Columbia Steel Casting Co. Inc. today manufactures a wide variety of steel and iron parts for basic industry. These are replacement parts for high-wear applications, such as those that take abuse from abrasion, impact, or heat in rock crushers, grinding mills, mining shovels and draglines, electric power plants, cement plants and recycling shredders. We are a vertically integrated manufacturer with all the departments in-house to design, manufacture and assure quality. Our current facility was begun in 1962, and has grown to cover 86 acres in North Portland. Our manufacturing, office and pattern storage buildings now total over 450,000 sq. ft.

Manufacturing processes are described in detail on the following page.
Vertical integration in a single plant gives us complete control of design, manufacturing and quality assurance.

**Product Engineering.** Specialized product engineers handle application engineering, design and automated drafting. We design to our high standards, always looking for improvements.

**Foundry engineering and patternmaking.** We design patterns to ensure proper metal flow and cooling for best part integrity, and we make all patterns in our own experienced pattern operation.

**Molding and coremaking.** These departments work closely to make dimensionally accurate olivine sand molds of the most intricate hollow section and thick section iron and steel castings.

**Metallurgy and melting.** We have developed our own high specification proprietary alloys, and ensure their composition using computerized spectrometer sampling up to the moment of pouring.

**Foundry and pouring.** Our foundry has two 10-ton and one 4-ton electric arc furnaces, and six 1,000 to 2,200 lb. induction furnaces. We can pour parts weighing up to 40,000 lbs.

**Casting cleaning.** Cast parts are shaken out of the molding sand, which is recycled. They then have risers removed with a hydraulic grapple and hammer system, and are surface ground as needed.

**Heat treating.** Our fourteen heat treating ovens use computer controls for optimum temperature rise and holding time. A pump-driven recirculating water system assures proper quenching.

**Machining.** Our 70,000 sq. ft. facility, Columbia Engineering Works, is one of the largest specialized machine shops in the West. Specialized fixtures are used to apply Xtend® high carbide overlays.

**Quality assurance.** Every part must meet specification for dimensions, composition and hardness. Testing capabilities include x-ray, ultrasound, die penetrant, magnetic particle and retained austenite.

**Shipping.** We are close to major highways, rail lines and shipping terminals of the Port of Portland, Oregon, ensuring prompt delivery of the largest of castings and component assemblies.
Columbia Steel offers a broad array of proprietary iron and steel alloys designed to suit any wear- or heat-resistant application.

Based on more than a century of experience, Columbia Steel has developed our own proprietary series of alloys which exceed the classic ASTM minimum standards. We offer one of the largest selections of wear- and heat-resistant alloys available from any single supplier. That provides many advantages to the end user. For example, we can supply all the various parts needed for a cement plant maintenance shutdown, from quarry to grinding mills to kiln to cooler. By varying the composition and heat treatment of our alloys, we are able to fine tune them, balancing toughness, hardness and/or heat and corrosion resistance for the specific application.

A complete listing of Columbia alloys is shown on the following page.
Columbia Steel proprietary alloys and their properties.

**Austenitic manganese steels.** These work hardening alloys are still the best choice for many crusher applications. As a manganese steel specialist, we offer our tough standard alloy and our high carbon premium grade Xtraloy®, which is successful in delivering extra wear life to many cone and jaw crusher users.

**High strength martensitic steels.** Developed to provide a combination of high strength, toughness and abrasion resistance, our H series is well accepted in mining, recycling and hammermills.

**Chromium molybdenum steels.** Compared to our H series, these steels offer improved abrasion resistance within the medium hardness range, making them ideal for many moderate impact applications such as grinding mills.

**High chromium alloy irons.** New technology and metallurgical controls allow better resistance to impact in these high hardness alloys. Columbia offers several fully heat treated grades plus a heat- and corrosion-resistant grade.

**Heat resistant stainless steels.** We produce most standard grades of heat resistant stainless steels regularly, and also produce short runs of other grades on customer request.

**Carbon steel.** We can produce carbon steels for general purpose applications which are readily weldable in a range of heat treated tensile strength levels to 100 KSI.

**Xtend Process®.** Our proprietary method of producing high integrity bi-metallic parts results in a hard wear resistant overlay, metallurgically bonded to a high strength base metal. When Columbia’s H series alloys are used as the base, they may range from 286 to 512 Brinnell, with the overlay up to 700 Brinnell. The result is exceptional wear resistance and greatly increased life.

<table>
<thead>
<tr>
<th>ALLOY</th>
<th>PROPERTIES</th>
<th>TYPICAL APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L</strong></td>
<td>Austenitic Manganese Steels</td>
<td>Unequaled toughness and good resistance to abrasion when impacts are sufficient to work harden.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Liners for gyratory, cone, jaw crushers; roll shells, shredder liners, hammers and grates, the Drop Cross®.</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>High strength Martensitic Steels</td>
<td>High strength, toughness and abrasion resistance. May be through-hardened from 286 to 512 HB.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dragline chain and linkage, shovel pads, shredder and hammermill hammers, tooth points and adapters.</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>Chromium Molybdenum Steels</td>
<td>Outstanding abrasion resistance within the medium hardness range. Grades range from 286 to 600 HB.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rod, ball and semi-autogenous mill liners, cement plant diaphragms, gyratory crusher concaves.</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>High Chromium Alloy Irons</td>
<td>Excellent abrasion resistance with improved impact strength and high hardness beyond 650 HB.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rod, ball and semi-autogenous mill liners, coal pulverizers, cement roller mill and cooler parts, VSI parts.</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>Heat Resistant Stainless Steels</td>
<td>High temperature oxidation resistance with good strength to 2,100°F. All standard grades.</td>
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<tr>
<td></td>
<td></td>
<td>High temperature parts for cement and lime, ore refining, steel oil refining, chemical and furnace applications.</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Carbon Steels</td>
<td>Ductility, weldability and heat treated tensile strength levels up to 100 KSI. All common grades.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crusher accessory items such as torch rings, locking nuts and toggle plates, plus general industrial parts.</td>
</tr>
<tr>
<td><strong>Xtend Process® Overlays</strong></td>
<td>High carbide wear resistant overlays bonded to L and H series alloys, with hardness levels up to 700 HB.</td>
<td>Dragline chain and linkage, dragline and dipper teeth, gyratory crusher mantles, and log washer paddles.</td>
</tr>
</tbody>
</table>
Need wear parts solutions? We look forward to hearing from you. To call, email, fax or visit:

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