T-CBN
New coated CBN grade for hardened steel turning

The new standard for hardened steel machining
New coated CBN grades
BXM series
Applicable for all types of hard materials

NEW For high speed machining

**BXM10**
Excellent crater wear resistance!
Newly developed CBN substrate for high speed cutting!

NEW All-round

**BXM20**

- **Standard cutting condition**

<table>
<thead>
<tr>
<th>Application</th>
<th>Grades</th>
<th>Machining Mode</th>
<th>Cutting speed V&lt;sub&gt;c&lt;/sub&gt; (m/min)</th>
<th>Depth of cut a&lt;sub&gt;p&lt;/sub&gt; (mm)</th>
<th>Feed f (mm/rev)</th>
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</thead>
<tbody>
<tr>
<td>BXM10</td>
<td>Continuous</td>
<td>200 (150 - 350)</td>
<td>0.1 (0.05 - 0.30)</td>
<td>0.1 (0.03 - 0.18)</td>
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<tr>
<td></td>
<td>Light interrupted</td>
<td>170 (150 - 250)</td>
<td>0.1 (0.05 - 0.30)</td>
<td>0.1 (0.03 - 0.15)</td>
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<tr>
<td>BXM20</td>
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<td>150 (70 - 220)</td>
<td>0.2 (0.05 - 0.30)</td>
<td>0.1 (0.05 - 0.25)</td>
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<td>Interrupted</td>
<td>150 (70 - 220)</td>
<td>0.1 (0.05 - 0.30)</td>
<td>0.1 (0.05 - 0.15)</td>
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</table>
New coating layer
Remarkable adhesion strength

Unique CBN substrate
High chipping resistance !!
Extremely tough Substrate !!

Application range

Comparison of damage

BMX20 has normal wear pattern without peeling

Normal wear
Peeling

BMX20
Competitor

Insert : 2QP-CNGA120408
Work material : SCM415H (60HRC)
Cutting speed : Vc = 130 m/min
Feed : f = 0.15 mm/rev
Depth of cut : ap = 0.15 mm
Coolant : Water soluble

Cutting performance

5 times longer tool life !

Interrupted cutting
Vc = 130 m/min
f = 0.15 mm/rev
ap = 0.15 mm

Removing carburized layer
Vc = 110 m/min
f = 0.12 mm/rev
ap = 0.6 mm

Continuous cutting
Vc = 130 m/min
f = 0.15 mm/rev
ap = 0.15 mm

Insert : 2QP-CNGA120408
Work material : SCM415H
Coolant : Water soluble
**Cutting performance**

**BXM10** High speed machining comparisons ($V_c = 300$ m/min)

- Insert: 2QP-CNGA120408
- Work material: SCM415H (59 – 61HRC)
- Cutting speed: $V_c = 300$ m/min
- Feed: $f = 0.1$ mm/rev
- Depth of cut: $a_p = 0.25$ mm
- Work process: Continuous cutting
- Coolant: Dry

**BXM20** Comparison of wear resistance

- Insert: 2QP-CNGA120408
- Work material: SCM415H (59 – 61HRC)
- Cutting speed: $V_c = 130$ m/min
- Feed: $f = 0.15$ mm/rev
- Depth of cut: $a_p = 0.15$ mm
- Work process: Continuous cutting
- Coolant: Water soluble

**BXM20** Comparison of toughness

- Insert: 2QP-CNGA120408
- Work material: SCM415H (59 – 61HRC)
- Cutting speed: $V_c = 130$ m/min
- Feed: $f = 0.15$ mm/rev
- Depth of cut: $a_p = 0.15$ mm
- Work process: Light interrupted cutting
- Coolant: Water soluble
“Hard Breakers” for removing the carburized layer

Two types of chipbreaker provide excellent chip control in a wide application range!

**HF type** For finishing

- Single sided CBN insert provides higher stability in heavy machining.
- Excellent chip control in small DoC due to the high functional nose. Delivers exceptional surface finishes.

**HM type** For medium cutting

- Single sided CBN insert provides higher stability in heavy machining.
- Providing ideal chip control in large DoC by the well designed chipbreaker. Suitable for medium cutting or roughing.

**Standard cutting condition (for removing the carburized layer)**

<table>
<thead>
<tr>
<th>Application</th>
<th>Grades</th>
<th>Chipbreaker</th>
<th>Cutting speed Vc (m/min)</th>
<th>Depth of cut ap (mm)</th>
<th>Feed f (mm/rev)</th>
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<td>BXM20</td>
<td>HF</td>
<td>150 (70 - 220)</td>
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<td>HM</td>
<td>150 (70 - 200)</td>
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<td>0.1 (0.05 - 0.20)</td>
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</table>
Wiper edge inserts

A finishing edge (wiper edge) is formed at the point of intersection between the corner radius and the straight cutting edge.

**Effect of wiper edge**

**Doubles the productivity → Reduced machining time**

The wiper edge can double the feed rate and suppress deterioration of the surface finish.

*f ≤ 0.3 mm/rev

**Superior surface finishes**

→ By integrating roughing and finishing into one process, the productivity can be increased.

Compared with conventional inserts, surface roughness can be improved with the wiper edge.

| Comparison of surface finish with hardened steel at 60 - 62 HRC |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| Without wiper     | With wiper edge   |                   |
| Ra: 0.83 µm, Rz: 4.11 µm | Ra: 0.10 µm, Rz: 1.03 µm |

**Note for using of wiper edge**

The wiper edge needs to contact the work piece at a right angle.

- For the wiper edge, the toolholder should have an end cutting angle as shown in the illustration.
- In using the wiper edge a high rigidity toolholder like the Turning-A or D-type is recommended. In the table below, recommended toolholders are shown.

**End cutting angle, recommended toolholders**

<table>
<thead>
<tr>
<th>Insert</th>
<th>Work material</th>
<th>Cutting speed</th>
<th>Feed</th>
<th>Depth of cut</th>
<th>Coolant</th>
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<tr>
<td>2QP-CNGA120408WL</td>
<td>SCM415 (62HRC)</td>
<td>Vc = 150 m/min</td>
<td>f = 0.1 mm/rev</td>
<td>ap = 0.15 mm</td>
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The wiper edge needs to contact the work piece at a right angle.
Designation System

<table>
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<tr>
<th>Number of edge</th>
<th>Type</th>
<th>ISO symbols</th>
<th>Additional symbol</th>
<th>Chipbreaker symbol</th>
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<tr>
<td>2</td>
<td>QP</td>
<td>T-CBN TAC insert</td>
<td>Without Standard honing</td>
<td>-HF For finishing</td>
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<tr>
<td>3</td>
<td></td>
<td></td>
<td>-L Light honing for low cutting force</td>
<td>-HM For medium cutting to roughing</td>
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<td>-H Heavy honing for toughness</td>
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<td></td>
<td></td>
<td></td>
<td>WG Wiper edge, 91° end cutting angle</td>
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<td>WJ Wiper edge, 93° end cutting angle</td>
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<td>WL Wiper edge, 95° end cutting angle</td>
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</table>

### Honing specification

- Standard honing: 0.13 mm × 25° +R-honing
- “-L” honing: 0.13 mm × 15° +R-honing
- “-H” honing: 0.13 mm × 35° +R-honing

Smaller honing angle makes the edge sharper with lower cutting forces.
Larger honing angle makes edge tougher.
## Inserts (Negative type)

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<tr>
<th>Features</th>
<th>Shape</th>
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- ●: Stocked items
- ★: Coming soon
# Inserts (Negative type with chipbreaker)

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<th>Features</th>
<th>Shape</th>
<th>Cat. No.</th>
<th>Grades</th>
<th>No. of corners</th>
<th>Dimensions (mm)</th>
<th>CBN length</th>
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<td>BXM10</td>
<td>BXM20</td>
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<td>9.525</td>
<td>4.76</td>
</tr>
</tbody>
</table>

# Inserts (Positive type)

<table>
<thead>
<tr>
<th>Features</th>
<th>Shape</th>
<th>Cat. No.</th>
<th>Grades</th>
<th>No. of corners</th>
<th>Dimensions (mm)</th>
<th>CBN length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>BXM10</td>
<td>BXM20</td>
<td>Relief angle</td>
<td>I.C.dia</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td>2QP-CCGW060202</td>
<td>● ●</td>
<td>2</td>
<td>7°</td>
<td>6.35</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td>2QP-CCGW09T304</td>
<td>● ●</td>
<td>2</td>
<td>7°</td>
<td>9.525</td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td>2QP-DCGW11T302</td>
<td>● ●</td>
<td>2</td>
<td>7°</td>
<td>9.525</td>
</tr>
</tbody>
</table>

●: Stocked items
★: Coming soon
## Practical Examples

<table>
<thead>
<tr>
<th>Work piece type</th>
<th>Automotive parts</th>
<th>Automotive parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert</td>
<td>2QP-VNGA160408</td>
<td>2QP-DNGA150404</td>
</tr>
<tr>
<td>Grade</td>
<td>BXM10</td>
<td>BXM10</td>
</tr>
<tr>
<td>Work material</td>
<td>SCr420, 20Cr4(H) (60 ~ 65HRC)</td>
<td>SCM420H (58 ~ 60HRC)</td>
</tr>
<tr>
<td>Cutting speed: $V_c$ (m/min)</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Feed : $f$ (mm/rev)</td>
<td>0.05 ~ 0.07</td>
<td>0.1</td>
</tr>
<tr>
<td>Depth of cut: $a_p$ (mm)</td>
<td>0.15</td>
<td>0.25</td>
</tr>
<tr>
<td>Machining</td>
<td>Continuous cutting</td>
<td>Continuous cutting</td>
</tr>
<tr>
<td>Coolant</td>
<td>Dry</td>
<td>Dry</td>
</tr>
</tbody>
</table>

### Results

- Excellent surface roughness.
- Doubled tool life due to higher wear resistance.

<table>
<thead>
<tr>
<th>Work piece type</th>
<th>Automotive parts</th>
<th>Automotive parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert</td>
<td>2QP-CNGA120408</td>
<td>2QP-CNGA120408</td>
</tr>
<tr>
<td>Grade</td>
<td>BXM20</td>
<td>BXM20</td>
</tr>
<tr>
<td>Work material</td>
<td>SCr420, 20Cr4(H)</td>
<td>SKH54, HS6-5-4 (63 ~ 64HRC)</td>
</tr>
<tr>
<td>Cutting speed: $V_c$ (m/min)</td>
<td>90 ~ 120</td>
<td>100</td>
</tr>
<tr>
<td>Feed : $f$ (mm/rev)</td>
<td>0.12</td>
<td>0.1</td>
</tr>
<tr>
<td>Depth of cut: $a_p$ (mm)</td>
<td>0.2 ~ 0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Machining</td>
<td>Continuous cutting</td>
<td>Heavy interrupted cutting</td>
</tr>
<tr>
<td>Coolant</td>
<td>Water soluble</td>
<td>Water soluble</td>
</tr>
</tbody>
</table>

### Results

- After machining 200 pcs.
- BXM20 has normal wear and stable tool life.
- 140% tool life improvement!
### Work piece type

<table>
<thead>
<tr>
<th>Insert</th>
<th>Automotive parts</th>
<th>Machine parts (Wear parts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2QP-DNGA150408</td>
<td>2QP-DNGA150404</td>
</tr>
<tr>
<td>Grade</td>
<td>BXM20</td>
<td>BXM20</td>
</tr>
<tr>
<td>Work material</td>
<td>SCr420, 20CrS4 (60 – 65HRC)</td>
<td>SKH51, HS6-5-2 (64HRC)</td>
</tr>
</tbody>
</table>

**Cutting conditions**

| Cutting speed: $V_c$ (m/min) | 80 | 45 |
| Feed : $f$ (mm/rev) | 0.08 | 0.07 |
| Depth of cut: $a_p$ (mm) | 0.1 | 0.05 |

**Machining**

Continuous to interrupted cutting

**Coolant**

Dry

**Results**

BXM20 has 13 times longer tool life than competitors.

BXM20 is stable, even in heavy interrupted. Still available.

### Cutting conditions

<table>
<thead>
<tr>
<th>Work piece type</th>
<th>Automotive parts</th>
<th>Truck parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert</td>
<td>2QP-CNGA120408</td>
<td>2QP-CNGA120408</td>
</tr>
<tr>
<td>Grade</td>
<td>BXM20</td>
<td>BXM20</td>
</tr>
<tr>
<td>Work material</td>
<td>SCr420H, 20Cr4(H)</td>
<td>SCM420 (59 – 63HRC)</td>
</tr>
</tbody>
</table>

**Cutting speed: $V_c$ (m/min)**

| 180 | 140 |

**Feed : $f$ (mm/rev)**

| 0.15 – 0.2 | 0.12 |

**Depth of cut: $a_p$ (mm)**

| 0.2 | 0.1 – 0.15 |

**Machining**

Continuous cutting

Continuous to interrupted cutting

**Coolant**

Water soluble

Dry (Air)

**Results**

No chippings. Tripled tool life, and more stable.

Tool life is 180% longer than competitors with stability, even when interrupted machining.