Solutions for automotive chassis and skin panel forming
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 MAYURA</td>
<td>Anti-adhesive solution for forming and trimming aluminium sheet metal</td>
<td>PVD multilayer ta-C</td>
<td>&lt; 150 °C</td>
<td>Coating 0.3 – 1.5 µm</td>
</tr>
<tr>
<td></td>
<td>BALINIT TRITON STAR</td>
<td>PVD multilayer CrAlN based</td>
<td></td>
<td>&lt; 250 °C</td>
<td>Coating 1 – 3 µm</td>
</tr>
<tr>
<td></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>
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:
- BALINIT MAYURA
- BALINIT TRITON STAR
- Laser Hardening

### BALINIT MAYURA
Trimming aluminum

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

<table>
<thead>
<tr>
<th>Tool</th>
<th>Trimming dies and punches 1.2379 / D2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece</td>
<td>Hood</td>
</tr>
<tr>
<td>Challenge</td>
<td>Aluminum starting to stick to cutting edges</td>
</tr>
<tr>
<td>Solution</td>
<td>BALINIT® MAYURA</td>
</tr>
<tr>
<td></td>
<td>Aluminum build-up over time was reduced</td>
</tr>
</tbody>
</table>

### BALINIT TRITON STAR
Aluminium trimming and flanging

Scrap panels [%]

<table>
<thead>
<tr>
<th>Tool</th>
<th>Aluminium trimming and flanging 1.2333/1.2358</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece</td>
<td>Fender/Bonnet/Door/Trunk Lid 5/6000 series Alu</td>
</tr>
<tr>
<td>Challenge</td>
<td>Aluminum sticking and high scrap rate</td>
</tr>
<tr>
<td>Solution</td>
<td>BALINIT® TRITON STAR</td>
</tr>
<tr>
<td></td>
<td>- Aluminium sticking significantly decreased</td>
</tr>
<tr>
<td></td>
<td>- Scrap rate has been greatly reduced</td>
</tr>
</tbody>
</table>

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

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

**BALINIT FORMERA**

**BALINIT FORMERA ADVANCED**
Deep drawing of seat components

<table>
<thead>
<tr>
<th>Parts produced</th>
<th>Tool</th>
<th>Workpiece</th>
<th>Challenge</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>120,000</td>
<td>Drawing 1,2379 (D2 / SKD11)</td>
<td>Automobile seat parts 700 MPa, 1.5 mm</td>
<td>AHSS drawing Heavy wear</td>
<td>Better surface quality of products - Much longer tool life without obvious wear</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Tool life [1,000 parts]</th>
<th>Tool</th>
<th>Workpiece</th>
<th>Challenge</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>180</td>
<td>Draw tool Tool steel (D2 / SKD11)</td>
<td>Axle beam 3.5 mm Tensile strength 590 MPa</td>
<td>Deep scratches &amp; material sticking</td>
<td>+200% tool life increased - Scratch/material sticking &amp; polishing is totally eliminated</td>
</tr>
</tbody>
</table>

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 × 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.
Close to our customers – worldwide

**Americas**
- more than 25 customer centres in
  - Argentina
  - Brazil
  - Canada
  - Mexico*
  - USA*

**Europe**
- more than 45 customer centres in
  - Austria
  - Belgium
  - Czech Republic
  - Finland
  - France
  - Germany*
  - Hungary
  - Italy
  - Liechtenstein
  - Luxembourg
  - Poland
  - Portugal
  - Romania
  - Slovakia
  - Spain
  - Sweden
  - Switzerland
  - Turkey
  - United Kingdom

**Asia**
- more than 35 customer centres in
  - China*
  - India
  - Indonesia
  - Japan*
  - Malaysia
  - Philippines
  - Singapore
  - South Korea
  - Thailand
  - Vietnam

* PPD customer centres

Contact us now!

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