MECHT
Helical End Mill for Titanium Alloy Machining

New Helical End Mill Design Added to the MECH Product Line

Unique Design for Stable Titanium Alloy Milling
  Insert combination for increased stability
  Special holder design for increased reliability
  Coolant holes for Excellent chip evacuation

Longer Tool Life with Low-resistance JS Chipbreaker and Tough PVD Coating Technology
MECHT
Helical End Mill for Titanium Alloy Machining

Insert Size Combination Improves Roughing Capabilities
Improved Coolant Hole Maintains Stable Machining and Long Tool Life

 desarrollado para reducir la tiritonación y el recorte de lixivo

**Unique Insert Combination**
Larger bottom inserts are positioned to handle larger cutting forces (excluding ø32mm)
Increased fracture resistance for stable machining

**New Design for Higher Reliability**
Bottom inserts are held in place by double-faced contacts

**Holding Surface 1**
Wide Holding Surface

**Holding Surface 2**
Additional Hold in the Axial Direction

**Bore Dia.**
Larger bore diameter improves fastening power and reduces chattering
ø50mm Cutter with ø27mm Bore (Conventional Bore: ø22mm)

**Toolholder Hardness**
Hardened 15% more than conventional holders

**Toolholder Spec**
Custom ordering available (Custom number of inserts and stages)

**Excellent Chip Evacuation**

**New flute design**
Large, smooth flutes prevent chip clogging

MECHT (ø50mm-4T 3 Stages)  Conventional (ø50mm-4T 4 Stages)

**Large flute**

**Smooth design**

**All inserts have coolant holes**
Optimized hole diameter controls flow amount and pressure
Smooth chip evacuation as well as superior cooling of the cutting edge
Longer Tool Life with Low-resistance JS Chipbreaker and Tough PVD Coating

**Low Cutting Force**  
**JS Chipbreaker**  
Heat at the cutting edge is suppressed due to sharp cutting performance extending tool life

**Greater Toughness**  
**PR1535**  
Fracture resistant with a tough substrate and high heat-resistant MEGACOAT NANO coating technology

**Tool Life Comparison (Internal Evaluation)**

MECHT showed good cutting edge condition with **50% longer tool life** than competitor B.

<table>
<thead>
<tr>
<th></th>
<th>MECHT</th>
<th>Competitor A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting time (min)</td>
<td>Further Machining Possible</td>
<td>Fracture</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool Life</td>
<td>x1.5</td>
<td></td>
</tr>
</tbody>
</table>

**Cutting Edge after Machining 50 min**

- **MECHT**: Good
- **Competitor A**: Fracture

Cutting Conditions: \( V_c = 130 \text{ sfm}, D.O.C. \times a_e = 1.692'' \times 0.787'', f_z = 0.0047 \text{ ipt}, \phi 50 \text{mm (5 Flutes)}, \text{Wet (External and internal coolant)} \)  
Workpiece: Ti-6Al-4V  
Machine: T50

**Slotting Titanium Alloy (Internal Evaluation)**

**D.O.C. = 0.787'' (0.4 \times DC)**

**Stable Machining without Chip Clogging or Chattering**

- **Chip Clogging**: None
- **Chattering**: None

Cutting Conditions: \( V_c = 130 \text{ sfm}, D.O.C. \times a_e = 0.787'' \times 1.97'' \text{(Slotting)}, f_z = 0.003 \text{ ipt}, \phi 50 \text{mm (5 Flutes)}, \text{Wet (External and internal coolant)} \)  
Workpiece: Ti-6Al-4V  
Machine: BT50

**Case Study**

**Aerospace Part** Ti-6Al-4V

- \( V_c = 180 \text{ sfm} (n = 350 \text{ rpm}) \)
- D.O.C. \times a_e = 0.94'' \times 0.63''
- \( f_z = 0.004 \text{ ipt} (V_f = 4.96 \text{ ipm}) \)
- Wet (Internal coolant)

MECHT50R-1711-3-4T-M  
BDMT170408ER-JS PR1535 (first stage)  
BDMT11T308ER-JS PR1535 (second and third stage)

**Cutting Efficiency**

- **MECHT**: \( V_f = 4.96 \text{ ipm} \)  
  \( x1.5 \)
- **Competitor B**: \( V_f = 3.30 \text{ ipm} \)

MECHT showed good chip evacuation and stable machining even with increasing feed rate. Machining efficiency was 50% better that of the competitor with equivalent tool life.  
(User evaluation)

**Recommended Cutting Conditions**

<table>
<thead>
<tr>
<th>Workpiece</th>
<th>Applications</th>
<th>Depth of Cut (in)</th>
<th>fz (ipt)</th>
<th>Recommended Insert Grade (Vc : sfm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium Alloy</td>
<td>Shouldering</td>
<td>~Length of Cut (APMX)</td>
<td>~0.5 DC</td>
<td>0.004 ~ <strong>0.005</strong> ~ 0.006</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>MEGACOAT NANO</strong> PR1535</td>
</tr>
<tr>
<td>Slotting</td>
<td></td>
<td>~0.5 DC</td>
<td>1 DC</td>
<td>0.002 ~ <strong>0.003</strong> ~ 0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100 ~ <strong>130</strong> ~ 160</td>
</tr>
</tbody>
</table>

**Note:** The bold values indicate recommended settings.
MECHT

End Mill

Fig.1

Shell Mill

Fig.2

### End Mill Dimensions

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Stock No.</th>
<th>No. of Flutes</th>
<th>No. of Stages</th>
<th>No. of Inserts</th>
<th>Dimensions (mm)</th>
<th>Drawing</th>
<th>Spare Parts</th>
<th>Applicable Inserts</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECHT 32-532-11-5-4T</td>
<td>●</td>
<td>4</td>
<td>5</td>
<td>20</td>
<td>32</td>
<td>32</td>
<td>140</td>
<td>55</td>
</tr>
</tbody>
</table>

### Shell Mill Dimensions

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Stock No.</th>
<th>No. of Flutes</th>
<th>No. of Stages</th>
<th>No. of Inserts</th>
<th>Dimensions (mm)</th>
<th>Drawing</th>
<th>Spare Parts</th>
<th>Applicable Inserts</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECHT 50R-1711-3-4T-M</td>
<td>●</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>50</td>
<td>27</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>MECHT 63R-17-4-5T-M</td>
<td>●</td>
<td>5</td>
<td>4</td>
<td>20</td>
<td>63</td>
<td>27</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>

### Applicable Inserts

<table>
<thead>
<tr>
<th>Insert</th>
<th>Part Number</th>
<th>D (mm)</th>
<th>Angle</th>
<th>MEGACOAT NANO</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDMT 11T302ER-JS</td>
<td>6.7</td>
<td>3.8</td>
<td>2.8</td>
<td>11.0</td>
</tr>
<tr>
<td>BDMT 11T304ER-JS</td>
<td>6.7</td>
<td>3.8</td>
<td>2.8</td>
<td>11.0</td>
</tr>
<tr>
<td>BDMT 11T308ER-JS</td>
<td>6.7</td>
<td>3.8</td>
<td>2.8</td>
<td>11.0</td>
</tr>
<tr>
<td>BDMT 170404ER-JS</td>
<td>9.6</td>
<td>4.9</td>
<td>4.4</td>
<td>17.0</td>
</tr>
</tbody>
</table>

* Use inserts with Corner R of 0.8 or less for the 2nd or higher stages
* Machining with coolant is recommended (Internal coolant pressure 1.5 MPa or higher)
* Coat anti-seize compound (P-37) thinly on the taper and the thread of the clamp screw when mounting inserts.

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