Aluminum Alloy Machining Solutions for Small Part Applications

Improved Productivity in Aluminum Small Part Machining

Molded PCD APD Chipbreaker

Improved Chip Control Y-axis Toolholder

Molded PCD AGT Chipbreaker for KTKF holders
Aluminum Alloy Machining
Solutions for Small Part Applications

PCD Chipbreaker for Finishing
Multi-functional PCD Chipbreaker for Grooving and Traversing with Excellent Chip Control
Y-axis Toolholders for High Quality Aluminum Machining Results

Superior Chip Control Improves Machining Quality and Productivity
Molded PCD APD Chipbreaker

APD Chipbreaker shows good chip control from small to large D.O.C.

High Performance Across a Variety of Machining Applications
Molded PCD AGT Chipbreaker for KTKF holders

Unique chipbreaker design provides excellent chip control

New Toolholders Maintain Stable Machining
Improved Chip Control Y-axis Toolholder

Excellent Chip Evacuation with Y-axis Tuning Prevents Chip Entanglement
**APD Chipbreaker**
Molded PCD Chipbreaker
Superior Chip Control when Machining Aluminum

1. **Good Chip Control Improves Productivity**

   **Challenges**
   - Chip clogging causes machining downtime
   - Low quality, cloudy finish results

   ![Long chips can cause these problems](image1)
   ![Chip clogging reduces surface finish quality](image2)

   **SOLUTION**
   Newly developed molded chipbreaker design
   Improved chip control increases productivity

   **Head** ADC12
   Cutting Conditions: \(n = 2700\) RPM, \(V_c = -2,790\) sfm, D.O.C. = 0.020", \(f = 0.004\) ipr
   CCMT09T304APD KPD001

   ![APD Chipbreaker](image3)
   ![Competitor B (without chipbreaker)](image4)

   Chips are evacuated smoothly
   No chip clogging and long chips
Newly Designed Molded Chipbreaker for Precise Chip Control

Chipbreaker Features

- **Dot for large D.O.C.**
  Controls chips with step

- **Dot for medium D.O.C.**
  Controls chips with side of dot

- **Land for small D.O.C.**
  Good Control of thin chips

- **Front edge dots**
  Stable chip control with a dot that protrudes to the corner

Chipbreaker Map

Chip Control Comparison (Internal evaluation)

APD chipbreaker showed stable machining up to 0.040” D.O.C. under various cutting conditions.

Excellent chip control from small D.O.C. to large D.O.C.
### Excellent Surface Finish

APD Chipbreaker with sharp edge showed better surface finish compared to competitor.

![APD Chipbreaker (KPD001)](image1)

#### Surface Finish Comparison (Internal evaluation)

**APD Chipbreaker (KPD001)**

- **0.64μmRa**

**Competitor D Molded Chipbreaker (PCD)**

- **0.84μmRa**

Cutting Conditions: Vc = 1460, D.O.C. = 0.010", f = 0.004 ipr, Continuous external turning, Wet, Workpiece: ADC12

### APD Inserts

<table>
<thead>
<tr>
<th>Shape</th>
<th>Part Number</th>
<th>Dimensions (in)</th>
<th>No. of Cutting Edges</th>
<th>KPD001</th>
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<tr>
<td><img src="image2" alt="CCMT" /></td>
<td>CCMT 32505APD</td>
<td>IC 3/8, S 5/32, D 0.173</td>
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<td>DCMT 32505APD</td>
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<td>TPMT 2205APD</td>
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<td>222APD</td>
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- Standard Stock

### Recommended Cutting Conditions

<table>
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<tr>
<th>Workpiece</th>
<th>Vc : sfm</th>
<th>D.O.C. (in)</th>
<th>fz (ipt)</th>
<th>PCD KPD001</th>
<th>Notes</th>
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<tr>
<td>Aluminum Alloy</td>
<td>980 – 4,920</td>
<td>~ 0.039</td>
<td>0.002 – 0.008</td>
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<td>Brass</td>
<td>980 – 4,920</td>
<td>~ 0.039</td>
<td>0.002 – 0.008</td>
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AGT Chipbreaker
Molded PCD Chipbreaker for KTKF Holders
Improved Chip Control for Various Aluminum Alloy Machining Applications

1 Stable Machining for a Wide Range of Applications

Chip control and surface finish comparison with grooving and traversing

Chip Control Comparison (Grooving)

AGT Chipbreaker showed better chip control when grooving compared to competitor.
It also showed superior surface finish with less scratching when traversing.

Surface Finish Comparison (Traversing)

2 Unique Chipbreaker Provides Excellent Chip Control

Dots

Traversing
Reduces chip clogging by adjusting the width of the chipbreaker to the D.O.C.
Dots around cutting edge for small D.O.C.

Grooving
Stable machining with three chipbreaker dots

Sloped Cutting Edge
Reduces chattering with low cutting force design
Good surface finish with excellent chip evacuation
TKF-AGT Inserts

<table>
<thead>
<tr>
<th>Shape</th>
<th>Part Number</th>
<th>Dimensions (in)</th>
<th>Angle</th>
<th>No. of Cutting Edges</th>
<th>KPD001</th>
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<td></td>
<td></td>
<td>CW</td>
<td>CDX</td>
<td>RE</td>
<td>W1</td>
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<td>0.004</td>
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<tr>
<td>250-AGT</td>
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<td>0.189</td>
<td>0.004</td>
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<td>0.343</td>
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</table>

Recommended Cutting Conditions

<table>
<thead>
<tr>
<th>Workpiece</th>
<th>PCD</th>
<th>Dimensions (in)</th>
<th>Angle</th>
<th>No. of Cutting Edges</th>
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</thead>
<tbody>
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<td>Brass</td>
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<td>330 – 1,150</td>
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<td>fz: (ipt)</td>
<td>0.001 – 0.006</td>
<td>0.001 – 0.008</td>
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</tr>
</tbody>
</table>

- PCD inserts are for traversing and grooving applications.
- When using in cut-off machining, maximum cut-off diameter is Ø0.315” (Ø8mm).
- Set the feed rate less than 0.003 ipr.
- Cutting with coolant is recommended.

Case Studies

**Spool Valve A6061**

n = 6,500 RPM  
D.O.C. = 0.079° (Grooving), 0.006° / 0.079° (Traversing)  
f = 0.004 ipr, Wet

**TKF-AGT**

Good chip control without chip clogging

**Conventional A**

Chip clogging occurred

(User Evaluation)
1 Controlled Chip Evacuation for Stable Machining

The Y-axis machining direction allows the chips to fall down and away from the workpiece, improving chip evacuation.

2 KTKF Grooving and Cut-Off System and External Turning Holders

KTKF
Back Turning, Threading and Cut-off

- KTKFR1216JX-12-Y : Shank 1216 Type
- KTKFR1616JX-12-Y : Shank 1616 Type

- Applicable Inserts : TKF12R…

For more details, see Kyocera Y-axis Toolholder brochure.

External Turning
Front turning

- SDJCR1212JX-11FF-Y : Shank 1212 Type
- SDJCR1616JX-11FF-Y : Shank 1616 Type

- Applicable Inserts : DC □□□ 325…

For more details, see Kyocera Y-axis Toolholder brochure.