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**

1. **Developed to Reduce Chattering and Chip Recutting Issues**

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

Cutting Edge after Machining 50 min

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

**Cutting Conditions**: Vc = 130 sfm, D.O.C. x ae = 1.692" x 0.787", fz = 0.0047 ipt, ø50mm (5 Flutes), Wet (External and internal coolant) Workpiece: Ti-6Al-4V Machine: T50

**Slotting Titanium Alloy** (Internal Evaluation)

D.O.C. = 0.787" (0.4 x DC)

Stable Machining without Chip Clogging or Chattering

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

Cutting Conditions: Vc = 130 sfm, D.O.C. x ae = 0.787" x 1.97" (Slotting), fz = 0.003 ipt ø50mm (5 Flutes), Wet (Internal coolant) Workpiece: Ti-6Al-4V Machine: BT50

**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>Ti-6Al-4V</td>
<td>Shouldering</td>
<td>~Length of Cut (APMX)</td>
<td>~0.5 DC</td>
<td>0.004 ~ 0.005 ~ 0.006</td>
</tr>
<tr>
<td>Ti-6Al-4V</td>
<td>Slotting</td>
<td>~0.5 DC</td>
<td>1 DC</td>
<td>0.002 ~ 0.003 ~ 0.004</td>
</tr>
</tbody>
</table>

**Case Study**

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

- Vc = 180 sfm (n = 350 rpm)
- D.O.C. x ae = 0.94" x 0.63"
- fz = 0.004 ipt (Vf = 4.96 ipm)
- Wet (Internal coolant)
- MECHT50R-1711-3-4T-M BDMT170408ER-JS PR1535 (first stage)
- BDMT11T308ER-JS PR1535 (second and third stage)

**Cutting Efficiency**

- **MECHT**: Vf = 4.96 ipm x1.5
- **Competitor B**: Vf = 3.30 ipm

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Stock</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-S32-11-5-4T</td>
<td>● 4 5 20</td>
<td>32 32 140</td>
<td>55 46</td>
<td>DC DCON LF LH APMX</td>
<td>SB-2555TRG DTM-8</td>
<td>MECHT32**-11-</td>
<td>1st Stage 2nd Stage or Higher</td>
<td></td>
</tr>
</tbody>
</table>

Shell Mill Dimensions

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Stock</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>● 4 5 20</td>
<td>50 27 20</td>
<td>14 55 65</td>
<td>DC DCCB LF CBDP KDP KWW APMX</td>
<td>SB-2555TRG DTM-8</td>
<td>MECHT50**-1711-</td>
<td>1st Stage 2nd Stage or Higher</td>
<td></td>
</tr>
</tbody>
</table>

Applicable Inserts

<table>
<thead>
<tr>
<th>Insert Right-Hand Shown</th>
<th>Part Number</th>
<th>Dimensions (mm)</th>
<th>Angle</th>
<th>MEGACOAT NANO</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDMT 11T302ER-J5</td>
<td>6.7 3.8 2.8 11.0</td>
<td>18° 13°</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>BDMT 11T304ER-J5</td>
<td>6.7 3.8 2.8 11.0</td>
<td>18° 13°</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>BDMT 11T306ER-J5</td>
<td>6.7 3.8 2.8 11.0</td>
<td>18° 13°</td>
<td>●</td>
<td></td>
</tr>
</tbody>
</table>

General JT chipbreaker and notched insert (only if holder has an even number of inserts) can also be used.

For more information, please contact your Kyocera sales representative.

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