FURNACE TECHNOLOGIES
PRODUCT PORTFOLIO
MODERNIZE YOUR HEAT TREATMENT PROCESS
WITH ADVANCED EQUIPMENT FROM PRIMETALS TECHNOLOGIES

Primetals Technologies offers the answers you seek for your heat treatment processes and equipment. Based on the technologies of Drever Company and Flinn & Dreffein Engineering Company, combined with decades of expertise, innovation, and experience, our Furnace Technologies team offers solutions to keep you competitive throughout the life cycle of your equipment.

FURNACE TECHNOLOGIES FOR HEAT TREATMENT

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubular Quench and Temper Lines</td>
<td>Heat treatment equipment for the production of oil country tubular goods (OCTG), truck rail, and other long products</td>
</tr>
<tr>
<td>Car Bottom Furnaces</td>
<td>Furnaces for a broad range of metal products and processes</td>
</tr>
<tr>
<td>Lamination Lines</td>
<td>Roller hearth furnaces to anneal and surface treat materials for motors and transformers</td>
</tr>
<tr>
<td>Plate Heat Treating Equipment</td>
<td>Roller hearth furnaces and quenches for the heat treatment of carbon, alloy, and stainless steel plates, including normalizing, hardening, and tempering</td>
</tr>
</tbody>
</table>

FURNACE TECHNOLOGIES FOR FINAL PRODUCTS

<table>
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<tbody>
<tr>
<td>Vertical Continuous Annealing Line (VCAL)</td>
<td>Vertical furnaces for the heat treatment of sheet and tin plate products</td>
</tr>
<tr>
<td>Horizontal Continuous Galvanizing Line (HCGL)</td>
<td>Horizontal, hot-dip coating furnace, and after-pot equipment for producing coated sheet products</td>
</tr>
<tr>
<td>Vertical Continuous Galvanizing Line (VCGL)</td>
<td>Vertical furnaces and after-pot tower equipment for producing premium galvanized and galvanneal sheet products</td>
</tr>
<tr>
<td>Continuous Galvanizing Line High Hydrogen Cooling</td>
<td>Upgrade your existing CGL furnace to increase capacity and produce third-generation advanced high strength steel (3G AHSS)</td>
</tr>
<tr>
<td>Annealing and Pickling Lines</td>
<td>Continuous furnaces for annealing and pickling process lines for stainless steel, silicon steel, and other special metal strip</td>
</tr>
<tr>
<td>Bright Annealing Line (BAL)</td>
<td>Furnaces for continuous bright annealing of stainless, special alloys, and non-ferrous foil and strip products</td>
</tr>
</tbody>
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As the pioneers of key furnace technologies, Primetals Technologies has the knowledge and experience to provide the best solution for your mill.
A LONG-TIME FURNACE SUPPLIER

For more than 40 years, Primetals Technologies has supplied vertical and horizontal furnaces to the steel industry, responding to requests for production capacity, thermal treatment cycle, greater energy savings and extended equipment lifetime.

FURNACES FOR CAL AND CGL
NEW DESIGN - FOR THE LATEST ADVANCED HIGH-STRENGTH STEELS

MAIN BENEFITS
• Vertical, horizontal or L-shape furnace types
• Flexibility to produce the most advanced steel grades in the automotive industry
• Solutions for AHSS such as direct flame impingement burners, heating strip to 950°C, and water/hydrogen quenching
• Atmosphere controls for improved wettability of higher alloy substrates
• Flexible exit section for complex thermal cycles
• Fully automated operation to minimize number of operators
• Accurate temperature control with advanced thermal models

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Thickness</th>
<th>0.2 to 6.0 mm</th>
</tr>
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<tbody>
<tr>
<td>Typical max. width</td>
<td>1880 mm</td>
</tr>
<tr>
<td>Max. cooling, gas</td>
<td>120°C/s/mm</td>
</tr>
<tr>
<td>Max. cooling, water</td>
<td>&gt;1500°C/s/mm</td>
</tr>
</tbody>
</table>

LATEST REFERENCES
• AK Steel Dearborn CGL, USA
• JFE Steel CGL, Indonesia
• JFE Steel CGL, China
• Baosteel CAL/CGL, China

CGL HIGH HYDROGEN COOLING
UPGRADE EXISTING FURNACES FOR 3G AHSS STEELS

LATEST REFERENCES
• ArcelorMittal Cleveland CGL, USA
• CSN, Volta Redonda, Brazil
• AK Steel Dearborn CGL, USA

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<tr>
<td>Typical max width</td>
<td>1825 mm</td>
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<tr>
<td>Max. cooling, gas</td>
<td>150°C/sec/mm</td>
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MAIN BENEFITS
• Patented high hydrogen cooling system achieves 150°C/sec/mm cooling rates
• Exit temperatures down to 150°C
• Patent-pending Tnozzle plenum design is more uniform across the width
• Operating costs reduced by minimizing power requirements and recycling hydrogen

LATEST REFERENCES
• AK Steel Dearborn CGL, USA
• JFE Steel CGL, Indonesia
• JFE Steel CGL, China
• Baosteel CAL/CGL, China

FASTER COOLING RATES
With a new cooling section, you can upgrade your continuous galvanizing line to increase capacity and produce more advanced high strength steels. High hydrogen cooling technology enables faster cooling rates and extends your product range to include third-generation advanced high strength steel.

CGL HIGH HYDROGEN COOLING UPGRADE EXISTING FURNACES FOR 3G AHSS STEELS
CONSISTENT AND EFFICIENT
For the production of normalized as well as quenched and tempered plates, we combine the latest technologies with end-to-end automation to ensure consistent product quality, maximum production output, low operating costs and minimal maintenance expenditures.

PLATE HEAT TREATMENT LINES
COST EFFECTIVE - LOW OVERALL OWNERSHIP COSTS

PIECEWISE SOLUTION
Flinn & Dreffein technology, featuring the first and only proven OD/ID spray quench, combined with full automation, enables our quench and temper lines to provide industry-leading capabilities to meet the exact requirements demanded for offshore and horizontal drilling.

TECHNICAL DATA
- Diameter: 60 – 600 mm
- Wall: ≥ 30 mm
- Normalizing: ≥ 950°C
- Tempering: 500 – 750°C
- Max. martensite: > 95%

MAIN BENEFITS
- Produces straight pipes with more than 95% martensite
- Efficient, low-NOx combustion
- Uniform heating
- Able to meet the most challenging API and proprietary requirements
- Fully automatic end-to-end line operation requires fewer operators

LATEST REFERENCES
- Borusan Mannesman Pipe, USA
- Boomerang Tube, USA
- U. S. Steel (4 lines), USA
- TMK IPSCO (4 lines), USA

PIPE QUENCH AND TEMPER LINE
OCTG - FOR THE MOST DEMANDING OIL COUNTRY TUBULAR GOODS

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LATEST REFERENCES
- AHMSA Normalizing Line, Mexico
- GRP Normalizing Line, Indonesia
- Baosteel Heat Treatment Line, China
- Bunge Quench & Temper Line, Australia

CONSISTENT AND EFFICIENT
For the production of normalized as well as quenched and tempered plates, we combine the latest technologies with end-to-end automation to ensure consistent product quality, maximum production output, low operating costs and minimal maintenance expenditures.

TECHNICAL DATA
- Thickness: 4.5 – 200mm
- Width: ≤ 5000 mm
- Normalizing: ≤ 950°C
- Tempering: 250 – 750°C
- Max. martensite: > 95%

MAIN BENEFITS
- Atmosphere furnace minimizes roll pickup
- Long-life, low-maintenance silicon carbide radiant tube burners
- Roller pressure quench produces flat plate of > 95% martensite
- Fully automatic end-to-end line operation requires fewer operators

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