DLC-coated Grade for Aluminum Alloy Machining

DS1000 Series

Excellent surface roughness for Aluminum!
Outstanding anti-welding properties
for aluminum alloy machining

The combination of the DS1000 coating and the AJ chipbreaker achieve significant improvements in tool life, excellent surface finish and burr prevention.

**DS1000 Series**

- **DLC – Diamond-Like Carbon**

**Problems in machining of aluminum alloys**

- Welding of work material or chips on the insert
- Reduced cutting edge sharpness
- Degradation of surface quality and reduced dimensional accuracy
- Reduced tool life

**What’s the solution?**

- Significant improvement in welding resistance
  - Excellent anti-welding properties achieved by maintaining lubricity between the work material and the surface of the insert throughout the cutting process.
- Improved adhesion between the DLC coating and the substrate
  - Prolongs anti-welding properties
  - Maintains high levels of machined surface quality

**AJ-CHIPBREAKER**

- Periphery ground, high-precision insert.
- Large rake angle and mirror-like rake surface.
- Outstanding low resistance with superior cutting edge sharpness and good chip control.

**Performance comparison**

**Excellent anti-welding properties**

Compared with non-coated products, the DS1200 grade yielded good results in a variety of aluminum alloys.

- Insert: XHGR110200FR-AJ
- Tool: EPH11R010M10.0-2
- Tool diameter: 10 mm
- No. of Inserts: 2 inserts
- Cutting speed: $v_c = 300$ m/min
- Axial depth of cut: $a_p = 2.0$ mm
- Feed per tooth: $f_z = 0.03$ mm/t
- Cutting fluid: Dry cutting

**Comparison of welding conditions and surface finish after 11m of machining.**

The DS1100 gave good results both in welding conditions and surface roughness. The non-coated product created a cloudy work surface finish due to microscopic chipping on the cutting edge. Competitor's products also left a cloudy surface finish due to the roughness of the film itself.

- Insert: Inserts for the following tool
  - Tool: General purpose cutter for a 45° shoulder
  - Machine: Horizontal machining center (BT40; 22kW; 14,000 min$^{-1}$)
  - Work material: A5052(60HB)
  - Cutting speed: $v_c = 1000$ m/min
  - Feed per tooth: $f_z = 0.15$ mm/t
  - Axial depth of cut: $a_p = 2.0$ mm
  - Radial depth of cut: $a_0 = 60$ mm
  - Cutting fluid: Dry cutting

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**Work material (cutting length)**

- A5052P (207m)
- A7075 (210m)
- AC4B-T6 (70m)

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**Non-coated product**

- DS1000

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**Non-coated product**

- DS1200

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**Non-coated product**

- DS1100

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**Competitor**

- DS1200

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**Competitor**

- DS1100

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# Inserts

![Fig.1](image1.png) ![Fig.2](image2.png) ![Fig.3](image3.png) ![Fig.4](image4.png) ![Fig.5](image5.png) ![Fig.6](image6.png) ![Fig.7](image7.png)

Right hand (R) shown.

<table>
<thead>
<tr>
<th>Insert Cat. No.</th>
<th>Grade</th>
<th>Dimensions (mm)</th>
<th>Insert shape</th>
<th>Applicable TAC mills</th>
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# Standard cutting conditions

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