



Internal turning tool

**MINI**<sup>FORCE</sup>**TURN**

Tungaloy Report No. 417S2-G

New **CBN**-tipped **DXGQ/U** inserts



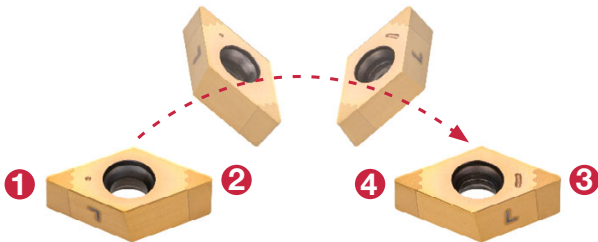
## Expansion of economical MiniForceTurn CBN grade insert line for hardened steel part turning

### New DXGQ/U inserts for profiling and back turning

**New**

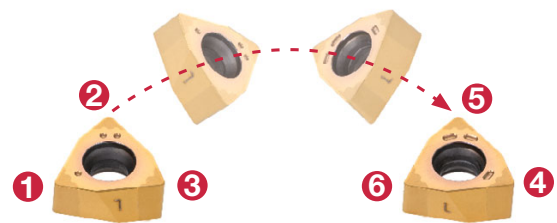
#### DXGQ/U insert

- 4 edges, rhombic 55°
- HP chipbreaker, without breaker



#### WXGQ/U insert

- 6 edges, Trigon 80°
- HP chipbreaker, without breaker



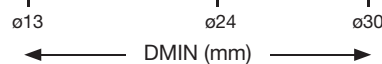
### APPLICATIONS: INTERNAL TURNING AND PROFILING OF HARDENED STEEL PARTS

**New**

#### DXGQ/U insert

MINIFORCE CBN

Positive ISO CBN



Cost-efficient double-sided CBN inserts covers minimum bore diameters from 13 - 24 mm

#### WXGQ/U insert

MINIFORCE CBN

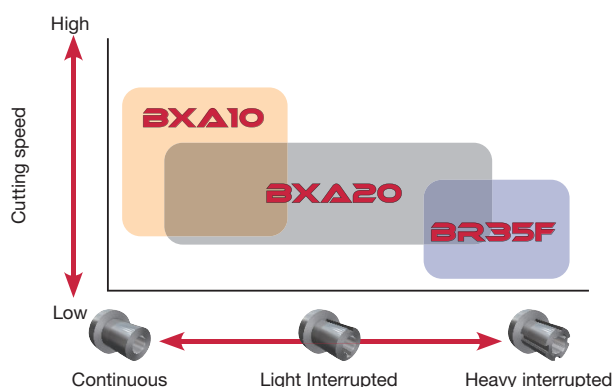
Positive ISO CBN

Negative ISO CBN



Cost-efficient double-sided CBN inserts covers minimum bore diameters from 12 to 32 mm

### APPLICATION AREA



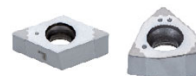
#### BXA10

- First choice for continuous to light interrupted cuts
- For  $V_c = 230$  m/min or less



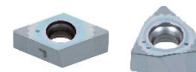
#### BXA20

- Versatile grade from continuous to heavy interrupted cuts
- For  $V_c = 180$  m/min or less



#### BR35F

- First choice for heavy interrupted cuts
- For  $V_c = 150$  m/min or less



# HARDBREAKER HP

## Designed for finish machining of hardened parts with close tolerances

- HP chipbreaker provides excellent surface quality and good chip control.
- Optimized chipbreaker geometry significantly reduces cutting force imposed on the cutting edge, ensuring long tool life.
- The edge preparation is designed to generate low cutting force, providing chatter-free machining and close tolerances.

**New**

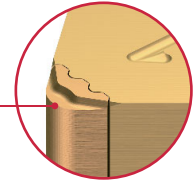


4QS-DXGU0703\*\*R/L-HP



6QS-WXGU0403\*\*R/L-HP

Optimized edge preparation for low cutting force



## CHIP CONTROL

HP chipbreaker provides excellent chip control in finish machining of hardened steel parts while eliminating chip packing during continuous cuts of I.D. turning operations.

### HARDBREAKER HP

### Competitor's ISO insert (w/o chipbreaker)



**H**

Insert : 6QS-WXGU040304L-HP BXA10  
 Toolholder : A16Q-SWLXR04-D180  
 Workpiece material : SCM420 / 42CrMo4 (60HRC)  
 Cutting speed :  $V_c = 150$  m/min  
 Feed :  $f = 0.1$  mm/rev  
 Depth of cut :  $a_p = 0.1$  mm  
 Coolant : Wet  
 Application : Continuous cut, I.D. turning

## CUTTING FORCES

HP chipbreaker features soft cutting geometry for reduced cutting forces while eliminating chatter during continuous cuts of I.D. turning operations that use long overhang tool setup.

|                                           | Tool overhang (mm) |    |    |    |    |    |         |
|-------------------------------------------|--------------------|----|----|----|----|----|---------|
|                                           | 30                 | 35 | 40 | 45 | 50 | 55 | 60      |
| <b>HARDBREAKER HP</b>                     | OK                 |    |    |    |    |    | Chatter |
| Competitor's ISO insert (w/o chipbreaker) |                    |    |    |    |    |    |         |

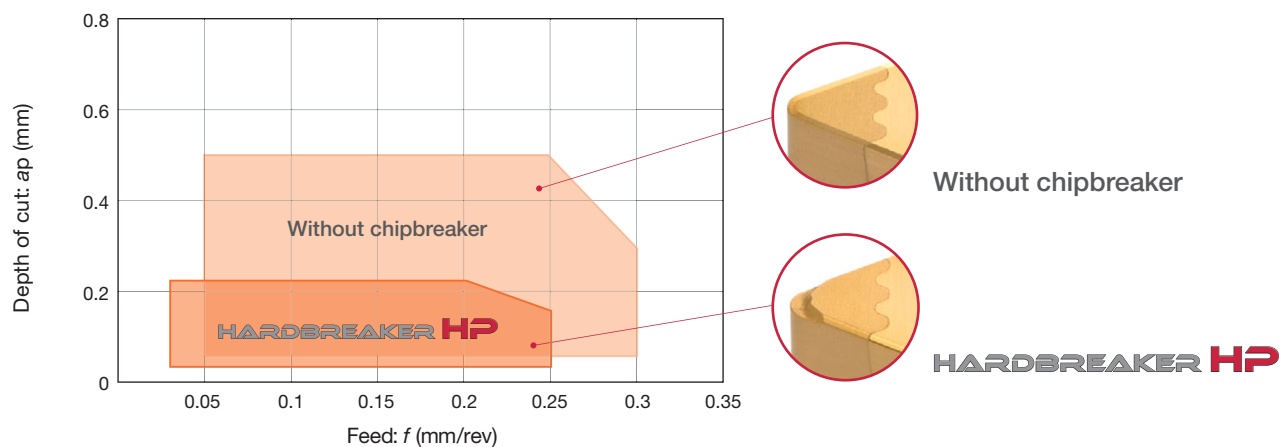
OK  
Chatter

**H**

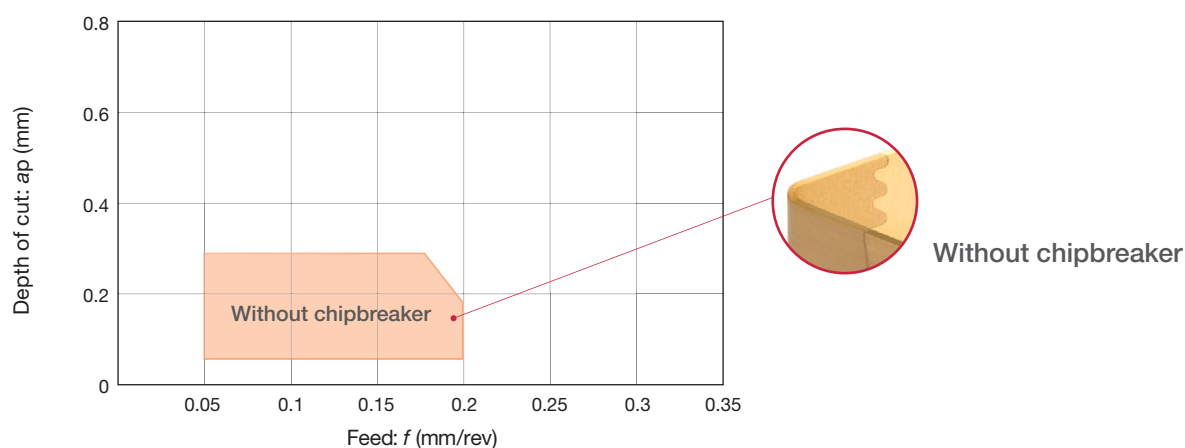
Insert : 6QS-WXGU040304L-HP BXA10  
 Toolholder : A16Q-SWLXR04-D180  
 Workpiece material : SCM420 / 42CrMo4 (60HRC)  
 Cutting speed :  $V_c = 150$  m/min  
 Feed :  $f = 0.1$  mm/rev  
 Depth of cut :  $a_p = 0.1$  mm  
 Coolant : Wet  
 Application : Continuous cut, I.D. turning

## APPLICATION AREA

### Continuous turning



### Interrupted turning

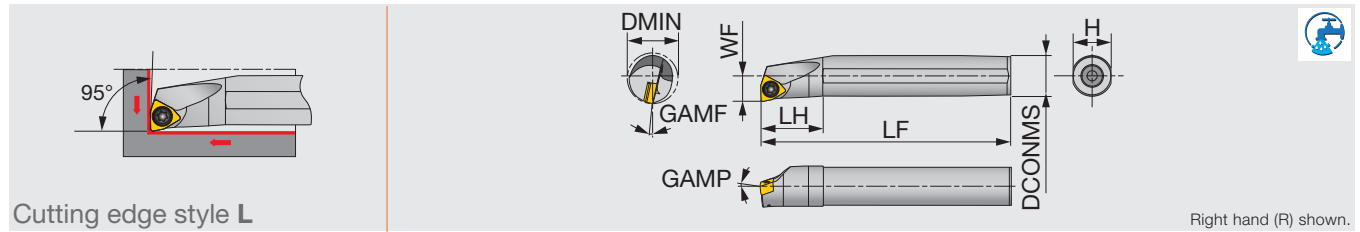


## STANDARD CUTTING CONDITIONS

| ISO | Grade | Workpiece condition | Cutting speed<br>$V_c$ (m/min) | Depth of cut<br>$a_p$ (mm) | Feed<br>$f$ (mm/rev) |
|-----|-------|---------------------|--------------------------------|----------------------------|----------------------|
| H   | BXA10 | Continuous          | 100 - 230                      | 0.05 - 0.5                 | 0.05 - 0.3           |
|     |       | Light interrupted   | 100 - 230                      | 0.05 - 0.3                 | 0.05 - 0.2           |
|     | BXA20 | Continuous          | 60 - 180                       | 0.05 - 0.5                 | 0.05 - 0.3           |
|     |       | Interrupted         | 60 - 180                       | 0.05 - 0.3                 | 0.05 - 0.2           |
|     | BR35F | Heavy interrupted   | 50 - 150                       | 0.05 - 0.3                 | 0.05 - 0.2           |

## A/E-SWLXR/L

Screw-on boring bar, for WXGQ/U inserts



Cutting edge style L

Right hand (R) shown.

| Designation         | Material | DMIN | DCONMS | WF | LF  | LH | H  | GAMP | GAMF | RE** | Insert             | Torque* |
|---------------------|----------|------|--------|----|-----|----|----|------|------|------|--------------------|---------|
| A10K-SWLXR/L04-D120 | STEEL    | 12   | 10     | 6  | 125 | 20 | 9  | -10  | -16  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| A12M-SWLXR/L04-D140 | STEEL    | 14   | 12     | 7  | 150 | 24 | 11 | -10  | -14  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| A16Q-SWLXR/L04-D180 | STEEL    | 18   | 16     | 9  | 180 | 32 | 15 | -10  | -11  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| A20R-SWLXR/L04-D220 | STEEL    | 22   | 20     | 11 | 200 | 36 | 18 | -10  | -10  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| E10M-SWLXR/L04-D120 | CARBIDE  | 12   | 10     | 6  | 150 | 25 | 9  | -10  | -16  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| E12Q-SWLXR/L04-D140 | CARBIDE  | 14   | 12     | 7  | 180 | 27 | 11 | -10  | -14  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| E16R-SWLXR/L04-D180 | CARBIDE  | 18   | 16     | 9  | 200 | 32 | 15 | -10  | -11  | 0.4  | WXGQ/U0403**L/R... | 0.9     |
| E20S-SWLXR/L04-D220 | CARBIDE  | 22   | 20     | 11 | 250 | 36 | 18 | -10  | -10  | 0.4  | WXGQ/U0403**L/R... | 0.9     |

\*Torque: Recommended torque (N·m) for clamping \*\*RE: The holder measurements are true with this insert radius

Note: Use the right hand toolholder (R) for the left hand insert (L). Use the left hand toolholder (L) for the right hand insert (R)

### SPARE PARTS

| Designation      | Clamping screw | Wrench |
|------------------|----------------|--------|
| A/E**-SWLXR/L... | SR34-514       | T-7F   |

- 1 Use the right hand toolholder (R) for the left hand insert (L)
- 2 Use the left hand toolholder (L) for the right hand insert (R)



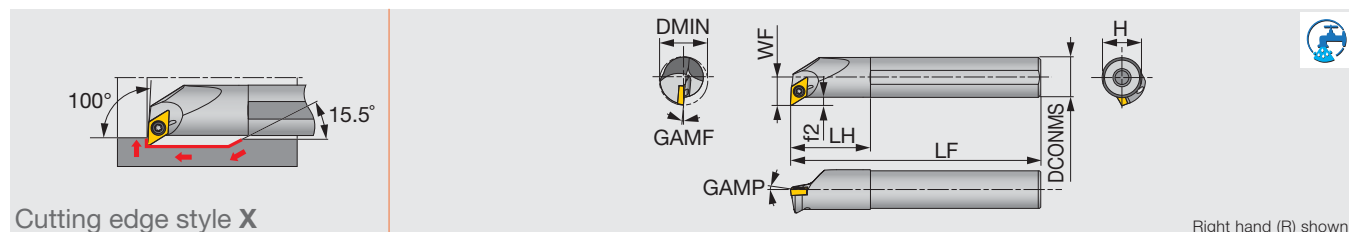
1 Right hand toolholder with left hand insert shown



2 Left hand toolholder with right hand insert shown

## A/E-SDXXR/L

Screw-on boring bar, for DXGQ/U inserts



Cutting edge style X

Right hand (R) shown.

| Designation         | Material | DMIN | DCONMS | WF   | LF  | LH | H  | f2  | GAMP | GAMF | RE** | Insert             | Torque* |
|---------------------|----------|------|--------|------|-----|----|----|-----|------|------|------|--------------------|---------|
| A10K-SDXXR/L07-D130 | Steel    | 13   | 10     | 7.6  | 125 | 20 | 9  | 2.6 | -14° | -16° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| A12M-SDXXR/L07-D160 | Steel    | 16   | 12     | 8.6  | 150 | 24 | 11 | 2.6 | -14° | -14° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| A16Q-SDXXR/L07-D200 | Steel    | 20   | 16     | 10.6 | 180 | 32 | 15 | 2.6 | -13° | -13° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| A20R-SDXXR/L07-D240 | Steel    | 24   | 20     | 12.6 | 200 | 36 | 18 | 2.6 | -13° | -12° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| E10M-SDXXR/L07-D130 | Carbide  | 13   | 10     | 7.6  | 150 | 25 | 9  | 2.6 | -14° | -16° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| E12Q-SDXXR/L07-D160 | Carbide  | 16   | 12     | 8.6  | 180 | 27 | 11 | 2.6 | -14° | -14° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| E16R-SDXXR/L07-D200 | Carbide  | 20   | 16     | 10.6 | 200 | 32 | 15 | 2.6 | -13° | -13° | 0.4  | DXGQ/U0703**L/R... | 0.9     |
| E20S-SDXXR/L07-D240 | Carbide  | 24   | 20     | 12.6 | 250 | 36 | 18 | 2.6 | -13° | -12° | 0.4  | DXGQ/U0703**L/R... | 0.9     |

\*Torque: Recommended clamping torque (N-m) \*\*RE : Standard corner radius

Note: Use right-hand toolholders (R) with left-hand inserts (L); and left-hand toolholders (L) with right-hand inserts (R)

### SPARE PARTS

| Designation      | Clamping screw | Wrench |
|------------------|----------------|--------|
| A/E**-SDXXR/L... | SR34-514       | T-7F   |

- 1 Use the right hand toolholder (R) for the left hand insert (L)
- 2 Use the left hand toolholder (L) for the right hand insert (R)



- 1 Right hand toolholder with left hand insert shown

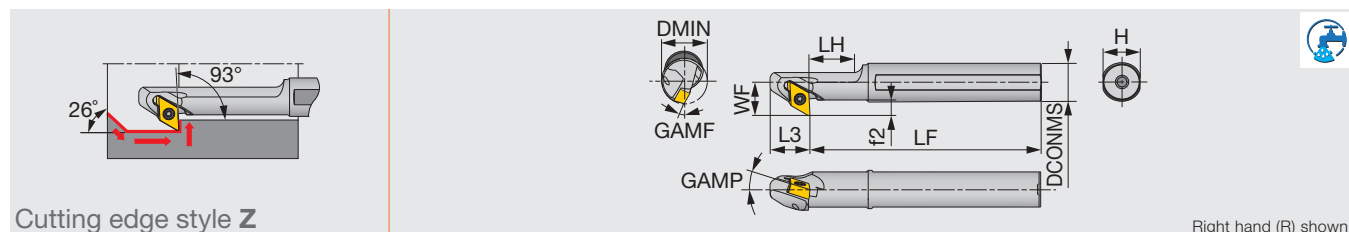


- 2 Left hand toolholder with right hand insert shown



## A/E-SDZXR/L

Screw-on boring bar, for DXGQ/U inserts



Cutting edge style Z

Right hand (R) shown.

| Designation         | Material | DMIN | DCONMS | WF   | LF  | LH | L3 | H  | f2  | GAMP | GAMF   | RE** | Insert             | Torque* |
|---------------------|----------|------|--------|------|-----|----|----|----|-----|------|--------|------|--------------------|---------|
| A12M-SDZXR/L07-D140 | Steel    | 14   | 12     | 10.5 | 150 | 30 | 13 | 11 | 4.5 | -10° | -14°   | 0.4  | DXGQ/U0703**R/L... | 0.9     |
| A16Q-SDZXR/L07-D160 | Steel    | 16   | 16     | 12.5 | 180 | 35 | 13 | 15 | 4.5 | -10° | -12.5° | 0.4  | DXGQ/U0703**R/L... | 0.9     |
| A20R-SDZXR/L07-D200 | Steel    | 20   | 20     | 14.5 | 200 | 40 | 13 | 18 | 4.5 | -10° | -10.5° | 0.4  | DXGQ/U0703**R/L... | 0.9     |
| E12Q-SDZXR/L07-D180 | Carbide  | 18   | 12     | 10.5 | 180 | -  | 13 | 11 | 4.5 | -11° | -11°   | 0.4  | DXGQ/U0703**R/L... | 0.9     |
| E16R-SDZXR/L07-D220 | Carbide  | 22   | 16     | 12.5 | 200 | -  | 13 | 15 | 4.5 | -11° | -9°    | 0.4  | DXGQ/U0703**R/L... | 0.9     |

\*Torque: Recommended clamping torque (N·m) \*\*RE : Standard corner radius

Note: Use right-hand toolholders (R) with right-hand inserts (R); and left-hand toolholders (L) with left-hand inserts (L).

### SPARE PARTS

| Designation      | Clamping screw | Wrench |
|------------------|----------------|--------|
| A/E**-SDZXR/L... | SR34-514       | T-7F   |

- 1 Right hand toolholders (R) are used with right hand inserts (R)
- 2 Left hand toolholders (L) are used with left hand inserts (L)



1 Right hand toolholder with right hand insert shown



2 Left hand toolholder with left hand insert shown

### MARKING

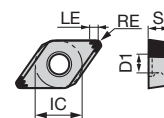


Insert hand is identified on the flank side





- : Continuous cutting
- ◐ : Light interrupted cutting
- ⊗ : Heavy interrupted cutting



IC : 6.35 mm  
D1 : 2.7 mm  
S : 3.18 mm

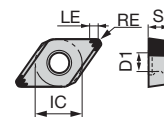
 **55° Rhombic  
with hole**



**New**

[illegible]

● : New product



IC : 6.35 mm  
D1 : 2.7 mm  
S : 3.18 mm

 **55° Rhombic  
with hole**

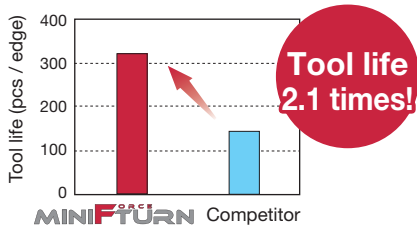
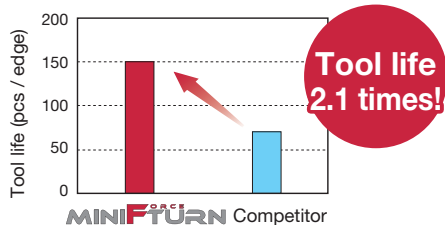


**New**

[illegible]

● : New product

## PRACTICAL EXAMPLES

| Workpiece type     |                              | Driven gear                                                                                                                                                                                                                                                        | Machine part                                                                                                                                                                                                                                                 |
|--------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Insert             |                              | <b>New</b> 4QS-DXGQ070304SPL                                                                                                                                                                                                                                       | 6QS-WXGQ040304SPL                                                                                                                                                                                                                                            |
| Grade              |                              | BXA10                                                                                                                                                                                                                                                              | BXA20                                                                                                                                                                                                                                                        |
| Workpiece material |                              | SCM420 / 18CrMo4 (50HRC)                                                                                                                                                                                                                                           | SCM415 / 15CrMo4 (60HRC)                                                                                                                                                                                                                                     |
|                    |                              |  <b>H</b>                                                                                                                                                                         |  <b>H</b>                                                                                                                                                                 |
| Cutting conditions | Cutting speed: $V_c$ (m/min) | 260                                                                                                                                                                                                                                                                | 90                                                                                                                                                                                                                                                           |
|                    | Feed : $f$ (mm/rev)          | 0.06                                                                                                                                                                                                                                                               | 0.06                                                                                                                                                                                                                                                         |
|                    | Depth of cut : $a_p$ (mm)    | 0.15                                                                                                                                                                                                                                                               | 0.075                                                                                                                                                                                                                                                        |
|                    | Coolant                      | Wet                                                                                                                                                                                                                                                                | Dry                                                                                                                                                                                                                                                          |
| Results            |                              |  <p><b>MiniForce-Turn</b> provided better cutting edge integrity and more rigid insert clamping, compared with ISO positive inserts, achieving 2.1 times tool life increase.</p> |  <p>Strong cutting edge design of <b>MiniForce-Turn</b> insert provided fracture resistance, prolonging tool life by 2.1 times over the competitor's positive insert.</p> |
| Workpiece type     |                              | Gear part                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                              |
| Insert             |                              | 6QS-WXGQ040304SPL                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                              |
| Grade              |                              | BXA10                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                              |
| Workpiece material |                              | SCM420 / 18CrMo4 (60HRC)                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                              |
|                    |                              |  <b>H</b>                                                                                                                                                                       |                                                                                                                                                                                                                                                              |
| Cutting conditions | Cutting speed: $V_c$ (m/min) | 70                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                              |
|                    | Feed : $f$ (mm/rev)          | 0.03                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                              |
|                    | Depth of cut : $a_p$ (mm)    | 0.1                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                              |
|                    | Coolant                      | Dry                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                              |
| Results            |                              |  <p><b>MiniForce-Turn</b> insert provided 1.5 times longer tool life over competitor's positive insert, while also eliminated chatter during machining.</p>                     |                                                                                                                                                                                                                                                              |



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