Solutions for automotive chassis and skin panel forming
Carbon-based coatings for aluminium forming tools

- Reduces the sticking of aluminium in the forming and trimming operations
- Keeps the press line clean of aluminum slithers and powdering affecting panel quality

**Solutions for trimming and forming:**
- Laser Hardening
- BALINIT HARD CARBON
- BALINIT TRITON STAR

### BALINIT HARD CARBON
Trimming aluminium

- Parts produced with minimal maintenance [1,000 parts]; [Cleaning trim edges with a cloth after every 5,000 parts]

### BALINIT TRITON STAR
Aluminium trimming and flanging

- Scrap panels [%]

All given data are approximate values and depend on application, environment and test conditions.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Workpiece</th>
<th>Challenge</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>BALINIT® HARD CARBON</td>
</tr>
<tr>
<td></td>
<td>Trimming dies and punches</td>
<td>Hood</td>
<td>Aluminium build-up over time was reduced</td>
</tr>
</tbody>
</table>

- Aluminium sticking significantly decreased
- Scrap rate has been greatly reduced
Reducing scrap & re-work costs while improving productivity in the press shop

Each process in the production of automotive body in white chassis presents unique challenges to the press shop. Oerlikon Balzers provides dedicated solutions for each process stage, tailored to solve the challenges of deep drawing, flanging and trimming of skin panels and forming structural parts both in steel and aluminium.

<table>
<thead>
<tr>
<th>Application</th>
<th>Solution</th>
<th>Description</th>
<th>Treatment description</th>
<th>Process temperature</th>
<th>Treatment zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large panel dies</td>
<td>BALITHERM PPD</td>
<td>Complete functional surface protection for mono-block cast iron tooling</td>
<td>Nitrogen diffusion (D) into the material + ceramic like compound layer (CL)</td>
<td>500 - 530 °C</td>
<td>80 - 150 µm (D) + 0 - 12 µm CL</td>
</tr>
<tr>
<td>Trimming and forming</td>
<td>LASER HARDENING</td>
<td>Localised protection for high load areas: Drawing/forming radii, Cutting edges, Flanging radii</td>
<td>Surface hardening (SH) via controlled laser</td>
<td>900 °C +</td>
<td>1.2 mm to 1.5 mm (SH)</td>
</tr>
<tr>
<td></td>
<td>BALINIT HARD CARBON</td>
<td>Anti-adhesive solution for forming and trimming aluminium sheet metal</td>
<td>PVD monolayer ta-C</td>
<td>&lt; 150 °C</td>
<td>Coating 0.5 - 3 µm</td>
</tr>
<tr>
<td></td>
<td>BALINIT TRITON STAR</td>
<td></td>
<td>PA-CVD monolayer a-C:H</td>
<td>&lt; 250 °C</td>
<td>Coating 1 - 3 µm</td>
</tr>
<tr>
<td>Forming AHSS</td>
<td>BALINIT FORMERA</td>
<td>Surface solution for tools forming AHSS (advanced high strength steel) and hot forming tools</td>
<td>PVD multilayer CrAlN based</td>
<td>480 °C</td>
<td>Coating 8 - 10 µm</td>
</tr>
</tbody>
</table>
**BALINIT FORMERA for forming tough structural parts**

- Surface solution designed to protect tools forming Advanced High Strength Material Parts and thick material.
- Durable, flexible coating. Outstanding performance in shear stress.

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**Solution for forming structural parts, AHSS, thick material:**

**BALINIT FORMERA**

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**BALINIT FORMERA ADVANCED**
**Drawing**

<table>
<thead>
<tr>
<th>Parts produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>Competitor AHSS solution</td>
</tr>
</tbody>
</table>

**Tool**
Drawing SKD11 (1.2379)

**Workpiece**
Automobile seat parts
700M Pa, 1.5 mm

**Challenge**
AHSS drawing
Heavy wear

**Solution**
**BALINIT® FORMERA ADVANCED**
- Better surface quality of products
- Much longer tool life without obvious wear

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**BALINIT FORMERA DUPLEX**
**Deep drawing of axle beam**

<table>
<thead>
<tr>
<th>Tool life [1,000 parts]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td><strong>BALINIT® LUMENA DUPLEX</strong></td>
</tr>
</tbody>
</table>

**Tool**
Draw tool
Tool steel: D2 / SKD11

**Workpiece**
Axle beam 3.5 mm
Tensile strength 590 MPa

**Challenge**
Deep scratches & material sticking

**Solution**
**BALINIT® FORMERA DUPLEX**
- +200 % tool life increased
- Scratch/material sticking & polishing is totally eliminated

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The DUPLEX Series includes a separate diffusion process allowing deeper diffusion depths.
The decisive advantage for more efficiency:
BALITHERM PPD for large stamping dies

Our future-oriented plasma-based diffusion process PPD (Pulsed-Plasma Diffusion) is applied in our INAURA systems. They provide a loading capacity of 10 x 3 metres and 40 tonnes. The fully automated process ensures a stable and controlled wear-protection coating procedure. The combination of hydrogen, nitrogen and electricity means that INAURA operates entirely without the use of poisonous gases and chemicals.

### BALITHERM PPD
Cold stamping of aluminium bonnet

**Tool**
OP 20 (stamping), EN-JS 2070

**Workpiece**
Aluminium bonnet inner / outer (1 mm sheet material)

**Challenge**
- Aluminium adhesion
- Wear on the sheet aluminium and on the forming radius / draw bead

**Solution**
BALITHERM® PPD
- No maintenance polish needed during production
- Better surface quality of parts

**Output per production run [parts]**

<table>
<thead>
<tr>
<th>Output per production run [parts]</th>
<th>Untreated</th>
<th>+ 400 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<tr>
<td>1,000</td>
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<td>5,000</td>
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</tbody>
</table>

### BALITHERM PPD
Cold stamping of trunk lid outer

**Tool**
OP 20 (stamping), EN-JS 2070

**Workpiece**
Trunk lid outer (0.7 mm sheet metal)

**Challenge**
- Zinc adhesion
- Wear on the sheet metal part and on the forming radius / draw bead

**Solution**
BALITHERM® PPD
- No maintenance polish needed during production
- Making longer production run possible
- Better surface quality of parts

**Output per production run [parts]**

<table>
<thead>
<tr>
<th>Output per production run [parts]</th>
<th>Untreated</th>
<th>+ 100 %</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<tr>
<td>900</td>
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<tr>
<td>1,000</td>
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</tbody>
</table>
Close to our customers – worldwide

Americas
around 27 customer centres in

Europe
around 50 customer centres in

Asia
more than 37 customer centres in

Contact us now!

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T +423 388 7500

* PPD customer centres

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