BALINIT® LUMENA
Productivity in forming
提升成型的生产力
**BALINIT® LUMENA:**
Fulfils the toughest requirements in forming

**BALINIT® LUMENA:** 满足成型的最高要求

**Challenges** 挑战

Today, high-strength to ultra-high-strength sheet steel has become the standard in crash-relevant automotive structural parts. When such components are processed, the high-strength characteristics of the metal result in significant stresses on the tool surface, particularly in highly loaded radius zones. In many cases, this causes premature tool failure. Similar problems are encountered in cold solid forming operations. With high degrees of metal deformation, the fatigue load of the base material is often exceeded, and this too, can lead to tool failure. Additionally, cold welding on the tool is often a problem. The consequences are increased maintenance and a deterioration of the surface quality of the part.

The solution 解决方案

These problems can be solved with BALINIT® LUMENA. The TiAlN coating with minimised residual stress significantly reduces abrasive wear in forming tools. The cold welding problem is largely diminished by the chemical composition of the coating. Cleaning intervals are extended and at the same time, product quality is improved.

BALINIT® LUMENA可以解决这些问题。TiAlN涂层具有非常低的剩余应力，从而显著降低成型模具的磨损。涂层的化学成分在很大程度上减少了冷焊的问题。模具的清洁间隔延长了，同时，产品质量也提高了。

The BALINIT® LUMENA coating has the following features:
- High hardness
- An optimised hardness to residual compressive stress ratio
- High abrasive wear resistance
- Improved chemical and thermal resistance
- Reduced coefficient of friction
- High achievable coating thicknesses (comparable with CVD)

**Properties of BALINIT® LUMENA**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coating material</td>
<td>TiAlN</td>
</tr>
<tr>
<td>Microhardness (HV 0,05)</td>
<td>3,400</td>
</tr>
<tr>
<td>Coefficient of friction</td>
<td>0.30 – 0.35</td>
</tr>
<tr>
<td>against steel (dry)</td>
<td></td>
</tr>
<tr>
<td>Max. service temperature (°C)</td>
<td>900</td>
</tr>
<tr>
<td>Coating colour</td>
<td>violet-grey</td>
</tr>
</tbody>
</table>

BALINIT® LUMENA涂层特点
- 高硬度
- 优化硬度与剩余压应力的比率
- 高耐磨性
- 改善化学稳定性和热稳定性
- 降低摩擦系数
- 可实现较高涂层厚度（与CVD涂层相比）
BALINIT® LUMENA:
Cost-effective, optimised forming processes

A comparison of our environmentally friendly PVD coatings with the CVD or TD coatings used so far in forming applications reveals that BALINIT® LUMENA delivers better or equivalent results – without the risk of tool distortion that can occur due to the high process temperatures involved in the application of CVD and TD coatings.

To目前为止，我们环保的PVD涂层与CVD、TD涂层在成型工艺中的应用有何区别，表明BALINIT® LUMENA展现了一个更好的或者相同的结果——但是，避免了由于高工艺温度所造成的工具变形的风险，而这种风险存在于CVD和TD涂层的应用中。

Applications:
- Forming of high-strength sheet steel in the automotive industry (for instance bumpers, longitudinal members, side-impact protectors)
- Cold solid forming of steering and drive elements, transmission parts, etc.
- Sheet metal forming (clutches, etc.)
- Hydroforming
- Aluminium profile extrusion

Bending:
- Automotive industry中的高强度板冷成形（例如：保险杠，车架纵梁，侧碰溃伤保护）
- 转向部件，传动装置等的冷体积成形
- 空心型材（离合器等）
- 压延成形
- 铝型材压延

Tighten the screws and nuts for good torsional rigidity.

### Sizing

<table>
<thead>
<tr>
<th>Parts [1,000]</th>
<th>uncoated</th>
<th>Competition</th>
<th>BALINIT™ LUMENA</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>0</td>
<td>approx. 5,000</td>
<td>&gt; 200,000</td>
</tr>
<tr>
<td>not possible</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Deep drawing

<table>
<thead>
<tr>
<th>Parts [1,000]</th>
<th>uncoated</th>
<th>BALINIT™ LUMENA</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
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<tr>
<td>500</td>
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<tr>
<td>400</td>
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<tr>
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<tr>
<td>200</td>
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<tr>
<td>100</td>
<td></td>
<td></td>
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<tr>
<td>0</td>
<td></td>
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</tr>
</tbody>
</table>

### Tool:
- Mandrel: Ø 120 x 250 mm
- Steel DIN 1.3343 (~ AISI M2)
- 62 HRC
- Material: DIN 1.0511 (~ AISI 1040)
- Thickness: 10 mm
- 6 strokes/min
- Lubrication: MQL oil mist
- Failure criterion: Cold welding

### Workpiece:
- TOOL (Toyota diffusion)
- BALINIT™ LUMENA

### Benefit:
- Without coating, only 50 parts could be produced.

### Bending

<table>
<thead>
<tr>
<th>Parts [1,000]</th>
<th>CrN</th>
<th>BALINIT™ LUMENA</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
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<td>15</td>
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<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Tool:
- Bending mandrel
- DIN 1.2379 (~ AISI D2), 61 HRC
- Tubes: DIN 1.4401 (~ AISI 316)
- Thickness: 1.5 ~ 1.75 mm
- Benefit: The BALINIT® LUMENA coating dramatically reduces cold welding.

### Workpiece:
- DIN 1.2379 (~ AISI D2), 61 HRC
- Tubes: DIN 1.4401 (~ AISI 316)
- Thickness: 1.5 ~ 1.75 mm
BALINIT® LUMENA: Enhances the reliability and life of your tools
BALINIT® LUMENA: 增加模具的可靠性和寿命

Sheet metal forming 钣金成型

<table>
<thead>
<tr>
<th></th>
<th>Monthly maintenance (hours) 每月维护 (小时)</th>
<th>Parts [1,000]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitor</td>
<td>30</td>
<td>180</td>
</tr>
<tr>
<td>BALINIT® LUMENA</td>
<td>15</td>
<td>140</td>
</tr>
</tbody>
</table>

Tool:
Forming die: DIN 1.2379 (~ AISI D2), 60 HRC
Workpiece:
1. Bumper, DIN 1.8998 (S360MC/CP-W 800)
   sheet thickness 2.8 mm
2. Sheet metal forming 浇注模具:
   DIN 1.2379 (~ AISI D2), 60 HRC
   保险杠, DIN 1.8998 (S360MC/CP-W 800)
   厚度 2.8 mm
Benefit: Monthly maintenance effort was reduced by 75% 每月的维护时间减少75%

<table>
<thead>
<tr>
<th></th>
<th>Forming die: DIN 1.2379 (~ AISI D2), 62 HRC</th>
<th>Parts [1,000]</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD</td>
<td>150</td>
<td>140</td>
</tr>
<tr>
<td>BALINIT® LUMENA</td>
<td>150</td>
<td>140</td>
</tr>
</tbody>
</table>

Tool:
Forming die: DIN 1.2379 (~ AISI D2), 62 HRC
Workpiece:
1. Bumper, DIN 1.0965 (S900MC/MS-W 1200)
   Sheet thickness 3.0 mm
2. Sheet metal forming 浇注模具:
   DIN 1.2379 (~ AISI D2), 62 HRC
   保险杠, DIN 1.0965 (S900MC/MS-W 1200)
   厚度 3.0 mm
Benefit: PVD coatings are much more cost-effective than CVD coatings.

Locations of Oerlikon Balzers 欧瑞康巴尔查斯分布

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Fax +1 205 884 1211
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Further coating centres:
其他涂覆中心:
Argentina, Austria, Brasil, Canada, China, Czech Republic, France, Germany, Hungary, Indonesia, Italy, Japan, Korea, Liechtenstein, Mexico, Poland, Portugal, Romania, Spain, Switzerland, Turkey
阿根廷,澳大利亚,巴西,加拿大,中国,捷克,法国,德国,匈牙利,印度尼西亚,意大利,日本,韩国,列支敦士登,墨西哥,波兰,葡萄牙,罗马尼亚,西班牙,瑞士,土耳其

www.oerlikon.com/balzers/cn