Boosting productivity

Value-adding coating solutions for gear cutting
Value-adding coatings and services are the right choice for your gear cutting applications

More than ever before, gear cutting is being driven by reducing production costs per part, for which high productivity and reliability in the cutting process is key. High-performance coatings from Oerlikon Balzers, such as BALINIT® ALTENSA, BALINIT® ALCRONA PRO and BALINIT® DURANA, allow higher cutting speeds and feeds in order to increase productivity in gear cutting, while new services such as primeGear improve cutting process reliability and help reduce both overall tool costs and costs per part.

Benefit from our gear cutting expertise

<table>
<thead>
<tr>
<th>Demands in gear cutting</th>
<th>Coating solutions from Oerlikon Balzers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase cutting parameters in gear cutting operations (e.g. for hobbing and gear skiving)</td>
<td>High-performance coatings such as BALINIT® ALTENSA and BALINIT® ALCRONA PRO and dedicated post-treatment</td>
</tr>
<tr>
<td>Variable chip thickness around the engaged cutting edge (e.g. for stick blades, skiving tools and hobs)</td>
<td>Tailored cutting edge radius and profiles with primeGear for different areas of the cutting edge</td>
</tr>
<tr>
<td>High impact stress on the cutting edge when entering the workpiece (e.g. for stick blades and shaper cutters)</td>
<td>Stabilised cutting edges by dedicated cutting edge profiles and coatings like BALINIT® DURANA for specific processes and cutting parameters</td>
</tr>
</tbody>
</table>
Our coating solutions for high-end gear cutting

<table>
<thead>
<tr>
<th>Material</th>
<th>Hobs</th>
<th>Stick blades</th>
<th>Shaper cutters</th>
<th>Skiving tools</th>
<th>Broaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unalloyed steel</td>
<td>AT / AP</td>
<td>DR / AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Steel &lt; 1000 N/mm²</td>
<td>AT / AP</td>
<td>DR / AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Steel &gt; 1000 N/mm²</td>
<td>AT / AP</td>
<td>DR / AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Steel 45 – 56 HRC</td>
<td>AT / AP</td>
<td>DR / AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Cast iron (GG, GGG)</td>
<td>AT / AP</td>
<td>DR / AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
</tbody>
</table>

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

Coating properties at a glance

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCRONA PRO</td>
<td>AlCrN-based</td>
<td>36 +/-3</td>
<td>-3 +/-1</td>
<td>1,100</td>
<td>&lt; 500</td>
<td>bright grey</td>
</tr>
<tr>
<td>ALTENSA</td>
<td>AlCrN-based</td>
<td>40 +/-3</td>
<td>-2 +/-1</td>
<td>1,100</td>
<td>&lt; 500</td>
<td>light grey</td>
</tr>
<tr>
<td>DURANA</td>
<td>AlTiN/TiSiXN-based</td>
<td>37 +/-3</td>
<td>-3.5 +/-1</td>
<td>1,000</td>
<td>&lt; 500</td>
<td>bronze</td>
</tr>
<tr>
<td>LATUMA</td>
<td>AlTiN-based</td>
<td>35 +/-3</td>
<td>-3 +/-1</td>
<td>1,000</td>
<td>&lt; 500</td>
<td>grey</td>
</tr>
</tbody>
</table>

AP = BALINIT® ALCRONA PRO  
AT = BALINIT® ALTENSA  
DR = BALINIT® DURANA  
LM = BALINIT® LATUMA
Outstanding results in challenging gear cutting applications

**Gear hobbing with primeGear**

<table>
<thead>
<tr>
<th>Tool life [parts]</th>
<th>BALINIT® ALCRONA PRO</th>
<th>+ 50%</th>
</tr>
</thead>
</table>

**Tool** PM-HSS hob, Ø 100 x 300, module: 2.25

**Workpiece** Crown gear

**Cutting parameters**
- 1st cut: $f = 3.7 \text{ mm/rev}$, $v_c = 190 \text{ m/min}$, dry
- 2nd cut: $f = 4.4 \text{ mm/rev}$, $v_c = 320 \text{ m/min}$, dry

**Source** Automotive end user

**Bevel gear cutting with BALINIT DURANA**

<table>
<thead>
<tr>
<th>Tool life [parts]</th>
<th>BALINIT® DURANA</th>
<th>+ 31%</th>
</tr>
</thead>
</table>

**Tool** Carbide stick blade

**Workpiece** Pinion gear

**Cutting parameters**
- $v_c = 162 \text{ m/min}$
- $f = 0.05 \text{ mm}$

**Source** Axle manufacturer

**Gear hobbing with BALINIT ALTENSA**

<table>
<thead>
<tr>
<th>Tool life [m/tooth]</th>
<th>BALINIT® ALTENSA</th>
<th>+ 525% at same speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>+ 340% at higher speed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool</th>
<th>PM-HSS hob (S390), Ø 80 mm</th>
</tr>
</thead>
</table>

**Workpiece** Steel 1.7174, AISI 4820, 20MnCr5 570N/mm²

**Cutting parameters**
- Test 1: $v_c = 280 \text{ m/min}$
- Test 2: $v_c = 320 \text{ m/min}$
- $m = 2$
- dry

**Source** Automotive end user

**Face hobbing with BALINIT ALCRONA PRO**

<table>
<thead>
<tr>
<th>Tool life [parts]</th>
<th>BALINIT® ALCRONA PRO</th>
<th>+ 260%</th>
</tr>
</thead>
</table>

**Tool** Carbide stick blade

**Workpiece** Crown gear

**Cutting parameters**
- $v_c = 162 \text{ m/min}$
- $a_v = 4 \text{ m/min}$
- Cycle time: 5.44 min
- wet

**Source** Automotive supplier, Brazil
primeGear gives you higher process reliability, reduced tool wear, extended tool life, shorter cycle times and cuts production costs. Together with you we will eliminate the weak links in tool life by analysing all phases in the tool life cycle:

- Surface treatment
- Cutting process
- Tool handling
- Resharpening

**Assessment of current status**
- Process analysis
- Analysis of tool wear and work material
- Analysis of resharpening quality
- Analysis of tool life cycle and production costs

**Tailored tool treatment**
- Tailored surface pre-treatment
- Perfect edge preparation
- Optimum coating for the specific application
- Tailored post-treatment

**primeGear**
- Reduction of variations and down-time in production
- Highest tool performance in combination with proven savings
- Part quality improvement
- Continuous improvement

**Example of tool cost reduction**

The results of a customer example show a higher process stability, improved tool wear and reduced regrinding stock lead. Reducing the resharpening variations in two steps and an optimum tool coating enabled longer reconditioning cycles, resulting in a total tool cost saving of 90% per year.

**Direct effect:**
- Step 1: Tool cost reduced by 47%
- Step 2: Tool cost reduced by additional 45%

**Indirect effects:**
- Predictability in tool life increases milling machine uptime
- Quality of machined gears improved (the difference between the first and last gear is reduced)
Contact us now!

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