For Small Parts Machining and Large Depths of Cut

LD Chipbreaker

Max Depth of Cut: 12 mm / Achieves High-Precision Machining in a Single Pass

Low-resistance chipbreaker for smooth machining
Stable chip control in a wide range of machining applications
**LD Chipbreaker**

Max Depth of Cut: 12 mm / Achieves High-Precision Machining in a Single Pass
Low-resistance cutting edge suppresses chattering / Stable chip control in a wide range of machining applications

1 Great for large depths of cut with single pass machining

Available for greater depths of cut than many conventional chipbreakers
Achieves high-precision machining in a single pass

**LD Chipbreaker Application Map**

- **D Type**
  - Max Depth of Cut: 12 mm

- **T Type**
  - Max Depth of Cut: 8 mm

**Chattering Resistance Comparison** (In-house Evaluation)

**D Type: Max Depth of Cut 12 mm**

- LD Chipbreaker
- Competitor A

*Cutting Conditions: Vc = 80 m/min, ap = 12 mm, f = 0.03 mm/rev, Wet (Oil-based)*

**T Type: Max Depth of Cut 8 mm**

- LD Chipbreaker
- Competitor A

*Cutting Conditions: Vc = 80 m/min, ap = 8 mm, f = 0.05 mm/rev, Wet (Oil-based)*

**Single-Pass Machining Advantages**

**Example 1:** Conventional tooling requires larger metal removal volume to be machined in multiple passes

- Single-pass machining prevents chip problems and maintains stability

**Example 2:** Long workpieces that can not be machined in multiple passes

- Single-pass machining suppresses chattering with high precision & high efficiency

**Conventional Chipbreaker**

**LD Chipbreaker**

Able to Accomplish Single-pass Machining
2 Low-resistance Cutting Edge

Large rake angle and slanted cutting edge for low-resistance and smooth machining

LD Chipbreaker

Cutting Force Comparison (In-house Evaluation)

Cutting Conditions: \( V_c = 80 \) m/min, \( f = 0.07 \) mm/rev, TNMG160404 Type
Workpiece: SCM415

3 Superior Chip Control in a Wide Range of Machining Applications

Chipbreaker shape optimized for various depths of cut
Stable chip control in a wide range of machining applications

Chip Control Comparison (In-house Evaluation)

T Type (Workpiece Diameter: \( \phi 25 \))

S45C

LD Chipbreaker

Competitor A

Chip Clogging

2.5  4.0  8.0  ap (mm)

Cutting Conditions: \( V_c = 80 \) m/min, \( f = 0.05 \) mm/rev, Wet (Oil-based), TNMG160404 Type

SKD61

LD Chipbreaker

Competitor A

2.5  4.0  8.0  ap (mm)

Chattering

Cutting Conditions: \( V_c = 80 \) m/min, \( f = 0.05 \) mm/rev, Wet (Oil-based), TNMG160404 Type

SUS304

LD Chipbreaker

Competitor A

Chip Clogging

2.5  4.0  8.0  ap (mm)

Cutting Conditions: \( V_c = 60 \) m/min, \( f = 0.03 \) mm/rev, Wet (Oil-based), TNMG160404 Type
MEGACOAT NANO PR1535

The combination of a high-toughness base material and a special nano layer coating maintains long tool life and stable machining of stainless steel

1. An increase in cobalt content yields a substrate with greater toughness
   *In comparison to our conventional material grade

2. Improved stability by optimization and homogenization of grains in the base material

3. MEGACOAT NANO coating technology for long tool life and stable machining

Coating Properties

<table>
<thead>
<tr>
<th>Hardness (GPa)</th>
<th>Oxidation Onset Temperature (ºC)</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>Low</td>
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<tr>
<td>15</td>
<td>Oxidation Resistance</td>
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<tr>
<td>20</td>
<td>High</td>
</tr>
<tr>
<td>25</td>
<td>Low</td>
</tr>
<tr>
<td>30</td>
<td>Oxidation Resistance</td>
</tr>
<tr>
<td>35</td>
<td>High</td>
</tr>
<tr>
<td>40</td>
<td>Low</td>
</tr>
</tbody>
</table>

- TiCN
- TiN
- TiAIN
- MEGACOAT
- MEGACOAT NANO

Cracking Comparison by Diamond Indentor (In-house Evaluation)

PR1535 Base Material
Conventional Material Grade

Short Cracks
Long Cracks

Note
PR1535 also shows superior performance in steel machining under unstable conditions

Machining Example

Pin: SKD61-equivalent

\[ V_c = 45 \text{ m/min (} n = 1,800 \text{ min}^{-1}) \]
\[ a_p = 1.5 - 1.6 \text{ mm, } f = 0.03 \text{ mm/rev} \]
Wet (Oil-based)
TNMG160404-LD PR1535

Chip Control

LD Chipbreaker
Competitor B

LD Chipbreaker shows more stable chip control than Competitor B
(User Evaluation)
## Standard Stock Item Part Numbers (Negative Inserts)

<table>
<thead>
<tr>
<th>Shape</th>
<th>Description</th>
<th>Dimensions (mm)</th>
<th>MEGACOAT NANO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I.C. Thickness</td>
<td>Hole Diameter</td>
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<tr>
<td></td>
<td>DNMG150402R-LD</td>
<td>12.70</td>
<td>5.16</td>
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<td>DNMG150404R-LD</td>
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<td></td>
<td>TNMG160402R-LD</td>
<td>9.525</td>
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<td>TNMG160404R-LD</td>
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</tbody>
</table>

R: R-hand only in stock

### Recommended Cutting Conditions

**LD Chipbreaker Application Map**

Adjust cutting conditions according to machine/workpiece rigidity

<table>
<thead>
<tr>
<th>Workpiece</th>
<th>MEGACOAT NANO</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Steel, Alloy Steel (SxxC, SCM, etc.)</td>
<td>PR1425</td>
<td>PR1535</td>
</tr>
<tr>
<td>Vc (m/min)</td>
<td>★</td>
<td>60 – 200</td>
</tr>
<tr>
<td>f (mm/rev)</td>
<td>0.02 – 0.08</td>
<td>0.02 – 0.08</td>
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<tr>
<td>Wet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless Steel (SUS304, etc.)</td>
<td>PR1425</td>
<td>PR1535</td>
</tr>
<tr>
<td>Vc (m/min)</td>
<td>★</td>
<td>60 – 160</td>
</tr>
<tr>
<td>f (mm/rev)</td>
<td>0.02 – 0.07</td>
<td>0.02 – 0.07</td>
</tr>
</tbody>
</table>

### Recommended Insert Grade

- PR1425
- PR1535