The illustrations, drawings, dimensional and weight data and other information included in this brochure are intended only for the purposes of describing our products and represent non-binding average values. They do not constitute quality data, nor can they be used as the basis for any guarantee of quality or durability. The applications presented serve only as illustrations and can be construed neither as quality data nor as a guarantee in relation to the suitability of the material. This cannot substitute for comprehensive consultation on the selection of our products and on their use in a specific application. The brochure is not subject to change control.
Zapp: from past generations – for future generations

Tooling Alloys

ASP® steels

CPM® steels

Zapp special steels

Advantages of powder metallurgical high-performance steels

CPM®, ASP® and zapp special steels for cold-work applications

Tool steels

Services and special offers

Contact
300 years of Zapp. In 1701 in Ründeroth, Germany, Hermann Zapp founded the company, which quickly became a specialist for high-grade, and high-performance steels. We deliver quickly and reliably thanks to a large network of selected sales partners and our own locations in Europe, Asia and the US. With our experience and expertise, we ensure that you can turn your ideas into reality. From past generations – for future generations!

We are your partner for your projects and can carry out the first manufacturing steps, such as cutting and straightening, prior to delivery. This allows you to fully concentrate on the core processes of your production. We supply the right product form for your specific needs: wire, bar, profile, tube, strip, CAD-CAM discs, and more from stainless steel, titanium materials, nickel, and CoCr based alloys or metal powders.

The quest for innovation, intensive quality assurance and the willingness to solve complicated technical problems are our driving forces.

For 300 years, progress has helped us build a future with you for the next generations.
For many years, the division’s core competence has been consulting and distribution of powder metallurgical tool steels. These achieve exceptional performance characteristics through a unique process in which the powder is pressed under high pressure at over 1,100 °C (2,000 °F) and then hot-worked. This method allows for higher alloy contents with a more homogeneous structure than conventional casting and solidification of steel. Due to this, production costs can be significantly reduced by better tool life, thanks to a longer service life of the individual tool and fewer retooling operations.

Most powder metallurgy tool steels are sourced exclusively from reputable suppliers such as Crucible Industries LLC/USA and Erasteel/F. Furthermore, we also offer increasingly Zapp-owned PM steels. All materials are also available in very small quantities, because finishing is our profession. Our large service centers in Germany, the USA, and China supply you quickly and easy.

Our motto

cost-optimized, fast, reliable

Test our performance! We are looking forward to your inquiry.
»Zapp – reliable, ambitious, professional, precise.«

»In sales, we ensure that we are a reliable supplier for you. My tasks include the planning and coordination of technical, organizational, and personal issues. We work ambitiously on cost-optimized solutions of your requirements. To ensure this, precise cooperation with our technical team and our sales force is required, as well as smooth and professional handling of our customer procedures. The permanent learning curve, getting involved in new processes, and dealing with people go hand in hand with my job and make these tasks so interesting.«

Daniela Habibovic, Manager Inside Sales
Tooling Alloys
Ratingen location, Germany
ASP® steels
In the production of ASP® steels, liquid steel melt is atomized using nitrogen. The fine powder is encapsulated in a steel cylinder, evacuated, and then hot isostatically pressed. To avoid possible unwanted residual porosity, the material is subsequently compacted through hot forging and rolling.

The Erasteel production route allows to achieve a very high degree of purity. For your applications, that means particularly high fatigue strength and the attainment of a very fine surface finish.

**THE ASP® MANUFACTURING PROCESS**

<table>
<thead>
<tr>
<th>Steel designation</th>
<th>C</th>
<th>Cr</th>
<th>Mo</th>
<th>W</th>
<th>V</th>
<th>Co</th>
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© ASP is a registered trademarks of Erasteel, France (Paris).

Data sheets and stock lists for the individual materials can be found at www.zapp.com.
CPM® STEELS

CPM® steels
Crucible is specialized in the production of high-alloy powder metallurgical cold-working and high-speed steels. These high-vanadium steels meet most demanding requirements for wear resistance and compressive strength.

For special applications that require high corrosion resistance, CPM® 420V and CPM® S30V are already successfully used in practice. All CPM® steels are also hot-worked for optimum performance.

THE CPM® MANUFACTURING PROCESS

1. Atomization
2. Powder
3. Filtering
4. Filling
5. Encapsulation
6. Hot isostatic pressing
7. Forging
8. Rolling

® CPM is a registered trademark of Crucible Industries LLC, United States (Syracuse, NY).

<table>
<thead>
<tr>
<th>Steel designation</th>
<th>C</th>
<th>Cr</th>
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<td>CPM® Rex M4</td>
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Typical analysis (standard values in mass-%)
### Powder Metallurgy steels

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<th>Grade</th>
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<th>Cr</th>
<th>Mo</th>
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<th>V</th>
<th>Co</th>
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<td>2.0</td>
<td>–</td>
<td>1.5</td>
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<tr>
<td>Z-Wear PM</td>
<td>1.1</td>
<td>7.8</td>
<td>1.6</td>
<td>1.1</td>
<td>2.4</td>
<td>–</td>
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<td>Z-Max PM</td>
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</table>

### Conventional steels

<table>
<thead>
<tr>
<th>Grade</th>
<th>Characteristics</th>
<th>Typical applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC 800, US 2000</td>
<td>Cold-work steel</td>
<td>Cutting and punching of thick sheets, cutting/punching tools, cutting, embossing, forming</td>
</tr>
<tr>
<td>CSM 21, Vaco 180T</td>
<td>Plastic mold steel, maraging</td>
<td>Plastic molds, corrosion-resistant components, components</td>
</tr>
<tr>
<td>LC 200 N, LC 185 MP</td>
<td>High corrosion resistance up to 60 HRC with outstanding toughness, nitrogen alloyed, high corrosion-resistant matrix steel with excellent polishing and toughness</td>
<td>Knives and wear parts for the food industry and plastics processing. Ideal for highly stressed components, e.g. in pumps and extruders. High-gloss/mirror-polished plastic molds, mirror-polished plastic molds for optical glasses and headlamps, slot dies in plastic extrusion, plastic molds for discs, extrusion nozzles for plastic profiles.</td>
</tr>
</tbody>
</table>

Tool steel available in many thicknesses and lengths.
ADVANTAGES OF POWDER METALLURGICAL HIGH PERFORMANCE STEELS

Advantages

1. Alloy content
   The highest alloy levels can be achieved without any adverse effect on mechanical properties.

2. Toughness
   The uniform distribution of carbide and the absence of metallurgical defects increase impact strength and fracture resistance.

3. Wear resistance
   The overall carbide volume, carbide type, and resulting carbide hardness increase the resistance to abrasive and adhesive surface stresses.

4. Grindability
   As the small globules of carbide can be more easily undercut, the machinability and grindability is significantly enhanced.

5. Dimensional stability
   Powder metallurgical steels are free of macro segregation. This leads to more uniform size change and appreciably higher dimensional stability. Tools need less finishing after the heat treatment.

6. Degree of purity
   Micro-cleanliness results in excellent polishability and outstanding EDM properties.
»Safety first!«

»Since 2001 I have worked as a factory manager in the Service Center Tooling Alloys in Unna. Here it’s all about safe and punctual delivery of our sawed and milled products to our customers. When loading our products on the trucks, load safety has the highest priority and is therefore very important to me.

There are precise regulations on how to pack the different materials and workpieces and how these have to be secured on the trucks. I also take care of safety at work, the permanent training of our employees, and the continuous improvement of our production processes. I then prepare the resulting measures and investments.

The steady view of all work processes is very important to me and must never be lost in everyday stress, because secure production processes also make satisfied employees.

At the end of the working day, I can go home reassured, knowing that I have done everything I can to prevent accidents at work and in traffic.«

Alexander Kuhlmann, Manager
Service Center Tooling Alloys
Unna location, Germany
CPM®, ASP® AND ZAPP SPECIAL STEELS
FOR COLD-WORK APPLICATIONS

Application examples

<table>
<thead>
<tr>
<th>Type of tool</th>
<th>Production material</th>
<th>Material</th>
<th>Hardness (HRc)</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting punch</td>
<td>Cu–Be, s = 0.28 mm</td>
<td>1.2379</td>
<td>61</td>
<td>75,000 parts before regrind</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP® 10V</td>
<td>62</td>
<td>1,500,000 parts before regrind</td>
</tr>
<tr>
<td>Sinter press stamp (calibration)</td>
<td>Iron powder D 7  Density 7.1 kg/dm³</td>
<td>1.3207 PM</td>
<td>64</td>
<td>54,000 parts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP® 10V</td>
<td>63</td>
<td>75,000 parts</td>
</tr>
<tr>
<td>Precision cutting punch</td>
<td>St 52, s = 8.0 mm 550 MPa</td>
<td>1.2379</td>
<td>58</td>
<td>20,000 parts before regrind</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP® Rex M4</td>
<td>59</td>
<td>60,000 parts before regrind</td>
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<tr>
<td>Embossing stamp</td>
<td>St 2k, s = 1.2 mm 500 MPa</td>
<td>1.3343</td>
<td>59</td>
<td>25,000 parts before regrind</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CP® 3V</td>
<td>59</td>
<td>30,000 parts before regrind</td>
</tr>
<tr>
<td>Sinter press tool</td>
<td>Iron powder</td>
<td>1.2767</td>
<td>53</td>
<td>5,000 parts</td>
</tr>
<tr>
<td></td>
<td>Density 6.85 kg/dm³</td>
<td>1.3207 PM</td>
<td>61</td>
<td>10,000 parts</td>
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<td></td>
<td></td>
<td>CP® 9V</td>
<td>55</td>
<td>310,000 parts</td>
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<tr>
<td>Die cutting tool</td>
<td>QStE 460 TM, s = 2.0 mm 800 MPa</td>
<td>1.2379 + TiCN ASP® 2053</td>
<td>61</td>
<td>150,000 parts to regrind</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ASP® 2005</td>
<td>61</td>
<td>500,000 parts to regrind</td>
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<tr>
<td>Precision cutting punch</td>
<td>16MnCr5, s = 4.5 mm 550 MPa</td>
<td>1.2379</td>
<td>60</td>
<td>80,000 parts to regrind</td>
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<tr>
<td></td>
<td></td>
<td>ASP® 2005</td>
<td>60</td>
<td>190,000 parts to regrind</td>
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Economic attractiveness

<table>
<thead>
<tr>
<th>Tool</th>
<th>Cutting Die</th>
<th>Zapp PM steel</th>
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<tbody>
<tr>
<td>Machine</td>
<td>Stamping press</td>
<td></td>
</tr>
<tr>
<td>Production material</td>
<td>St 37 thickness 0.5 mm</td>
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<td>Value of production run</td>
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<td>Type of steel</td>
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<td>Z-Wear PM</td>
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<tr>
<td>Material costs</td>
<td>80 €</td>
<td>360 €</td>
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<td>Total tool costs</td>
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<td>Material cost proportion</td>
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<td>Quantities per regrind</td>
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<td>ca. 500,000</td>
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<tr>
<td>Number of regrinds</td>
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<td>15</td>
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<tr>
<td>Costs per regrind</td>
<td>150 €</td>
<td>150 €</td>
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<tr>
<td>Max. number of parts per tool</td>
<td>ca. 2,250,000</td>
<td>8,000,000</td>
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<tr>
<td>Two further tools required</td>
<td>8,000</td>
<td>0 €</td>
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<tr>
<td>Additional regrinding costs (30 x € 150)</td>
<td>4,500 €</td>
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<td>Costs of production run</td>
<td>18,750 €</td>
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# TOOL STEELS

## Cold working

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<th>Mn</th>
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## Hot working

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## Plastic moulding

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<td>-</td>
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## High speed steel

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»My experience leads to optimal results in production...«

»... to our customers. I now have 20 years of work experience in sawing and milling technology, which is advantageous. This is to the benefit of our customers in order to optimally organize the production process.«

Stefan Kirchner, Foreman
Service Center Tooling Alloys
Unna location, Germany
Our products get to you as quickly as possible thanks to...

1. a large, well stocked warehouse,
2. modern machinery for processing.

Zapp’s service center is fully stocked with the largest inventory of powder metallurgical CPM® high performance steels available from one location. We also stock specialty materials and approximately 1,000 tons of conventionally produced tool steels. Hardened EDM blocks are also part of our product range.

With our modern machinery, we can meet your processing requirements in a wide range of dimensions of round and flat dimensions. Zapp has a worldwide distribution network and our own Service Centers in Unna/Germany, Charleston/USA, Gurnee/USA, as well as in Taicang/China.

Processing options
By means of our own grinding and milling technology, it is possible to deliver milled and ground semi-finished products or to manufacture production parts based on drawings according to customer specifications.
»We are a really good team.«

»In the inside sales department of the Tooling Alloys division, I have been looking after the wishes and needs of our customers for many years.

In order to provide the best possible service here, a close and trusting cooperation with colleagues from other departments such as purchasing, technology, and the service center is necessary. I enjoy this teamwork a lot.«

Angela Schulze, Inside Sales
Tooling Alloys
Ratingen location, Germany
»Whether air/sea freight, truck or parcel service – we ship according to your needs.«

»In the shipping department of our service center we arrange fast and flexible processing of our customer orders and bring them safely to you by different shipping methods, individually adapted to the products and quantities ordered by you.

We prepare transports domestically and abroad, and thus ensure a smooth process from shipping to delivery.«

Sonja Landwehr, Logistics
Service Center Tooling alloys
Unna location, Germany
CONTACT

TOOLING ALLOYS
Zapp Materials Engineering GmbH
Zapp-Platz 1
40880 Ratingen
P.O. Box 101862
40838 Ratingen
Germany
Phone +49 2102 710-542
Fax +49 2102 710-596
toolingalloys@zapp.com

Zapp Tooling Alloys, Inc.
475 International Circle
Summerville, South Carolina 29483
U.S.A.
Phone +1 888 9289927
Fax +1 843 8736649
ztasales@zapp.com

SERVICE CENTER
Zapp Materials Engineering GmbH
Hochstrasse 32
59425 Unna
P.O. Box 2129
59411 Unna
Germany
Phone +49 2304 79-511
Fax +49 2304 79-7952
toolingalloys@zapp.com

Zapp Tooling Alloys, Inc.
1528 St. Paul Ave.
Gurnee, Illinois 60031
U.S.A.
Phone +1 888 9289927
Fax +1 843 8736649
ztasales@zapp.com

Zapp Precision Metals (Taicang) Co., Ltd.
Ningbo Road 34
Taicang Economic Development Area
Jiangsu 215400
P.R. China
Phone +86 512 5395-0517
Fax +86 512 5395-0520
china@zapp.com

Service Centers | Sales Offices
www.zapp.com