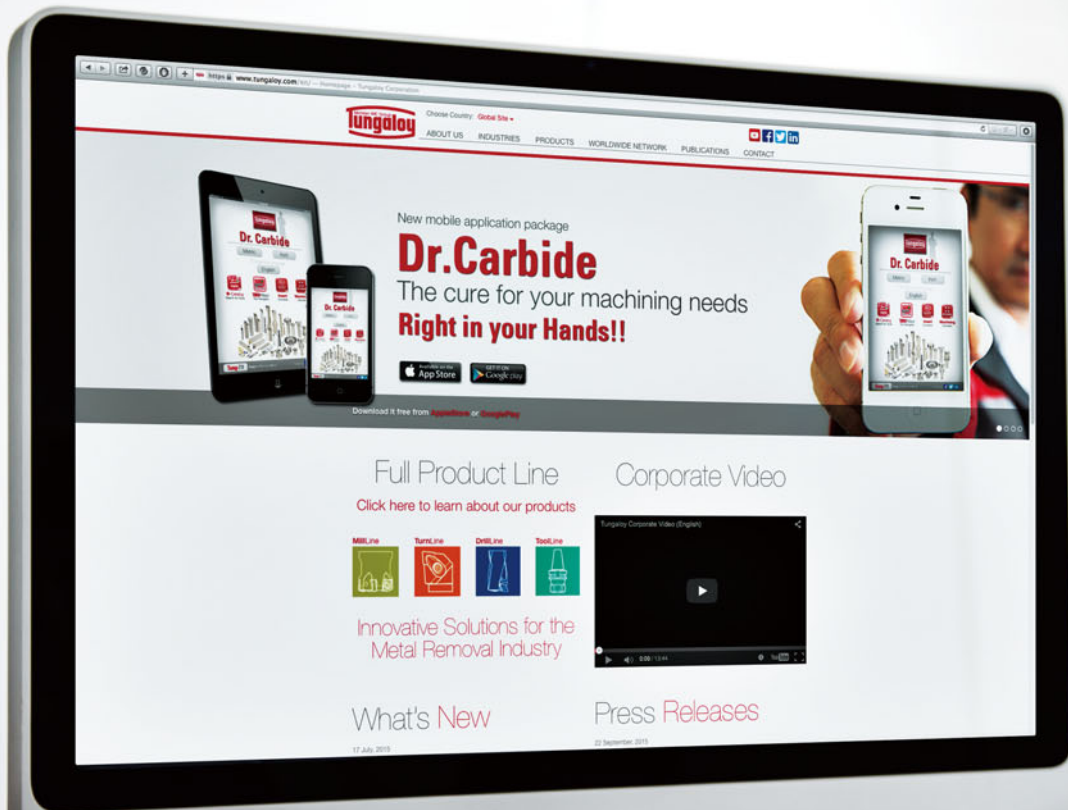


## PRACTICAL EXAMPLES

| Workpiece type     |                           | Machine parts  | Bracket  |
|--------------------|---------------------------|--|--|
| Holder             |                           | LPTC16J063B25.4L061R03 (ø63, z = 3)  | LPTC16M080B32.0L076R04 (ø80, z = 4)  |
| Insert             |                           | TCMT160620PDER-NMJ   | TCMT160620PDER-NMJ   |
| Grade              |                           | AH3135<br>SS400  | AH3135<br>SCSiMn2H   |
| Workpiece material |                           |   |   |
| Cutting conditions | Cutting speed: Vc (m/min) | 150 (Competitor: Vc = 105)   | 135 (Competitor: Vc = 126)   |
|                    | Feed per tooth: fz (mm/t) | 0.2  | 0.33 (Competitor: fz = 0.3)  |
|                    | Feed speed: Vf (m/min)    | 455  | 709  |
|                    | Depth of cut: ap (mm)     | 50   | 75   |
|                    | Width of cut: ae (mm)     | 10   | 5  |
|                    | Method of machining       | Shoulder milling   | Shoulder milling   |
|                    | Coolant                   | Air  | Air  |
| Machine            |                           | Tower M/C, BT50  | Vertical M/C, BT40   |
| Results            |                           |  <p>Thanks to its high chatter stability, TungTriShred increased the feed rate by 25%.</p> |  <p>Thanks to its low cutting force, TungTriShred improved MRR by 15%, significantly reducing the machining costs.</p>                |
| Workpiece type     |                           | Flange   | Rail   |
| Holder             |                           | TPTC16M050B22.0R04 (ø50, z = 4)  | LPTC16M080B32.0L076R04 (ø80, z = 4)  |
| Insert             |                           | TCMT160620PDER-NMJ   | TCGT160608PDER-MJ  |
| Grade              |                           | AH120<br>FC300 / GG30  | AH120<br>E1101   |
| Workpiece material |                           |   |   |
| Cutting conditions | Cutting speed: Vc (m/min) | 150  | 125 (Competitor: Vc = 57)  |
|                    | Feed per tooth: fz (mm/t) | 0.18   | 0.15   |
|                    | Feed speed: Vf (m/min)    | 700  | 240  |
|                    | Depth of cut: ap (mm)     | 2  | 45   |
|                    | Width of cut: ae (mm)     | 10   | 15   |
|                    | Method of machining       | Shoulder milling   | Shoulder milling   |
|                    | Coolant                   | Wet  | Air  |
| Machine            |                           | Horizontal M/C, BT40   | Tower M/C, BT50  |
| Results            |                           |  <p>Smaller chips and reduced cutting forces improves tool life by 1.5 times.</p>         |  <p>TungTriShred's high chatter stability allowed high speed machining, improving MRR. The -MJ geometry improved surface finish.</p> |

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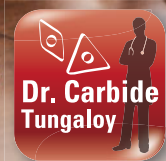
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