FORMING AND MOLDING
Application specific solutions

Lower cost and improved productivity

Ionbond has been offering coating services for 40 years, greatly contributing to overall cost savings and increasing the productivity of forming and molding processes. With PVD, CVD and PACVD technology available, Ionbond has the broadest offering of coatings in the industry and can select the process that suits a given situation without compromise.

- Longer tool life
- Improved part quality
- Reduced lubricant usage
- Reduced downtime
- Reduced tool maintenance
- Elimination of secondary operations

Ionbond™ and Bernex™ multipurpose coatings

These traditional multipurpose coatings are often used in general forming and injection molding applications.

- Ionbond™ 01 TiN
- Ionbond™ 10 TiCN
- Ionbond™ 20 AlTiN
- Ionbond™ 22 TiAlCrN
- Ionbond™ 25 AlCrN
- Ionbond™ 30 CrN
- Ionbond™ 40 a-C:H:W
- Ionbond™ 41 a-C:H:W + a-C:H
- Bernex™ 02 TiC
- Bernex™ 13 TiCN – TiC-TiN
High performance coatings

The high performance coatings are specifically designed for forming and molding tools utilized in the most demanding applications where improved productivity is needed.

Ionbond™ 90 Concept

Ionbond™ 90 Concept is the next generation PVD coating that combines excellent fatigue resistance, high hardness and low coefficient of friction in order to provide superior performance in the most demanding low temperature forming and molding applications. This unique combination of properties enables Ionbond™ 90 Concept to provide superior performance to that of traditional PVD, CVD, and TD Coatings.

- Forming AHSS and HSLA Alloys
- Forming stainless steels
- Forming steel > 2mm in thickness
- Cold forging steel
- Piercing and forming punches – ferrous alloys
- Powder metal compaction
- Plastic injection molding – abrasion applications

Ionbond™ 35

Ionbond™ 35 CrWN is a PVD coating specifically designed for high temperature forming applications. It exhibits excellent oxidation and abrasion resistance, along with superior resistance to chemical attack by molten aluminum compared to traditional PVD coatings. Its deposition temperature at 350 °C makes it compatible with the commonly used tool materials.

- Die casting
- Hot stamping (press hardening)
- Hot forging
- Tight tolerance hot extrusion
- Rubber molding
- Plastic injection molding – outgassing resins

Ionbond™ 42

Ionbond™ 42, CrN + a-C:H provides a combination of high fatigue and abrasion resistance with a very low coefficient of friction and ultra-smooth surface. This makes Ionbond™ 42 the preferred solution for non-ferrous forming and plastic injection molding applications.

- Piercing, forming, and trimming non-ferrous materials
- Plastic injection molding ejector pins
- Plastic injection molding – sticky resins
- Powder metal compaction
Added capabilities and services

**Bernex™ CVD coatings for complex shapes and features**

Bernex™ CVD coatings continue to find applications in the coating of molds, and dies. The nature of the chemical vapor deposition process makes it possible to coat surfaces that cannot be reached by a PVD process and makes it an ideal solution for tools with open dimensional tolerances, demanding materials and complex geometries. The coating materials include titanium-based nitrides and carbides as well as different forms of aluminum oxides and doped elements.

- Complex geometries
- Inner contours

**Bernex™ 29**

Bernex™ 29 is a CVD multi-layer coating based on Al₂O₃. It exhibits excellent thermal stability, chemical inertness, and high resistance to wear. This combination of characteristics makes it the leading solution for hot extrusion applications for ferrous and non-ferrous alloys.

- Open tolerance aluminum die casting
- Open tolerance hot extrusion
- Open tolerance plastic injection molding – outgassing resins

**Quality assured**

Ionbond tool coating centers hold an extensive range of international accreditations, including ISO 9001, ISO 9002, AS 9100, TS 16949, and are approved by numerous OEMs in the tool industry. On top of the quality system Ionbond has a mindset that focuses on the needs of its customers and constantly works on improving products and processes.

**Reliability and delivery**

- Fast turnaround times
- Pick-up and drop-off service

**Service**

Ionbond’s services don’t stop with the coating. It is committed to providing added services and value including surface preparation to meet the needs of its customers.

- Pre- and postcoating polishing
- Pre- treatment processes
- Quality certifications
- Failure analysis services
# Ionbond Molding and Forming Coatings

<table>
<thead>
<tr>
<th>Technology</th>
<th>PVD</th>
<th>PVD</th>
<th>PACVD</th>
<th>CVD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coating</td>
<td>Ionbond™ 90 Concept</td>
<td>Ionbond™ 35 CrWN</td>
<td>Ionbond™ 42 Cr + CrN + a-C:H</td>
<td>Bernex™ 29 Al₂O₃</td>
</tr>
<tr>
<td>Typical coating thickness (µm)</td>
<td>6–8</td>
<td>5–8</td>
<td>1–8</td>
<td>8–16</td>
</tr>
<tr>
<td>Cross sections</td>
<td><img src="image1" alt="Cross section" /></td>
<td><img src="image2" alt="Cross section" /></td>
<td><img src="image3" alt="Cross section" /></td>
<td><img src="image4" alt="Cross section" /></td>
</tr>
<tr>
<td>Deposition temperature</td>
<td>400 °C</td>
<td>350 °C</td>
<td>200–250 °C</td>
<td>1000 °C</td>
</tr>
<tr>
<td>Service temperature</td>
<td>300 °C</td>
<td>800 °C</td>
<td>300 °C</td>
<td>1000 °C</td>
</tr>
<tr>
<td>Friction vs. steel</td>
<td>0.12</td>
<td>0.3</td>
<td>0.1</td>
<td>&lt; 0.2</td>
</tr>
<tr>
<td>Microhardness HV 0.05</td>
<td>3800</td>
<td>3000–3200</td>
<td>2000–2800</td>
<td>3000</td>
</tr>
<tr>
<td>Coating interior surfaces</td>
<td>Limited</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes, incl. hidden details</td>
</tr>
</tbody>
</table>
| Typical applications | ▶ Forming AHSS and HSLA alloys  
▶ Forming steel > 2mm in thickness  
▶ Forming stainless steel  
▶ Cold forging steel  
▶ Piercing and forming punches for steel, AHSS, HSLA, and stainless alloys  
▶ Powder metal compaction  
▶ Plastic injection molding – abrasion applications | ▶ Aluminum die casting  
▶ Hot stamping (press hardening)  
▶ Hot forging  
▶ Close tolerance hot extrusion  
▶ Rubber molding  
▶ Plastic injection molding – outgassing resin applications | ▶ Piercing, forming, trimming non-ferrous materials  
▶ Plastic injection molding – ejector pins  
▶ Plastic injection molding – sticky resins  
▶ Powder metal compaction | ▶ Open tolerance aluminum die casting  
▶ Open tolerance hot extrusion  
▶ Open tolerance plastic injection molding – outgassing resins |

For a complete coating listing please see [www.ionbond.com](http://www.ionbond.com)
Competence and Innovation – Worldwide

Ionbond is a leader in surface enhancement technology and provides advanced coating solutions featuring a broad range of hard, low friction, wear resistant coatings based on PVD, PACVD and CVD technologies for a wide range of applications. It has a global presence with coating centers in strategic locations across Europe, Asia, and North America and has one of the largest coating networks in the world.

Ionbond is part of the IHI Group, a Japanese industrial group with significant R&D resources that operates through multiple business fields including: Energy and Resources, Social Infrastructure, Industrial Machinery and Aero Engines.

Global and regional headquarters

**IHI Ionbond**
Group Headquarters
Uetlibergstrasse 132
CH-8046 Zürich
Phone: +41 44 298 50 70
Fax: +41 44 298 50 99
info@ionbond.com

**Ionbond Switzerland – Dulliken**
Coating Center
Industriestrasse 9
CH-4657 Dulliken
Phone: +41 62 553 42 00
infoch@ionbond.com

**Ionbond France – Lyon**
Services Headquarters
Europe Zone 1
25, rue des Frères-Lumiére
FR-69680 Chassieu
Phone: +33 4 72 79 46 60
Fax: +33 4 72 79 46 61
infofr@ionbond.com

**Ionbond Netherlands – Venlo**
Services Headquarters
Europe Zone 2
van Heemskerckweg 30
NL-5928 LL Venlo
Phone: +31 77 465 65 65
Fax: +31 77 351 34 99
infonl@ionbond.com

**Ionbond US – Michigan**
Services Headquarters
North America
1923 East Whitcomb
Madison Heights
USA MI 48071
Phone: +1 248 398 9100
Fax: +1 248 398 2110
infous@ionbond.com

**Ionbond China – Wuxi**
Services Headquarters
Asia
Building 17-B
No. 15 Hanjiang Road
Wuxi New District
Wuxi City, Jiangsu Province
China (Postcode: 214028)
Phone: +86 510 8815 2528
Fax: +86 510 8181 6819
infocn@ionbond.com

See our website for a full list of all coating centers and local equipment sales offices. www.ionbond.com