FLEXIBLE HIGH-PERFORMANCE PLANTS
References for hot strip mills since 2000
Hot strip rolling mills

SMS group
X-Roll® hot strip mills from the SMS group are all-round plants for the manufacture of hot strip. Their product range extends from thin strips with a minimum 1.2 millimeters final gauge to high-strength tube steels with a thickness of 25.4 millimeters, along with stainless steel grades. A large number of high-powered technological features ensure excellent hot strip quality and guarantee high cost efficiency and availability.

As a leading plant-maker for the steel and non-ferrous metals industry, SMS has executed 15 orders worldwide for hot strip mills, with a total capacity of over 60 million t per annum since the year 2000. The majority of the new plants have been built by the SMS group in China, but investments have been made in modern hot strip mills also in Turkey, India and North and South America.

Our X-Roll® hot strip mills are designed in accordance with our customers’ requirements with the aid of comprehensive process simulations. The design basis is the respective product range. Two fundamental variants have become standard here:

- High-performance hot strip mills are designed for an annual capacity of up to 5.5 million t. They are usually equipped with a slab sizing press, two reversing roughing stands, seven finishing stands and three coilers.
- Compact hot strip mills cater for capacities between 1.5 and 4 million t per annum. Their main features are the single-stand roughing mill and a mandrelless coilbox between the roughing and finishing stands.

SMS supplies the mills as integrated units with mutually coordinated systems comprising mechanical equipment, electrical & automation systems and process know-how.

The integrated solutions are based on the extensive knowledge of our engineers concerning the possibilities of plant engineering, detailed process engineering knowledge and our know-how in the fields of design and manufacture of core components in our own workshops in Germany.

Our customers obtain major benefits from our plants:

- Powerful plant engineering with a secure future for the manufacture of modern steel grades in top-class product quality and within closest geometrical and metallurgical tolerances, high yield and availability.
- High profitability thanks to Ecoplants components for reducing the energy consumption and for high process stability.
- Handling of the entire project with just one partner, who is responsible for supplying all of the plants and services relevant to the process. This means that there are no interfaces at all with other suppliers, such as for electrical and automation systems.
- A steep run-up curve thanks to our own manufacture of mechanical core components and to the preliminary optimization of the Electrical & Automation package by means of Plug & Work.

X-Roll® designates the family of brands from our Flat-Product Rolling Mills Division. It symbolizes plants and technical equipment for the economical and flexible production of flat-steel products.
POWERFUL COMPONENTS

Hot strip mills from the SMS group are universally equipped with equipment and technologies which guarantee high productivity, a wide range of products and top product quality, all of which of course signify high profitability. Furthermore, Ecoplants components installed in the entire process chain contribute to environment-friendly production thanks to their ability to reduce energy consumption and enhance the process stability.
A SELECTION OF THE TECHNICAL HIGHLIGHTS:

- Descaler for excellent surface quality
- Slab sizing press for flexible adaptation of the slab width*
- Camber-free rolling for eliminating strip cambers and high rolling stability*
- Mandrelless coilbox for compact layout of the hot strip mill, storage of process heat and uniform strip temperature
- Crop shear with cut optimization for low cropping losses*
- Finishing stands in compact and maintenance-friendly construction
- Work roll quick-change system
- CVC® plus, the actuator for strip profile, contour and flatness*
- X-Roll® oil bearings for mounting the backup rolls
- Gear unit with case-hardened bullgears and pinions
- Sieflex® HT spindles for safe transmission of extremely high torques*
- Roll gap lubrication for reduction of the roll force*
- Looper technology for safe strip running
- Strip cooling with cooling concepts structured one above the other to achieve economic production of all steel grades
- Universal coiler for straight-sided, closely wound coils
- UNI plus Coiler for the winding of high-strength heavy-gauge strip
- Pallet conveyor system for flexible, gentle and safe coil transport
- X-Pact® electrical and automation package for controlling the entire production process
- Plug & Work for shortening the commissioning

*Ecoplants-Komponente
SMS GROUP AS A SYSTEM SUPPLIER

The SMS group supplies its plants as integrated solutions with mutually coordinated systems comprising mechanical equipment, electrical and automation packages and the pertaining process know-how. The supply scope of our X-Pact® electrical and automation systems embraces all levels - from energy supply and distribution, drive engineering and instrumentation, to measuring systems and sensors, Level 1 and Level 2 systems with the process models, the visual display interface (HMI) and finally the production planning system.

The process models make a decisive contribution to the product quality, productivity and flexibility of the plant. The pass schedule calculation (PSC), the profile, contour and flatness control (PCFC®) and the cooling section control (CSC) model are based on mathematical and physical models and are used for setting the various equipment items of the rolling mill under consideration of the material properties.

Before delivery, we test the complete X-Pact® automation system with the unique "Plug & Work" procedure. During this, the new automation system is installed in our test facilities beforehand and then tested and pre-optimized. This is possible thanks to a close-to-reality real-time plant simulation in which the customer-specific plant, including all its dynamic plant behavior parameters, is reproduced. It is proven that the Plug & Work concept speeds up the plant run-up and shortens the commissioning times. At the same time, during the integration test, the plant operators are prepared comprehensively for their coming tasks.

The personnel learn the plant functions and the handling of these under realistic operating situations in virtual productive operation. In addition to the metallurgical plant and equipment with the electrical and automation systems, the SMS group portfolio also includes the foundation layouts, the utilities systems and ancillary plants such as the water supply and treatment system and the roll shop. Here, thanks to our many years of experience, we offer solutions that are efficient and suitable for the requirements of rolling mills.

With its X-Cellize® service, the SMS group is also the competent partner for dealing with all challenges relating to plant operation. SMS offers a wide range of maintenance and inspection services, spare parts supply and training and also contributes comprehensive process know-how. Thanks to the worldwide service network, SMS experts are always close to the customer.

Perfectly harmonized systems are a precondition for excellent manufacturing results.
The competence of the SMS group also extends to ancillary plants such as the water supply and treatment system.

Closeness to the customer is a hallmark of the SMS Service.
PLANT LAYOUT, DESIGN AND MANUFACTURE GO HAND-IN-HAND

One of our success factors is the close intermeshing of development, design and manufacture. All departments are under a single roof at the Hilchenbach location, which means that continuous exchange is a matter of course. This kind of cooperation using the shortest possible routes guarantees the continuous fully-integrated optimization of our products. Of equal importance is the close customer contact throughout the entire life-cycle of the plant.

All plants and components are designed and laid out individually by SMS according to the concrete operational requirements. To determine the process requirements, we make use of methods such as FEM analyses (Finite Element Method) or dynamic simulations such as those of deformation behavior. For design work we use state-of-the-art 3D CAD systems to arrive at efficient and reliable results.

The core components of our hot strip mills, such as CVC® shifting systems, hydraulic roll-gap adjustment systems or drive engineering are manufactured by us in our workshop of 40,000 m², equipped with the most up-to-date machines, in Hilchenbach.

The range of manufacturing in our workshop extends from the production of high-quality welded structures, machining operations with a powerful pool of machine tools for innovative production processes, and onwards to the assembly and installation of heavy machinery. We install all millstands, coilers and pipework and carry out function tests and trial runs on special test facilities. We thus achieve a high degree of efficiency and a long service life of these components, which are decisive for the product quality and the profitability of the plants.
Pre-assembly ensures trouble-free commissioning of the plants at the works.

Gear unit manufacture is a core competence of the Hilchenbach workshop.
BAOSTEEL ZHANJJIANG IRON & STEEL
Zhanjiang, China

HOT STRIP MILL WITH “ECO” COMPONENTS

In June 2013 Baosteel Zhanjiang Iron & Steel awarded us an order for the supply of a 2,250 mm hot strip mill. The rolling mill is being built at the new steel location in Zhanjiang in the south of China and will go into operation at the end of 2015.

The new hot strip mill for Baosteel Zhanjiang Iron & Steel will set a new standard for the efficient and environment-friendly production of hot strip, since it is equipped with a large number of technology packages and Ecoplants components. Such components include thermal insulation elements between the roughing and finishing mills, the CVC® plus system and hydraulic differential tension loopers in the finishing mill.

As the first new plant worldwide, all finishing stands are being equipped with Sieflex®-HT toothed universal joint shafts (HT = High Torque). These shafts have the same diameter as before but can reliably transmit considerably higher drive torques. Above all in the front stands of the finishing mill, the high-performance joint shafts allow the high rolling torques that are necessary for the production of high-strength hot strip. The use of the Sieflex®-HT toothed universal joint shafts also makes higher degrees of freedom possible when selecting the work roll diameters.

MAIN COMPONENTS and FUNCTIONS

- Slab sizing press
- Two-high reversing rougher with edging stand
- Four-high reversing rougher with edging stand
- Thermal insulation elements - Crank crop shear
- Seven four-high finishing stands with Fully hydraulic roll gap adjustment (HGC)
- CVC® plus with work roll shifting and integrated work roll bending
- Interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
- Roll-gap lubrication system
- Hydraulic loopers (F1 to F3)
- Differential-tension loopers (F4 to F6)
- Roll quick-change equipment
- Laminar strip cooling
- Two hydraulic coilers with Automatic Step Control

With the new Sieflex®-HT toothed universal joint shaft, higher drive torques than before can be reliably transmitted in finishing stands.
“Eco” components in the hot strip mill at Baosteel Zhanjiang.

Technical Data

Year of commissioning 2015

Annual production
5,500,000 t

Steel grades
Carbon steels, tube grades, shipbuilding steels, IF steel grades

Slab
Thickness 210, 230, 250 mm
Width 900 to 2,150 mm
Length 4,500 to 11,000 mm
Weight 38.0 t

Finished strip
Thickness 1.2 to 25.4 mm
Width 800 to 2,100 mm

Coil
Outside diameter max. 2,150 mm
Spec. coil weight max. 24.0 kg/mm
Total weight max. 38.0 t
**HABAŞ**

**Aliağa, Turkey**

The Turkish steelmaker Habaş entered the flat-steel market in 2014 with a compact hot strip mill from SMS. The mill is initially designed for an annual capacity of 2.5 million tons, and can later be extended to 4.5 million tons.

The product range of the hot strip mill includes not only carbon steels and multi-phase steels but also high-strength tube grades. The two downcoilers are designed as UNI plus coilers for the coiling of tube steels in strength class X80 up to a thickness of 25.4 millimeters. They are characterized by reinforced mechanical components and an optimized coiling strategy for these materials.

For the mill, SMS also supplied the entire electrical and automation package with the Level 1 and Level 2 systems, the technological measuring systems, instrumentation, sensors, the HMI (Human Machine Interface) and the drive engineering. The mill automation was tested beforehand and pre-optimized in an integration test. At the same time, during the Plug & Work tests, the Habaş operating personnel were trained on the virtual mill in preparation for their future work.

**MAIN COMPONENTS and FUNCTIONS**

- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Drum-type crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
- Interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
- Roll-gap lubrication system
- Hydraulic loopers (F1 to F4)
- Differential-tension loopers (F5 and F6)
- Roll quick-change equipment
- Laminar strip cooling system
- Two UNI plus coilers with Automatic Step Control
- Pallet conveyor system
- Complete X-Pact® electrical and automation package for the entire hot strip mill

*The mandrelless coilbox improves the conditions for finish-rolling.*
TECHNICAL DATA

Commissioning July 2014

Annual production
Initial stage 2,500,000 t
Expansion stage 4,500,000 t

Steel grades
Carbon steels, HSLA steels, tube grades, DP steels, stainless grades

Slab
Thickness 200 to 225 mm
Width 1,000 to 2,100 mm
Length 12,000 mm
Weight max. 40.0 t

Finished strip
Thickness 1.2 to 25.4 mm
Width 700 to 2,100 mm

Coil
Outside diameter max. 2,100 mm
Spec. coil weight max. 22.0 kg/mm
Total weight max. 40.0 t
PANZHIHUA IRON & STEEL
Xichang, China

The hot strip mill at Panzhihua Iron & Steel went into operation in December 2011. The SMS group supplied the seven-stand finishing train for the mill, with the decisive components for strip quality.

The finishing stands have a roll force of 50 (F1-F4) and 40 (F5-F7) MN respectively. For gauge control, all stands are equipped with hydraulic roll-gap adjustment systems. The setting of strip profile, contour and flatness is performed by using the CVC® plus system with integrated work roll bending. On the basis of the process parameters for each strip, the PCFC® profile, contour and flatness control system calculates the correct shifting position for the work rolls, which have a special barrel finish, as well as the setting values for the work roll bending. The roll gap is thus able to be ideally adapted to the changing conditions for each strip, allowing strips with close geometrical tolerances to be produced.

The finishing stands are characterized by their compact and low-maintenance design. Each hydraulic actuator, for example, is controlled by its own module. The individual modules are grouped in compact columns on the millstand service platform, where they are well protected and, at the same time, easily accessible.

In 2015 SMS is extending the roughing train by a slab sizing press, so that Panzhihua Iron & Steel can flexibly adjust the finished strip widths.

MAIN COMPONENTS and FUNCTIONS

- Slab sizing press
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - PCFC® (Profile, contour and flatness control)
  - Interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
  - Roll-gap lubrication system
  - Hydraulic loopers (F1 to F4)
  - Differential-tension loopers (F5 and F6)

Loopers ensure stable strip running.
**TECHNICAL DATA**

Commissioning December 2011

**Annual production**  
3.7 million t

**Steel grades**  
Carbon steels, tube grades

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<td>Spec. coil weight</td>
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Finishing stand with CVC® plus, work roll bending and hydraulic roll-gap adjustment systems.
AM/NS CALVERT
(formerly ThyssenKrupp Steel USA)
Calvert, Alabama, USA

WORKS COMPLEX WITH SMS GROUP TECHNOLOGY

In July 2010 the new high-performance hot strip mill, supplied by the SMS group, went into operation at ThyssenKrupp Steel USA. Since 2014 it belongs to ArcelorMittal/Nippon Steel & Sumitomo (AM/NS) and is the core element of the new works complex in Calvert (Alabama), for which SMS also supplied a combined pickling line/tandem cold mill, a continuous pickling line, three continuous galvanizing lines and an annealing line.

The high-performance hot strip mill has an annual capacity of 5.3 million tons, of which one million ton are represented by stainless grades. This makes it one of the world’s most powerful mills. Besides the mechanical equipment, we also supplied the complete electrical and automation package and the drives, thus enabling all systems to be harmonized precisely with each other. Moreover, the reheating furnaces, the coil conveyor system and the roll dressing shop are under our responsibility.

The main components of the X-Roll® hot strip mill are a slab sizing press, one two-high and one four-high roughing stand, each with an edging stand at the entry side, seven finishing stands, the laminar strip-cooling section and three down-coilers.

MAIN COMPONENTS and FUNCTIONS

- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - Interstand cooling system, anti-peeling device, fume suppression and exhausting system, roll cooling systems
  - Roll gap lubrication
  - Hydraulic loopers
  - Differential-tension loopers
  - Roll quick-change equipment
- Laminar strip-cooling section
- Three hydraulic coilers with Automatic Step Control
- Pallet conveyor system
- X-Pact® electrical and automation package for the entire hot strip mill
**TECHNICAL DATA**

**Commissioning** July 2010

**Annual production**
5.3 million t, of which 1 million t stainless steel grades

**Steel grades**
carbon steels, thin sheet, IF steel, tube steels, austenitic and ferritic stainless grades

### Slab

*Carbon steels*
- Thickness: 180 to 255 mm
- Width: 800 to 2,000 mm
- Length: 4,200 to 11,500 mm

*Stainless steels*
- Thickness: 180 to 240 mm
- Width: 800 to 1,870 mm
- Length: 4,200 to 11,500 mm
- Weight: max. 36.0 t

### Finished strip

*Carbon steels*
- Thickness: 1.5 to 25.4 mm
- Width: 800 to 1,870 mm

*Stainless steels*
- Thickness: 2.0 to 10.0 mm
- Width: 800 to 1,860 mm

### Coil
- Outside diameter: max. 2,150 mm
- Spec. coil weight: max. 23.0 kg/mm
- Total weight: 36.0 t

Two-high roughing stand with edger.
ÇOLAKOĞLU METALURJİ
Gebze, Turkey

ENTRY onto the market for FLAT-STEEL PRODUCTS

The plant at Çolakoğlu Metalurji A.S. in Turkey was the first conventional X-Roll® hot strip mill for which we supplied the mechanical equipment and the complete electrical and automation package. The new works was built in Gebze, a port on the Sea of Marmara about 30 kilometers away from Istanbul. There, Çolakoğlu Metalurji also operates an electric steel-making plant with rolling facilities for long products.

Thanks to the supply of the complete plant engineering from a single source, all systems were optimally coordinated with one another. We tested the complete automation system prior to commissioning by using the Plug & Work method.

By means of pre-optimization and pre-commissioning, the hot strip mill attained stable production within a very short time. Also with regard to the strip quality, the benefits of a full-line supply by the SMS group became evident right from the start. Already after three weeks, 99% of all strips produced were within the agreed tolerances for strip gauge and width, as well as strip profile and flatness.

MAIN COMPONENTS and FUNCTIONS

- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Drum-type crop shear
- Seven four-high finishing stands with
  - Seven four-high finishing stands with
  - Fully hydraulic roll-gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - Interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
  - Roll-gap lubrication system
  - Hydraulic loopers
  - Roll quick-change equipment
- Laminar strip cooling system
- Two hydraulic coilers with Automatic Step Control
- Pallet conveyor system
- X-Pact® electrical and automation package for the entire hot strip mill
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BHUSHAN STEEL
Meramandali, India

INDIA - A GROWTH MARKET

Bhushan Steel Ltd. erected an integrated iron and steel plant in the Indian federal state of Orissa. For the new works complex, we supplied the CONARC®-based steelworks, two continuous slab casters and an X-Roll® hot strip mill.

In the first construction stage, the compact hot strip mill includes a four-high reversing roughing stand, a mandrelless coilbox, a six-stand finishing mill and two coilers. It is thus designed for an annual production of 3.0 million tons. Bhushan Steel also entrusted SMS with the mill expansion, i.e. the increasing of capacity to 4.5 million tons per annum. It comprises an additional two-high roughing stand, a seventh finishing stand, the extension of the laminar cooling by two cooling groups and a third coiler.

The production range of the hot strip mill not only includes input stock for the group’s own cold rolling mills but also a range of high-quality products, with HSLA steels, tube steels and stainless steel grades.

MAIN COMPONENTS and FUNCTIONS

- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Drum-type crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - PCFC® (Profile, contour and flatness control)
  - Automatic pass-line adjustment (F5 and F6)
  - Interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
  - Roll-gap lubrication system
  - Hydraulic loopers
  - Roll quick-change equipment
- Laminar strip cooling system
- Three coilers with Automatic Step Control
- Pallet conveyor system
### TECHNICAL DATA

**Commissioning** March 2010

**Annual production**
- 1st construction stage: 3,000,000 t
- 2nd construction stage: approx. 4,500,000 t

**Steel grades**
Carbon steels (low, medium and high carbon), tube steels, stainless steels

**Slab**
- Thickness: 200 to 250 mm
- Width: 800 to 1,680 mm
- Length: 6,000 to 12,000 mm
- Weight: 37.0 t

**Finished strip**
- Thickness: 1.4 to 25.4 mm
- Width: 800 to 1,680 mm

**Coil**
- Outside diameter: max. 2,100 mm
- Spec. coil weight: max. 22.0 kg/mm
- Total weight: 37.0 t

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Pre-assembly of the coiler in the SMS workshop.
SHOUGANG JINGTANG UNITED IRON & STEEL, Caofeidian, China

HOT STRIP MILL in a new industrial complex

The high-capacity hot strip mill at Shougang Jingtang United Iron & Steel produced its first strip in December 2008. The mill is located on the island of Caofeidian on the coast of Hebei province, where the Chinese steelmaker Shougang Iron & Steel has erected a complete iron and steel plant. For the plant complex we are also supplying a combined picking line / tandem cold mill and several strip processing lines.

The X-Roll® hot strip mill is designed for an annual capacity of 5.5 million tons. The roughing mill consists of a slab sizing press, a two-high and a four-high reversing stand. Hydraulic roll gap adjustment systems, CVC® plus and work roll bending in all finishing stands as well as hydraulic loopers (F1 to F3) and differential-tension loopers (F4 to F6) guarantee close geometrical tolerances and stable production.

It was decided that we should receive the order not only because of our highly developed, tried-and-tested components but also because of the positive experience that Shougang Iron & Steel had made when working with us. Besides the X-Roll® hot strip mill at the Qian’an location, we had supplied the company with a heavy plate mill, a combined pickling line / tandem cold mill and several facilities for strip processing.

MAIN COMPONENTS and FUNCTIONS of the rolling mill

- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - PCFC® (Profile, contour and flatness control)
  - Automatic pass-line adjustment, interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
  - Roll-gap lubrication system
  - Hydraulic loopers (F1 to F3)
  - Differential-tension loopers (F4 to F6)
  - Roll quick-change equipment
- Laminar strip cooling
- Three hydraulic coilers with Automatic Step Control
- Pallet conveyor system
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<td>Spec. coil weight</td>
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<td>Total weight</td>
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Drive engineering from the SMS group.
BENXI IRON & STEEL
Benxi, China

MODERN COOLING TECHNOLOGIES

The high-capacity hot strip mill at Benxi Iron & Steel went into operation in November 2008. The new mill has enabled the company to increase its hot strip capacity by 5.15 million tons, and it is now able to open up new markets through its wide range of products, including strips made of carbon and stainless steels.

The main components of the X-Roll® hot strip mill are a slab sizing press, one two-high and one four-high reversing roughing stand, a crop shear, the seven-stand finishing train, the cooling section with laminar and compact cooling, and three fully hydraulic downcoilers.

The combination of laminar and compact cooling provides Benxi Iron & Steel with a wide range of cooling strategies for modern steel grades. The compact cooling system at the end of the cooling process allows the application of very high water flow rates and therefore very high cooling rates. For additional flexibility, in the laminar cooling system, SMS replaced the first five of the total of 20 cooling groups with double-reinforced units.

MAIN COMPONENTS and FUNCTIONS of the rolling mill

- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - Automatic pass-line adjustment
  - Interstand cooling system, anti-peeling device, fume suppression system and roll cooling systems
  - Roll gap lubrication
  - Hydraulic loopers (F1 to F3)
  - Differential-tension loopers (F4 to F6)
  - Roll quick-change equipment
- Laminar strip cooling with double-reinforced cooling groups
- Compact cooling
- Three hydraulic coilers with Automatic Step Control
- Pallet conveyor system
### TECHNICAL DATA

**Commissioning November 2008**

**Annual production**

5,150,000 t

**Steel grades**

Stainless steel grades, carbon steels, high-strength low-alloy steels, shipbuilding steels, tube steels, DP, MP and TRIP steel grades

**Slab (carbon steels)**

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<td>230 and 250 mm</td>
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<td>4,500 to 11,000 mm</td>
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**Slab (stainless steels)**

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<tbody>
<tr>
<td>180 and 200 mm</td>
<td>1,000 to 2,150 mm</td>
<td>4,500 to 11,000 mm</td>
</tr>
</tbody>
</table>

**Finished strip (carbon steels)**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2 to 25.4 mm</td>
<td>1,000 to 2,150 mm</td>
</tr>
</tbody>
</table>

**Finished strip (stainless steels)**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 to 20.0 mm</td>
<td>1,000 to 2,150 mm</td>
</tr>
</tbody>
</table>

**Coil**

<table>
<thead>
<tr>
<th>Outside diameter</th>
<th>Spec. coil weight</th>
<th>Total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. 2,150 mm</td>
<td>max. 24.0 kg/mm</td>
<td>40.0 t</td>
</tr>
</tbody>
</table>
HANDAN IRON & STEEL
Handan, China

HOT STRIP MILL
for 4.5 million t

The X-Roll® hot strip mill from Handan Iron & Steel went into operation in August 2008. Besides the mechanical equipment, we supplied the profile and flatness model for this mill and, as the consortium leader, coordinated the companies participating in the project.

The mill is designed as a high-capacity hot strip mill and possesses a slab sizing press, two four-high reversing roughing stands, a seven-stand finishing train and three fully hydraulic coilers. The two reversing roughing stands in four-high construction provide the mill with a particularly high degree of flexibility in the drafting pattern for the roughing mill.

Automatic Step Control in the coiler unit makes possible the gentle winding of the strips. Special polishing devices regularly clean the pinch rolls and thereby prevent pick-ups which may cause damage to the strip surface.

In establishing its flat-steel production, Handan Iron & Steel has placed its trust in plants from the SMS group. The firm’s successful entry into this market was accomplished in 1999 with a CSP® facility. For the further processing of the products we supplied two combined pickling lines / tandem cold mills in 2005 and 2010.

MAIN COMPONENTS and FUNCTIONS of the rolling mill

- Slab sizing press
- Two four-high reversing roughing stands with edger
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - PCFC® (Profile, contour and flatness control)
  - Automatic pass-line adjustment
  - Interstand cooling system, anti-peeling device, fume suppression and exhausting system and roll cooling systems
  - Roll-gap lubrication system
  - Hydraulic loopers (F1 to F3)
  - Differential-tension loopers (F4 to F6)
  - Roll quick-change equipment
- Laminar strip cooling system
- Three hydraulic coilers with
- Automatic Step Control
- Pinch roll polishing devices
- Pallet conveyor system
TECHNICAL DATA

Commissioning August 2008

Annual production
Initial stage 4,500,000 t

Steel grades
HSLA steel, carbon steel grades (low, medium and high carbon), steels for automotive structural components, tube steels, IF, DP, MP, TRIP steel grades

Slab
Thickness 230 to 250 mm
Width 900 to 2,150 mm
Length 4,800 to 11,000 mm
Weight 40.0 t

Finished strip
Thickness 1.2 to 25.4 mm
Width 800 to 2,130 mm

Coil
Outside diameter max. 2,150 mm
Spec. coil weight max. 24.0 kg/mm
Total weight 40.0 t

The hydraulic control systems are accommodated in protective housings in the utility platforms on the millstands.

Laminar cooling system with edge masking.

Layout of the hot strip mill.
MAANSHAN IRON & STEEL
Maanshan, China

The first line with a PALLET CONVEYOR SYSTEM

Within a few years, Maanshan Iron & Steel (Masteel) has become one of China’s most important hot strip producers, thanks to plants from the SMS group. First of all, in 2004, the CSP® plant went into operation, followed three years later by the new X-Roll® hot strip mill.

The high-capacity hot strip mill is part of a new works complex, for which we have also supplied two continuous casters. These are arranged in such a way that a large proportion of the slabs can be fed into the rolling mill by hot charging. The slab sizing press is the ideal link between the continuous caster and the hot strip mill, since it allows width reductions of up to 350 millimeters and thus a high degree of flexibility as regards casting and strip widths. The roughing train has two powerful four-high reversing stands. These give Masteel a large amount of flexibility in the drafting pattern.

At Masteel, an innovatory pallet conveyor system has been installed for the first time in a hot strip mill. In this system, the hot coils are deposited on transport pallets and conveyed safely into the coil storage yard. The simple and modular structure of the system enables investment, maintenance and operating costs to be kept lower than for conventional systems and, at the same time, the layout can be organized in a flexible manner.

MAIN COMPONENTS and FUNCTIONS of the rolling mill

- Slab sizing press
- Two four-high reversing roughing stands with edger
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - PCFC® (Profile, contour and flatness control)
  - Automatic pass-line adjustment
  - Interstand cooling system, anti-peeling device, fume suppression and exhausting system and roll cooling systems
  - Roll-gap lubrication system
  - Hydraulic loopers (F1 to F3)
  - Differential-tension loopers (F4 to F6)
  - Roll quick-change equipment
- Laminar strip cooling system
- Three hydraulic coilers with
  - Automatic Step Control
  - Pinch roll polishing devices
- Pallet conveyor system
### TECHNICAL DATA

**Commissioning February 2007**

**Annual production**
- Initial stage: 5,500,000 t

**Steel grades**
- HSLA steel, carbon steel grades (low, medium and high carbon), steels for automotive structural components, tube steels, steel for pressure purposes

<table>
<thead>
<tr>
<th>Slab</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>230 and 250 mm</td>
</tr>
<tr>
<td>Width</td>
<td>800 to 2,130 mm</td>
</tr>
<tr>
<td>Length</td>
<td>4,800 to 12,000 mm</td>
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<tr>
<td>Weight</td>
<td>max. 45.0 t</td>
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</table>

<table>
<thead>
<tr>
<th>Finished strip</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>1.2 to 25.4 mm</td>
</tr>
<tr>
<td>Width</td>
<td>800 to 2,130 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coil</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Outside diameter</td>
<td>max. 2,150 mm</td>
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<tr>
<td>Spec. coil weight</td>
<td>max. 24.0 kg/mm</td>
</tr>
<tr>
<td>Total weight</td>
<td>45.0 t</td>
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</table>

- Cold charging
- Hot charging
SHOUgang Iron & Steel
Qian’an, China

COMPACT LINE thanks to COILBOX

The X-Roll® hot strip mill from Shougang Iron & Steel went into operation in December 2006. A mere twelve months later, the line reached its nominal capacity of 330,000 tons/month.

The powerful roughing train at Shougang Iron & Steel consists of a slab sizing press, a two-high and a four-high reversing roughing stand. The line thus has the potential for a future production increase.

The mandrelless coilbox enabled the distance between the roughing and finishing trains to be shortened and a compact plant layout was thus achieved. Furthermore, the homogeneous transfer bar temperature and the smaller thickness of the transfer bar make it possible to reduce the required forming capacity, which means that only six stands are necessary in the finishing train.

On the line, Shougang produces not only strips for processing in the cold rolling mill supplied by the SMS group but also multiphase steel grades and high-strength tube steels. Already during the hot commissioning, Shougang Iron & Steel received the commercial certification for a tube steel in strength class X80. To enable strips in these grades to be coiled more reliably and in high quality, the SMS group supplied Shougang Iron & Steel with a new coiler intended specially for high-strength, thick-gauge strips.

MAIN COMPONENTS and FUNCTIONS of the hot strip mill

- Slab sizing press
- Two-high reversing roughing stand
- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Crank crop shear
- Six four-high finishing stands with
  - fully hydraulic roll-gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - interstand cooling, anti-peeling device, fume suppression system and roll cooling systems
  - roll gap lubrication
  - hydraulic loopers
  - quick roll-change equipment
- Laminar strip cooling system
- Three hydraulic coilers with Automatic Step Control

INTENDED EXTENSIONS

- One walking-beam furnace
- One vertical edger on the two-high roughing stand
- One finishing stand
## TECHNICAL DATA

**Commissioning December 2006**

### Annual production

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<tr>
<th>Stage</th>
<th>Production (t)</th>
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<tbody>
<tr>
<td>Initial</td>
<td>4,000,000</td>
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### Steel grades

Carbon steels (low, medium and high carbon), high-strength low-alloy steels, steels for pressure and high-pressure purposes, tube steels, multiphase steels

### Slab

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Thickness</td>
<td>230 (250) mm</td>
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<tr>
<td>Width</td>
<td>900 to 2,150 mm</td>
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<tr>
<td>Length</td>
<td>4,000 to 10,500 mm</td>
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<tr>
<td>Weight</td>
<td>Max. 38.5 t</td>
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### Finished strip

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>1.5 to 19.0 mm</td>
</tr>
<tr>
<td>Width</td>
<td>750 to 2,130 mm</td>
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</table>

### Coil

<table>
<thead>
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<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter</td>
<td>Max. 2,220 mm</td>
</tr>
<tr>
<td>Spec. coil weight</td>
<td>Max. 24.0 kg/mm</td>
</tr>
<tr>
<td>Total weight</td>
<td>38.0 t</td>
</tr>
</tbody>
</table>

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**Layout of the hot strip mill.**
TAIYUAN IRON & STEEL
Taiyuan, China

China’s largest STAINLESS STEEL PRODUCER

With the commissioning of the X-Roll® compact hot strip mill in the summer of 2006, Taiyuan Iron & Steel assumed its place as one of the world’s largest stainless steel producers. The total production of the mill is around four million tons/year, comprising stainless steel strips and carbon steel strips in equal proportions.

A mandrelless coilbox is installed between the roughing and finishing trains at Taiyuan Iron & Steel. The intermediate storage of the rolling stock in the coilbox results in a homogeneous temperature over the entire transfer bar length and thus assures constant conditions during finish rolling. This enables Taiyuan Iron & Steel to produce stainless steel strip with a minimum gauge of 2.0 millimeters.

In order to extend the product range for high-strength steels, SMS modernized the laminar cooling and supplied a UNI plus coiler in 2012. In the strip cooling system, the entire laminar cooling system was dismantled and replaced by reinforced cooling groups with a view to increasing the water volumes and thus the cooling rates. Each row of cooling tubes can be switched separately, thus allowing great flexibility in implementing a very wide variety of cooling strategies.

The UNI plus coiler is one of the world’s most powerful coilers and is designed for the cooling of tube grades in strength classes X100 and X120 and for high-strength dual-phase steels. To ensure reliable discharge and safe processing of the coils, the coiler includes a coil transfer car of advanced design, a patented coil hold-down device and an optimized coil banding machine.

MAIN COMPONENTS and FUNCTIONS of the hot strip mill

- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - Interstand cooling system, anti-peeling device, fume suppression and exhausting system and roll cooling systems
  - Roll-gap lubrication
  - Hydraulic loopers (F1 to F3)
  - Differential-tension loopers (F4 to F6)
  - Roll quick-change equipment
- Laminar strip cooling system with reinforced cooling groups
- Two hydraulic coilers with
  - Automatic Step Control
  - Pinch roll polishing devices
- UNI plus coiler

Finishing stands with newly developed fume exhaust system.
## TECHNICAL DATA

**Commissioning June 2006**

**Annual production**
- 4,000,000 t
- of which stainless steels 2,000,000 t

**Steel grades**
Austenitic and ferritic stainless steel grades (AISI 200, 300, 400 series), carbon steel grades (low and medium carbon), tube steels up to X120

### Slab
- **Carbon steels**
  - Thickness: 230 to 250 mm
  - Width: 1,000 to 2,130 mm
  - Length: 4,800 to 12,000 mm
- **Stainless steels**
  - Thickness: 180 to 200 mm
  - Width: 1,000 to 2,100 mm
  - Length: 4,800 to 12,000 mm
  - Weight: max. 40.0 t

### Finished strip
- **Carbon steels**
  - Thickness: 1.2 to 25.4 mm
  - Width: 1,000 to 2,130 mm
- **Stainless steels**
  - Thickness: 2.0 to 20.0 mm
  - Width: 1,000 to 2,100 mm

### Coil
- Outside diameter: max. 2,150 mm
- Spec. coil weight: max. 23.0 kg/mm
- Total weight: 40.0 t

---

Layout of the hot strip mill.
**WUHAN IRON & STEEL**

Wuhan, China

**CHINA’S FIRST HOT STRIP MILL** with a strip width of over 2,000 mm

Wuhan Iron & Steel (Wisco) has been producing high-grade hot strip since 2003 with the X-Roll® hot strip mill supplied by us and an X-Pro® dividing shear. The mill was initially designed for an annual production of 3.5 million tons. Already in the year of commissioning, Wisco decided to implement the second stage of construction, representing a capacity increase to 4.5 million tons. Actually, Wisco today attains an annual production of more than 5 million tons.

Wisco’s hot strip mill was the first facility in China for strips with widths greater than 2,000 millimeters. One of the customer markets for strips in this width is among others the automotive industry.

The Wisco facility was the first hot strip mill in China to be equipped with a slab sizing press and thus to have the possibility of flexible coordination of the casting widths and strip widths. The four-high reversing roughing stand and the finishing stands are fitted with hydraulic roll-gap adjustment systems for controlling the strip gauge. The strip profile and flatness are set in the finishing train using CVC® plus to close tolerances.

At the beginning of 2009 the CSP® facility built by us commenced operations at Wuhan Iron & Steel. This line is used above all to produce high-quality grades such as multiphase steels and magnetic steel strip. The transfer of these products to the CSP® line allows the conventional hot strip mill to utilize its strengths to the full as regards productivity.

**MAIN COMPONENTS and FUNCTIONS of the hot strip mill in the first stage of construction**

- Slab sizing press
- Four-high reversing roughing stand with edger
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - PCFC® (Profile, contour and flatness control)
  - Automatic pass-line adjustment
  - Interstand cooling systems, anti-peeling devices, fume suppression system and roll cooling systems
  - Hydraulic loopers
  - Roll quick-change equipment
- Laminar strip cooling system
- Two hydraulic coilers with
- Automatic Step Control

**MAIN COMPONENTS in the second stage of construction**

- One two-high roughing stand
- One hydraulic coiler with Automatic Step Control
### TECHNICAL DATA

**Commissioning March 2003**

**Annual production**
- First stage of construction: 3,500,000 t
- Second stage of construction (2004): 4,500,000 t

**Steel grades**
Carbon steels (low, medium and high carbon), IF steels, multiphase steels, tube steels up to X80

**Slab**
- Thickness: 230 to 250 mm
- Width: 800 to 2,150 mm
- Length: 4,500 to 11,000 mm
- Weight: 38.5 t

**Finished strip**
- Thickness: 1.2 to 25.4 mm
- Width: 700 to 2,130 mm

**Coil**
- Outside diameter: 2,150 mm
- Spec. coil weight: 24.0 kg/mm
- Total weight: 38.5 t

- Cold charging
- Hot charging
- Direct charging for the future
ARCELOR-MITTAL TUBARÃO
Vitória, Brazil

TURNKEY FACILITY

Since 2002 ArcelorMittal Tubarão (formerly CST) has been operating a compact hot strip mill supplied by us on a turnkey basis. The mill has enabled ArcelorMittal Tubarão to extend its good reputation as a manufacturer of top-quality slabs also to the hot strip field.

The annual capacity of the mill was 2.0 million tons at the time of commissioning. Meanwhile, the capacity has been increased to around 4.0 million tons/year by installing an additional walking-beam furnace.

The slabs for the hot strip mill are produced by two continuous casters supplied by us. These are arranged in such a way that the slabs can be inserted into the hot strip mill by hot charging.

The mandrelless coilbox and the finishing stands, which are equipped with all up-to-date actuators, allow the production of hot strip with very close geometrical and metallurgical tolerances. A special thin-strip technology package makes possible minimum strip gauges of only 1.0 millimeters. This package also includes the high-speed gauge control system (AGC) and the tensiometer looper behind F4 and F5. The strip tension distributions measured by the tensiometer loopers serve as incoming information for the strip-flow control system and the profile, contour and flatness control system, which form part of the automation package supplied by us.

MAIN COMPONENTS and FUNCTIONS of the hot strip mill

- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Crank crop shear
- Seven four-high finishing stands with
  - Fully hydraulic roll gap adjustment (HGC)
  - CVC® plus with work roll shifting and integrated work roll bending
  - Interstand cooling system, anti-peeling device and roll cooling systems
  - Roll-gap lubrication
  - Hydraulic loopers (F1 to F5)
  - Roll quick-change equipment
- Laminar strip cooling system
- Two hydraulic coilers with Automatic Step Control
- X-Pact® automation system
  - PCFC® (profile, contour and flatness control system)
  - CSC (process model for laminar strip cooling)
  - TCS (technological control systems for the finishing train and coilers)

INTENDED EXTENSIONS

- One walking-beam furnace
- One four-high reversing roughing stand
### TECHNICAL DATA

**Commissioning** August 2002

**Annual production**
- First stage of construction 2,000,000 t
- Second stage of construction (2008) 4,000,000 t

**Steel grades**
Structural steels, ULC steels, IF steels, high-carbon steels, high-strength low-alloy steels, tube steels

<table>
<thead>
<tr>
<th>Slab</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>200 to 250 mm</td>
</tr>
<tr>
<td>Width</td>
<td>750 to 1,955 mm</td>
</tr>
<tr>
<td>Length</td>
<td>4,500 to 11,500 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>max. 40.0 t</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Finished strip</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>1.2 to 16.0 mm</td>
</tr>
<tr>
<td>Width</td>
<td>700 to 1,880 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coil</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter</td>
<td>2,100 mm</td>
</tr>
<tr>
<td>Spec. coil weight</td>
<td>max. 22.5 kg/mm</td>
</tr>
<tr>
<td>Total weight</td>
<td>40.0 t</td>
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</tbody>
</table>

- Cold charging
- Hot charging
FURTHER REFERENCES
prior to 2000

**BAOSHAN IRON & STEEL**
Shanghai, China

Year of commissioning 1989

Main components
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Two four-high non-reversible roughing stands with edger
- Seven-stand finishing mill with CVC® technology
- Laminar strip cooling
- 3 coilers

Annual production 4,200,000 t

Steel grades
Steel grades: Carbon steels, tube grades

Finished strip
Thickness 1.2 to 25.4 mm
Width 600 to 1,900 mm

Special features
- For the first time, CVC® technology in all finishing stands
- Production greatly in excess of 100 million tons of hot strip since 1989

**TATA STEEL**
Jamshedpur, India

Year of commissioning 1993

Main components
- Four-high roughing stand with edger
- Coilbox
- Six-stand finishing mill with CVC® plus
- Laminar strip cooling
- 2 coilers

Annual production 3,550,000 t

Steel grades
carbon steels (low and medium carbon), HSLA steels, tube steels, micro-alloyed steels, structural steels

Finished strip
Thickness 1.2 to 12.0 mm
Width 650 to 1,550 mm

**SAHAVIRIYA STEEL INDUSTRIES**
Bang Saphan, Thailand

Year of commissioning 1994

Main components
- Four-high roughing stand with two edgers
- Coilbox
- Seven-stand finishing mill with CVC® plus
- Laminar strip cooling
- 3 coilers

Annual production 2,400,000 t

Steel grades
Carbon steels, micro-alloyed steels, ferritic and austenitic stainless grades

Finished strip
Thickness 1.0 to 19.0 mm
Width 750 to 1,550 mm
### ESSAR STEEL
**Hazira, India**

**Year of commissioning** 1996  
**Main components**  
- Four-high roughing stand with edger  
- Coilbox  
- Six-stand finishing mill with CVC® plus  
- Laminar strip cooling  
- 2 coilers  

**Annual production** 3,000,000 t  
**Steel grades**  
Kohlenstoffstähle (low and medium carbon), Baustähle, Rohrstähle, mikrolegierte Stähle  

**Finished strip**  
- Thickness: 1.2 to 16.0 mm  
- Width: 600 to 1,640 mm

### CHINA STEEL CORP.
**Kaohsiung, Taiwan**

**Year of commissioning** 1997  
**Main components**  
- Two-high roughing stand with edger  
- Four-high roughing stand with edger  
- Seven-stand finishing mill  
- Laminar strip cooling  
- 2 coilers  

**Annual production** 2,700,000 t, of which 160,000 t stainless grades  
**Steel grades**  
Carbon steels (low and medium carbon), silicon steels, stainless steels, tube steels  

**Finished strip**  
- Thickness: 1.2 to 12.7 mm  
- Width: 914 to 1,880 mm

### ARCELOR-MITTAL EISENHÜTTENSTADT
**Germany**

**Year of commissioning** 1997  
**Main components**  
- Four-high roughing stand with edger  
- Mandrelless coilbox  
- Five-stand finishing mill with CVC® plus  
- Laminar strip cooling  
- 1 coiler  

**Annual production** 1,500,000 t  
**Steel grades**  
Low-carbon steels, IF steel grades, structural steels (with improved atmospheric corrosion resistance), high-strength and micro-alloyed steels, non-grain-oriented silicon steels  

**Finished strip**  
- Thickness: 1.5 to 13.0 mm  
- Width: 600 to 2,000 mm

### SAUDI IRON & STEEL COMPANY
**Al-Jubail, Saudi-Arabia**

**Year of commissioning** 1999  
**Main components**  
- Four-high roughing stand with edger  
- Coilbox  
- Six-stand finishing mill with CVC® plus  
- Laminar strip cooling  
- 2 coilers  

**Annual production** 2,000,000 t  
**Steel grades**  
Structural steels, steels for welded pipes, tube steels up to X60, HSLA grades  

**Finished strip**  
- Thickness: 1.2 to 16.0 mm  
- Width: 900 to 1,650 mm
# OVERVIEW OF REFERENCES

<table>
<thead>
<tr>
<th>Customer</th>
<th>Country</th>
<th>Commissioning</th>
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<tbody>
<tr>
<td>Baosteel Zhanjiang Iron &amp; Steel</td>
<td>China</td>
<td>2015</td>
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<tr>
<td>Habaş</td>
<td>Turkey</td>
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<td>ArcelorMittal Tubarão</td>
<td>Brazil</td>
<td>2002</td>
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<td>Saudi Iron &amp; Steel</td>
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<td>ArcelorMittal Eisenhüttenstadt</td>
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<tr>
<td>China Steel Corporation</td>
<td>Taiwan</td>
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<tr>
<td>Essar Steel</td>
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<tr>
<td>Sahavirîya Steel Industries</td>
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<td>Baoshan Iron &amp; Steel</td>
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<tr>
<td>Design capacity [Million t per annum]</td>
<td>Strip thickness [mm]</td>
<td>Strip width [mm]</td>
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<td>800 – 2,100</td>
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The information provided in this brochure contains a general description of the performance characteristics of the products concerned. The actual products may not always have these characteristics as described and, in particular, these may change as a result of further developments of the products. The provision of this information is not intended to have and will not have legal effect. An obligation to deliver products having particular characteristics shall only exist if expressly agreed in the terms of the contract.