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 to 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

Application and Engineering Support

Ionbond offers an extended product portfolio, many years of application experience and know-how to its customers to find engineered coating solutions for forms and molds that maximize performance for specific operating conditions. Ionbond engineers assess each situation individually. The outcome is a system solution aimed at delivering the identified objectives.

- Tool material
- Workpiece material or resin
- Working temperatures
- Tool life expectation
- Tool failure mode
A Track Record of Performance

**Stamping and Cold Forming**

Ionbond’s coating solutions exhibit the toughness, wear resistance, and galling resistance needed to improve the performance of punches, dies, and other tooling used in stamping, forming, and compaction applications.

- Advanced high-strength steels
- Stainless steels
- Low carbon and HSLA steel
- Aluminum and copper alloys
- Titanium and nickel alloys
- Coated and plated materials

**Plastic Injection Molding**

With superior hardness and wear resistance, Ionbond coatings protect plastic injection molds from the abrasive wear caused by fiber reinforced and engineered resins, along with protecting critical mold surfaces from handling-related damage. The high density of the coatings protects mold surfaces from corrosive out-gassing of resins thus preventing pitting and improving part quality. The ultimate benefits of Ionbond coatings are improved resin flow, superior release, and improved part surface finish.

- Mold cavities
- Cores
- Ejector
- Pins
- Sleeves
- Runner systems
- Feed screws
- Sprue bushings and gates

**Hot Forming**

Forming applications performed at elevated temperatures are extremely demanding on tool surfaces. Ionbond PVD and Bernex CVD coatings possess superior toughness, reduced friction and resist corrosive attack and erosive and abrasive wear. They make the tool last longer and increase the quality of the work piece.

- Die casting
- Hot forging
- Warm forming
- Hot extrusion
Added Capabilities and Services

CVD for complex Shapes and Features

CVD continues to find applications in the coating of molds, dies and forming tools. 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
- Demanding materials

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
- Quality certifications
- Failure analysis services

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
## 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™ 01 TiN</td>
<td>Ionbond™ 30 CrN</td>
<td>Ionbond™ 43 a-C:H</td>
<td>Bernex™ 02 TiC</td>
</tr>
<tr>
<td>Typical coating thickness (µm)</td>
<td>2–4</td>
<td>4–6</td>
<td>1–3</td>
<td>3–8</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>425 °C</td>
<td>150–400 °C</td>
<td>160–200 °C</td>
<td>1000 °C</td>
</tr>
<tr>
<td>Service temperature</td>
<td>450 °C</td>
<td>700 °C</td>
<td>300 °C</td>
<td>300 °C</td>
</tr>
<tr>
<td>Friction vs. steel</td>
<td>0.55</td>
<td>0.55</td>
<td>&lt; 0.1</td>
<td>0.2</td>
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<tr>
<td>Microhardness HV 0.05</td>
<td>2800</td>
<td>2000–2600</td>
<td>2000–2800</td>
<td>3500</td>
</tr>
<tr>
<td>Inner features</td>
<td>Limited</td>
<td>Limited</td>
<td>Limited</td>
<td>Yes, incl. hidden details</td>
</tr>
</tbody>
</table>
| Typical applications | - Blanking  
- Piercing  
- Trimming  
- Cold forging  
- Plastic injection molding | - Forming  
- Flanging  
- Drawing  
- Cold extrusion  
- Aluminum die casting  
- Plastic injection molding  
- Hot forging | - Non-ferrous forming  
- Disc media molding  
- Other select plastic injection molding applications | - Open tool dimensional  
- Tolerance forming  
- Flanging  
- Drawing  
- Extrusion of steel, stainless steel, HSLA steel, AHSS steel alloys |

For a complete coating listing please see [www.ionbond.com](http://www.ionbond.com)
Ionbond is a global leader in surface enhancement technology and has been dedicated to serving high demanding industries such as tool making, automotive, industrial, aerospace, racing, medical and many others.

Ionbond has a global presence with 40 coating centers in strategic locations ready to work in partnership with manufacturers and their suppliers to provide cost-effective solutions to the most pressing needs facing the industry. 40 years of presence has enabled a deep understanding of the material requirements and future trends facing the industries. With ISO 9001 and specific certifications for individual industries and numerous manufacturer approvals Ionbond is the partner for coating services.

Competence and Innovation – Worldwide

See our website for a full list of all coating centers including Asia and North America. www.ionbond.com