SMS group

X-Roll®

Flexible high-performance plants

References for hot strip mills since 2000


SMS group
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X-Roll®-hot strip mills

X-Roll® hot strip mills from SMS group are all-round plants for manufacturing hot strip. You can use them to produce a wide range of products – from thin strips with a minimum final gage of 1.2 millimeters to high-strength tube steels with a thickness of 25.4 millimeters, along with stainless steel grades. Built in is a large number of high-performance technological features that ensure excellent hot strip quality and guarantee high cost-effectiveness and availability.

As a leading plant maker for the steel and non-ferrous metals industry, SMS carried out 18 orders worldwide for hot strip mills between 2000 and 2017. They add up to a total capacity of over 77 million t per annum. SMS group built the majority of the new plants in the Far East, but investments have also been made in modern hot strip mills in Turkey, India, and North and South America.

We customize our X-Roll® hot strip mills to required specifications using comprehensive process simulations. The design is based on the respective product range. There are two fundamental variants that 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 of 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 coordinated systems comprising mechanical equipment, electrical & automation systems, and process knowhow.

The integrated solutions are based on the extensive knowledge of our engineers in relation to the options of plant engineering, detailed process engineering knowhow and our expertise in the design and manufacture of core components in our own workshops in Germany.

You as our customers obtain major benefits from our plants:

- Powerful plant engineering with a secure future for manufacturing modern steel grades in top-class product quality within extremely close geometrical and metallurgical tolerances plus high yield and availability.
- High profitability thanks to Ecoplants components fitted out to reduce energy use and ensure high process stability.
- Handling of the entire project with just one partner, who is responsible for supplying all the plants and services relevant to the process. This means there are no interfaces at all with other suppliers, e.g. for electrical and automation systems.
- A steep run-up curve due to in-house manufacture of mechanical core components and preliminary optimization of the electrical & automation package using Plug & Work.
- Services are available for the entire service life of the mill.

X-Roll®

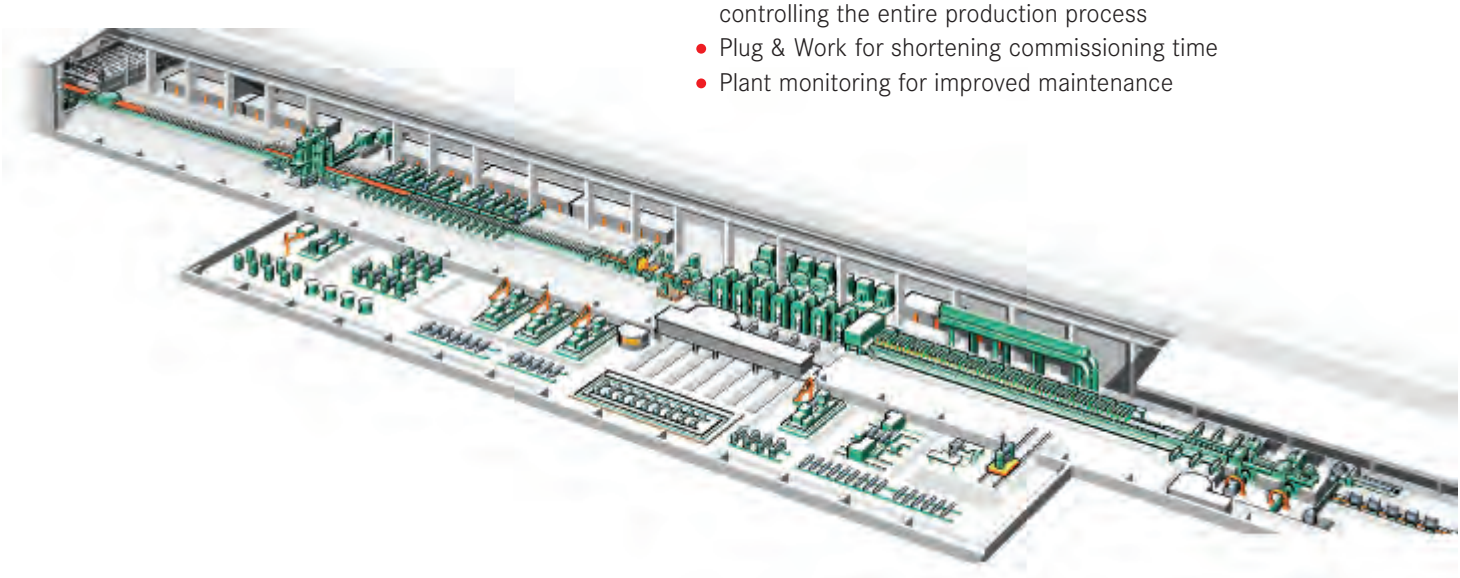
X-Roll® designates the family of brands from our Flat-Product Rolling Mills Division. It indicates plants and technical equipment for economical and flexible production of flat-steel products.

Powerful components

Hot strip mills from SMS group universally consist of equipment and technologies that guarantee high productivity, a wide range of products, and top product quality, all of which of course signify high profitability. What also benefits you is that Ecoplants components installed in the entire process chain contribute to eco-friendly production. Why? Because they reduce energy use and therefore reduce operational costs and enhance process stability.

A selection of the technical highlights:

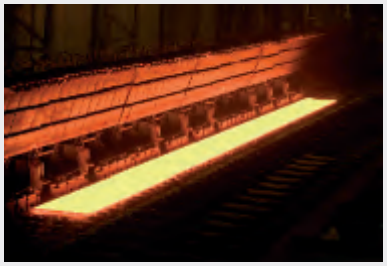
- Descaler for excellent surface quality
- Slab sizing press for flexible adjustment of slab width
- Camber-free rolling for eliminating strip cambers and for high rolling stability
- Transfer bar cooler to increase production for special grades
- High-performance heat insulation panels to reduce temperature losses, with a long service life
- Mandrelless coilbox for compact layout of the hot strip mill
- Crop shear with cut optimization for low cropping losses
- Finishing stands in compact and maintenance-friendly design
- Work roll quick-change system
- CVC®plus, the actuator for strip profile, contour and flatness
- 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 roll force and roll torque
- Looper technology for safe strip tracking behavior
- 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 winding high-strength heavy-gage strip
- Pallet conveyor system for flexible, careful and safe coil transport
- X-Pact® electrical and automation package for controlling the entire production process
- Plug & Work for shortening commissioning time
- Plant monitoring for improved maintenance




Descaler


Slab sizing press


Camber-free rolling


Heat insulation panels


Mandrelless coilbox


Crop shear


Finishing stands with CVC® plus technology


Drive technology


Sieflex® HT spindles

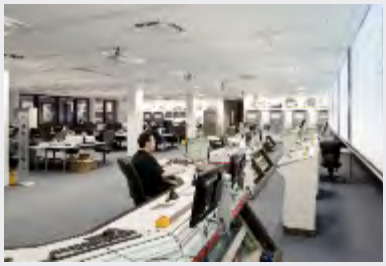

Looper technology


Strip cooling


Coiler technology


Pallet conveyor system


X-Pact® electrical and automation package


“Plug & Work” test

SMS group as a system supplier

SMS group supplies its mills as integrated solutions with coordinated systems comprising mechanical equipment, electrical and automation packages, and the relevant process know-how.

Included in the supply scope of our X-Pact® electrical and automation package are 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. They are used for setting the various equipment elements and actuators of the rolling mill, taking into account the material properties.

Early on, before delivery, we test the complete X-Pact® automation package with our unique Plug & Work procedure. During this process, 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 customized plant, including all its plant behavior parameters, is reproduced. It is proven that the Plug & Work concept speeds up plant run-up and commissioning. Simultaneously, during the integration test, the plant operators are prepared comprehensively for their future tasks.

The personnel learn – in virtual production operation scenarios – the plant functions and their handling in realistic operating situations.

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, due to our many years of experience, we offer solutions that are both efficient and suitable for the requirements of rolling mills.

What our service means to you is that we are also your competent partner for dealing with all challenges relating to plant operation. SMS offers you a wide range of maintenance and inspection services, spare parts supply and training. We also contribute comprehensive process expertise. Just as effective is our worldwide service network, so that SMS experts are always nearby.

The manufacture of high-quality products is significantly impacted by process control. We provide the necessary expertise – also across different plants – to ensure reliable production of even high-strength and high-quality steel grades such as AHSS and UHSS. Completing our portfolio are suitable quality monitoring systems.

The experts from Met/Con ensure we can also parameterize the technological process.

Perfectly harmonized systems are a prerequisite for excellent production results.

The Plug & Work test reduces commissioning time.

The expertise of the SMS group also extends to ancillary plants such as the water supply and treatment system.

Closeness to customers is a hallmark of the SMS group service.

Plant layout, design, and manufacture go hand-in-hand

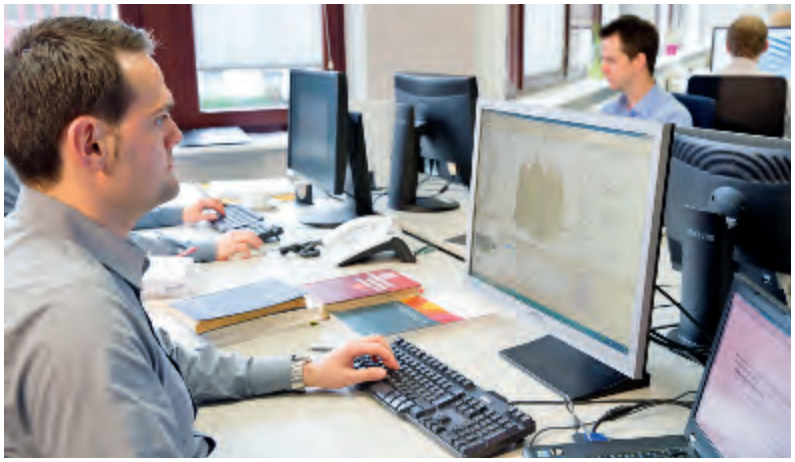
One of our success factors is the close intermeshing of development, design, and manufacture. All departments are under a single roof at the Hilchenbach site, so that continuous exchange is a matter of course. This kind of cooperation using the shortest possible routes guarantees the continuous holistic improvement of our products. What also counts is close contact with customers throughout the entire life cycle of their plant.

All plants and components are designed individually by SMS to meet the specific operational needs. To determine the process requirements, we apply methods such as FEM (Finite Element Method) analyses or dynamic simulations such as those for deformation behavior. Moreover, for design work, we use state-of-the-art 3D CAD systems.

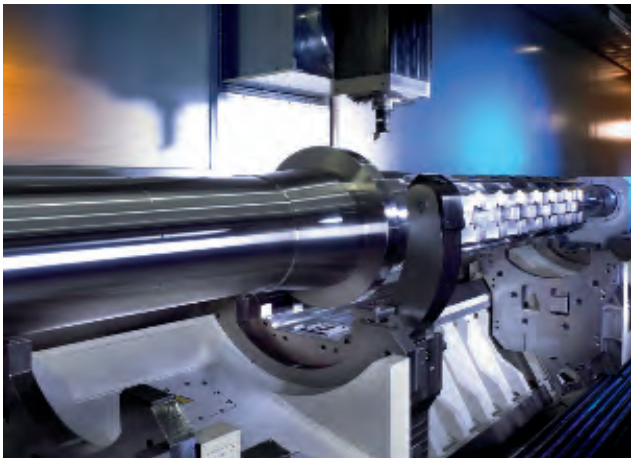
The core components of our hot strip mills, such as CVC® bending and shifting systems, hydraulic roll-gap adjustment systems, coiler mandrel valve stands, or drive engineering, are manufactured by us in our 40,000 m^2 workshop in Hilchenbach equipped with the most up-to-date machines.

The range of manufacturing in our workshop extends from the production of high-quality welded structures, to machining operations with a powerful pool of machine tools for innovative production processes, to the assembly and installation of heavy machinery.

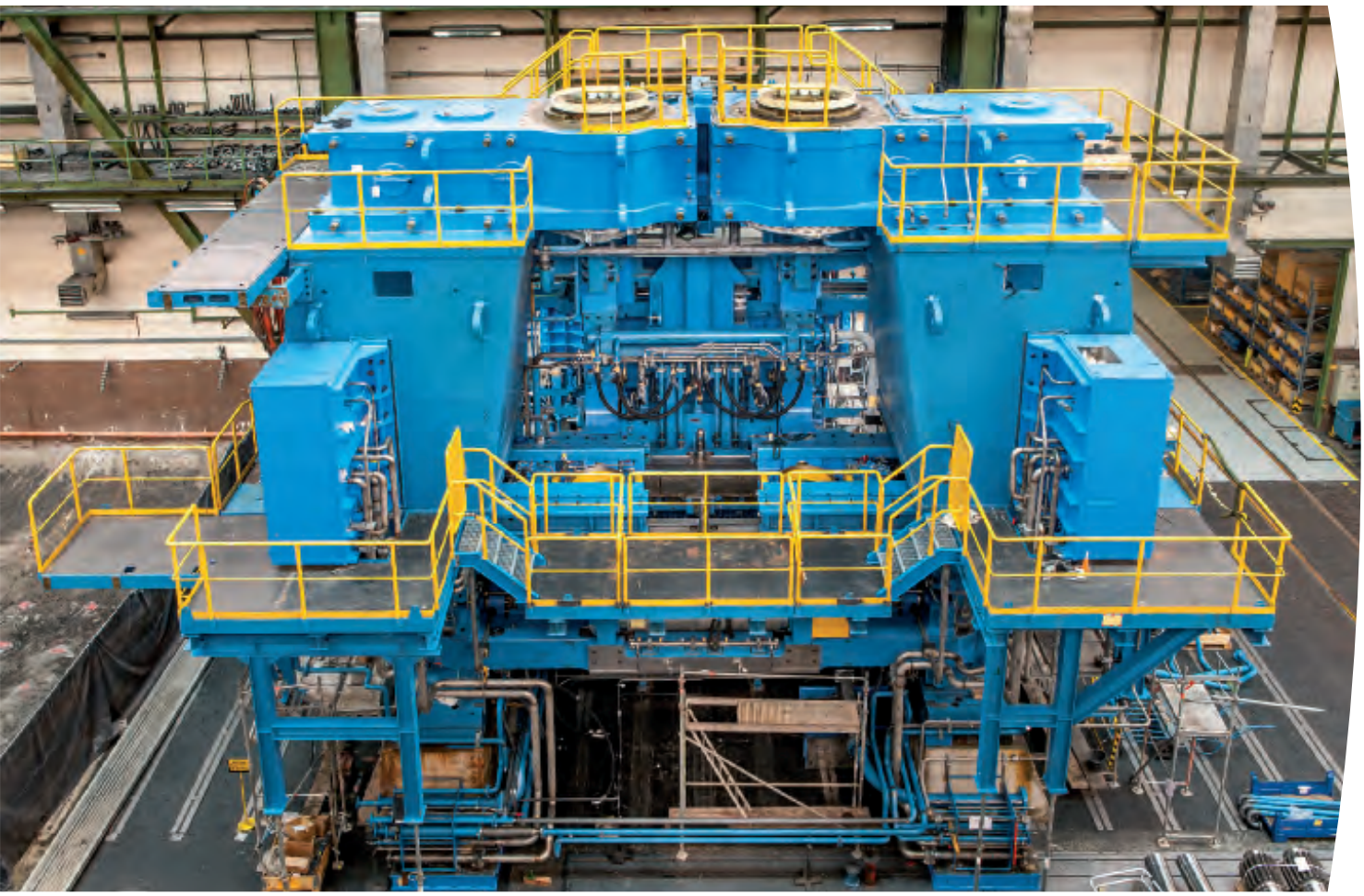
We install all millstands, coilers and pipework to the customer's requirements and carry out function tests and trial runs on special test facilities. This is how we achieve a high degree of efficiency and a long service life for these components – which are crucial to the product quality and the profitability of the plants.



All plants are individually designed.



SMS manufactures the core components that are crucial to strip quality in its own workshops.



Pre-assembly ensures trouble-free commissioning of the plants at the works.

Gear unit manufacturing is a core competence of the workshop in Hilchenbach.

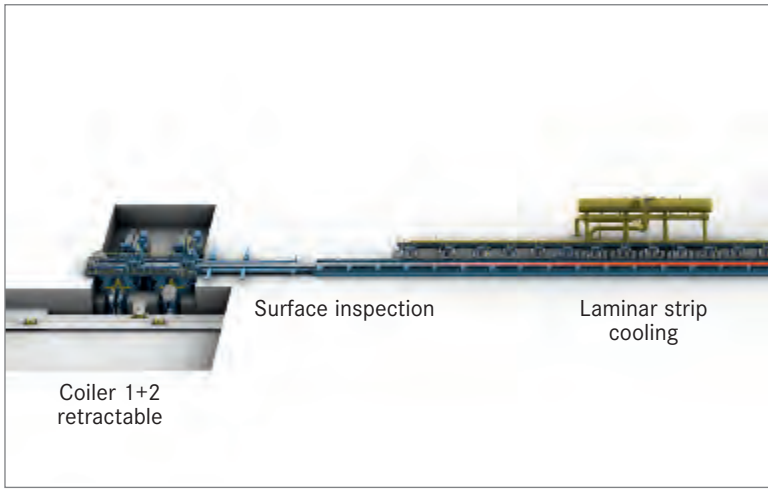
Baoshan Zhanjiang Iron and Steel
Zhanjiang, China

Four years after the successful commissioning of the 2250 mm hot strip mill, Baosteel Zhanjiang Iron and Steel Co. Ltd. has placed an order with SMS group GmbH for a second hot strip mill at its steel plant in Zhanjiang in the south of China.

The hot strip mill is designed for an annual capacity of 4.5 million tons of hot strip with final gages of 1.2 mm to 12.7 mm and strip widths of between 720 mm and 1,630 mm. The new hot strip mill will focus production on thin, wide, and high-strength steel grades with a tensile strength of up to 1200 MPa.

The new hot rolling mill consists of a slab sizing press, a two-high and four-high reversing roughing stand, each with a flange-mounted edging stand, a coilbox, seven CVC®plus four-high finishing stands, laminar strip cooling system, and two hydraulic coilers. The arrangement of the new plant has been optimized so that both hot strip mills can be operated from a central control desk in future. SMS group was awarded the contract for a "Wisdom Equipment System", which is an important element in the centralized operation of both hot strip mills. This system is used to continuously evaluate the condition of the plant and display it to the operator. If the plant or components do not work within the optimal operating window, suitable measures to restore the ideal plant condition are recommended. The main components of the "Wisdom Equipment System" are the Production Condition Analyzer (PCA), GeniusCM for monitoring the plant condition, and the intelligent drive spindle developed by SMS for the finishing mill. In addition, our scope of supply includes the proven smart assistance systems from SMS, such as tail-out monitoring and analysis systems for rolling stability.

Commissioning of the hot strip mill is scheduled for mid-2021. The interaction of the two hot strip mills 1780 and 2250 will set a new standard in the effective and cost-efficient production of hot strip in China and around the world.

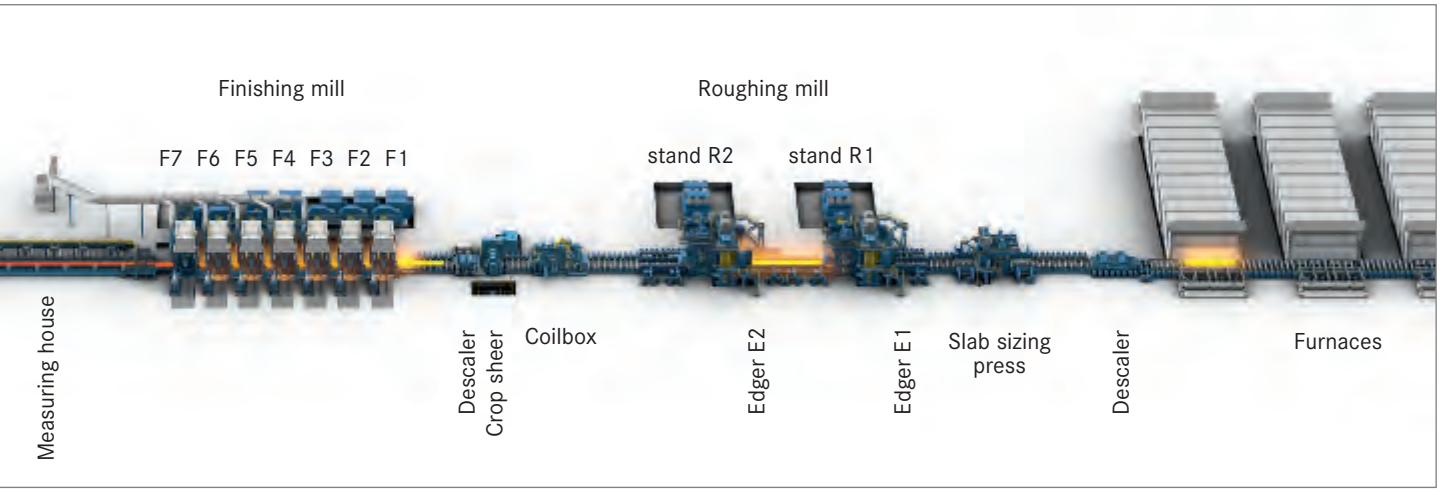


Main components

- Slab yard connected to slab caster
- Three walking beam furnaces
- High-pressure water descaler in front of slab sizing press
- Slab sizing press
- 2-high reversing roughing stand R1 with edger
- 4-high reversing roughing stand R2 with edger
- Heat retention hoods between R1/R2 and R2 and finishing mill
- Coilbox
- Crank-type crop shear
- High-pressure water descaler in front of FM
- 7-stand finishing mill with roller sideguides
- Run out roller table with laminar cooling
- Two universal down coilers

Technical Data

Commissioning	2021
Annual capacity	4.5 million t
Steel grades	Cold rolled super high strength steel, Ultra low carbon steel, Carbon constructional steel, High-strength steel, Non-oriented silicon steel, Dual and Multiple phase steel
Slab data	
Width:	900 mm - 1650 mm
Thickness:	230 mm and 250 mm
Length:	11000 mm max.
Strip dimensions	
Width:	720 mm - 1630 mm
Thickness:	1.2 mm - 12,7 mm
Spec. Coil Weight	max. 23.5 kg/mm

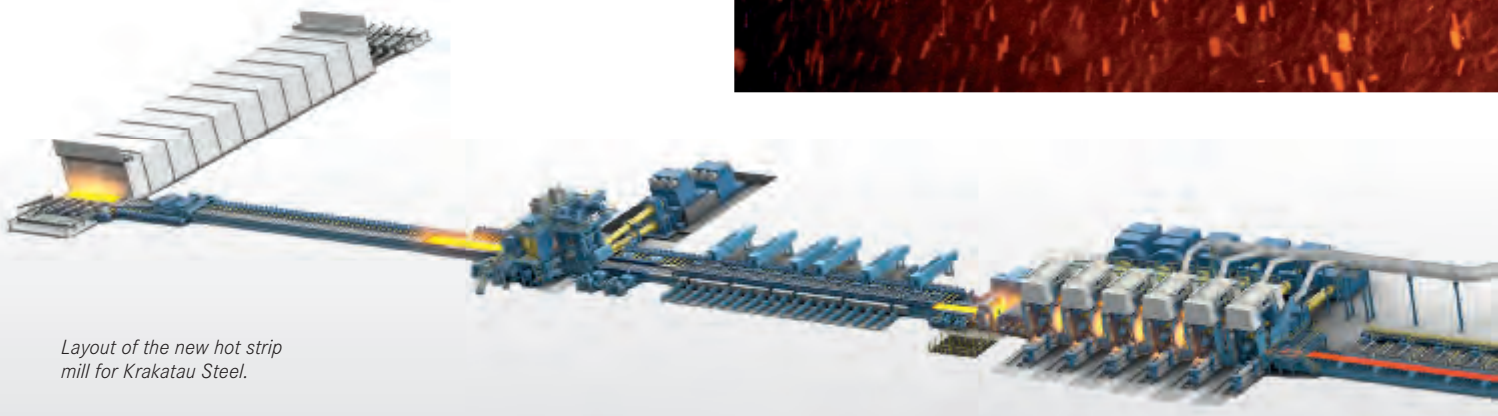


PT Krakatau Steel
Indonesia

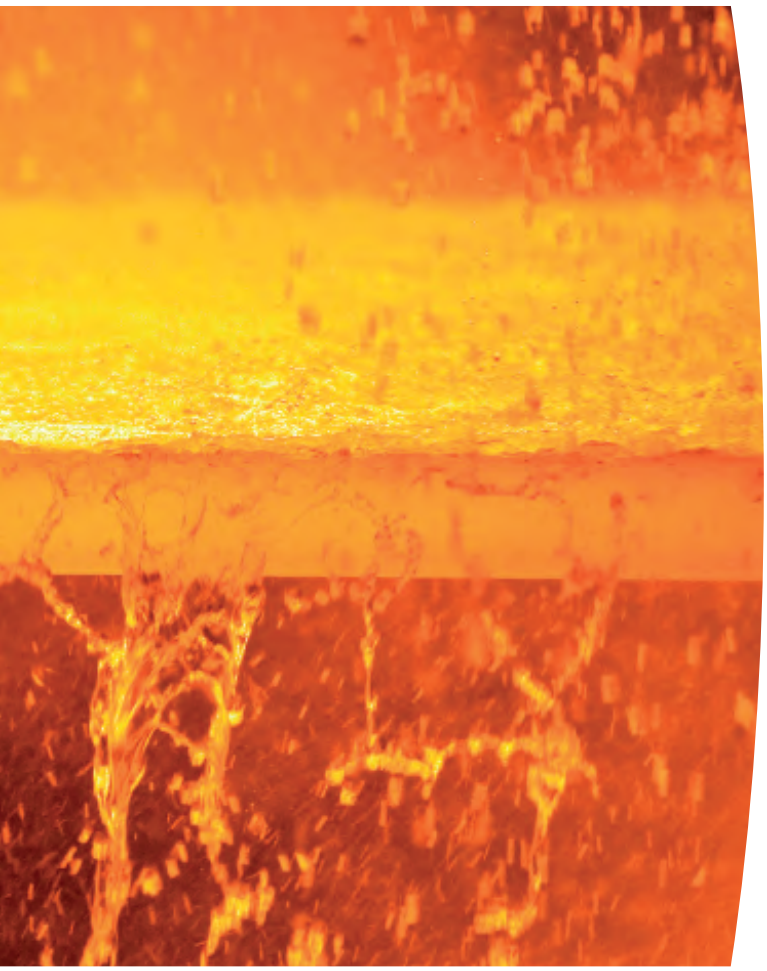
Indonesian company PT Krakatau Steel has contracted us to supply a turnkey hot strip mill. Included in the order is the entire process equipment – from the slab to the coil yard, the electrical and automation systems, the auxiliary facilities, and construction of the infrastructure and bays. This is a joint project also involving Indonesian consortium member PT Krakatau Engineering.

The hot strip mill will be one of the most modern plants of this type worldwide. That means PTKS will be able to meet all demands for quality, productivity, and cost-effectiveness.

As the leader of the consortium, SMS group is responsible for ensuring that the entire plant complex goes into production on schedule.



Layout of the new hot strip mill for Krakatau Steel.

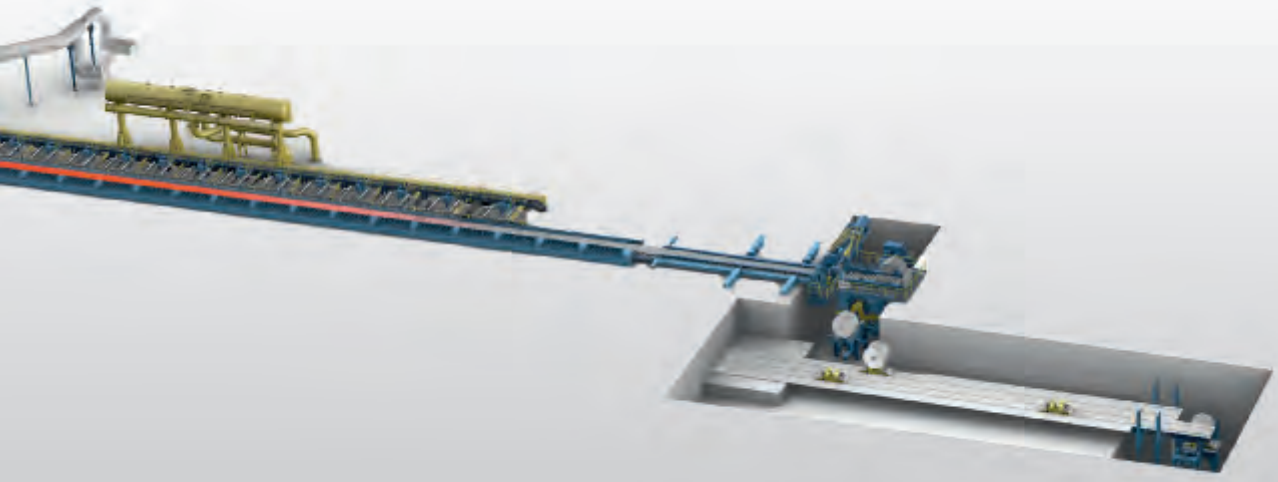


Main components

- Walking beam furnace
- Four-high reversing roughing stand with edger
- Heat panels
- Six finishing stands with
  - Hydraulic roll gap adjustment (HGC)
  - CVC®plus with work roll shifting and integrated work roll bending
- Laminar strip cooling system
- Hydraulic downcoiler
- Coil conveyor system
- XPact® electrics and automation

Technical Data

Commissioning	2021
Annual capacity	
Initial stage	1.5 million t
Steel grades	Automotive grades, structural steel, pipe and tube grades
Slab	
Thickness	200 - 250 mm
Width	600 - 1,700 mm
Finished strip	
Thickness	1.4 - 16 mm
Width	600 - 1,650 mm



HBIS Laoting Steel Co., Ltd.
Tangshan, China

Low energy consumption and high-quality products

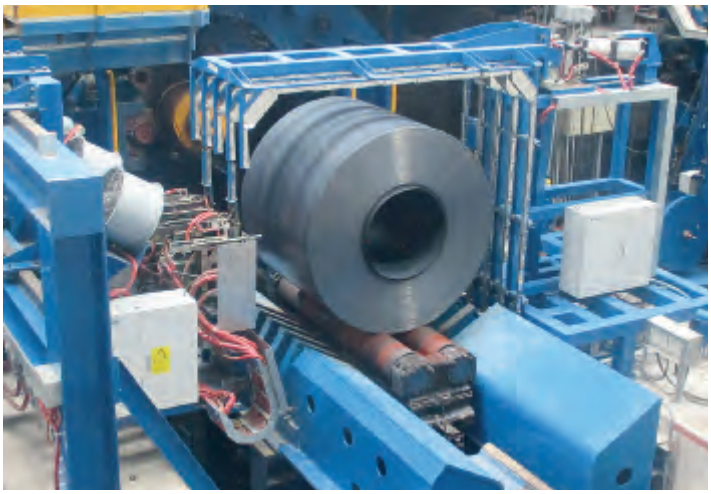
The hot strip mill at HBIS Laoting Iron & Steel is located in the Chinese province of Hebei and started production mid-2020.

The mill is designed for an annual capacity of 4.1 million tons and can produce strips up to a maximum width of 1,900 mm and thicknesses of between 1.2 and 25.4 mm. The product mix comprises a wide spectrum of carbon steels and ranges from deep-drawing grades to high-strength steels and pipe grades.

Based on an ecologically and economically optimized layout, the roughing mill features a slab sizing press, a two-high and a four-high roughing stand with edger, and a mandrelless coilbox. Thanks to the sizing press and the associated hot charging of slabs and use of the coilbox, energy consumption levels during rolling can be reduced. The seven finishing stands are equipped with hydraulic adjustment systems and the CVC®plus roll shifting system with integrated work roll bending. These actuators can be used to adjust the strip thickness and strip profile, contour, and flatness within close tolerances. In addition, a special work roll cooling system is used that enables water and energy to be saved.

The strip cooling system provides for high cooling rates so that HBIS Laoting can produce high-strength steel grades and tube steels with efficient alloying concepts. The specially designed coiler group can wind these grades in the low temperature range up to a strip thickness of 25.4 mm.

The hot strip mill for HBIS Laoting is the thirteenth strip mill from SMS group in China. All imported hot strip mills in China that have a barrel length of more than 2,000 mm were, without exception, supplied by SMS group. The HBIS group, which is based in the Chinese province of Hebei, is the world's third largest steel producer.



Main components

- Four walking beam furnaces
- High pressure water in front of slab sizing press
- Slab sizing press
- 2-high reversing roughing stand R1
- 4-high reversing roughing stand R2 with edger
- Coilbox mandrel less
- Crank-type crop shear
- High pressure water descaler in front of finishing mill
- 7-stand finishing mill
- Run out roller table with ultra-fast laminar cooling and laminar cooling
- Three down coilers

Technical Data

Commissioning	2020
Annual capacity	4.1 million t
Hot rolled products	1.15 mt/year
Coils for cold rolling	2.95 mt/year

Steel grades (cold rolling)
Deep drawing and super deep drawing (incl. IF), Structural steel, High strength steel (340 - 590 MPa and over 590 MPa)

Steel grades (hot rolled commercial coil)
Carbon and high quality carbon structure steel, Automobile structure steel (DP800, MP1000, MS1200), High weather resistant structure and container steel, Pipeline (X42-X100) and ship steel, Boiler and pressure vessel steel, Bridge steel (Q235, Q420)

Slab dimensions

Thickness:	200, 230, 250 mm (mainly 230)
Width:	900 - 1,900 mm
Length:	4,500 mm - 11,000 mm

Strip dimensions

Thickness:	1.2 - 25.4 mm
Width:	900 - 1,900 mm
Coil weight:	36.5 t max.
Specific coil weight:	24 kg/mm max

Transfer bar dimensions

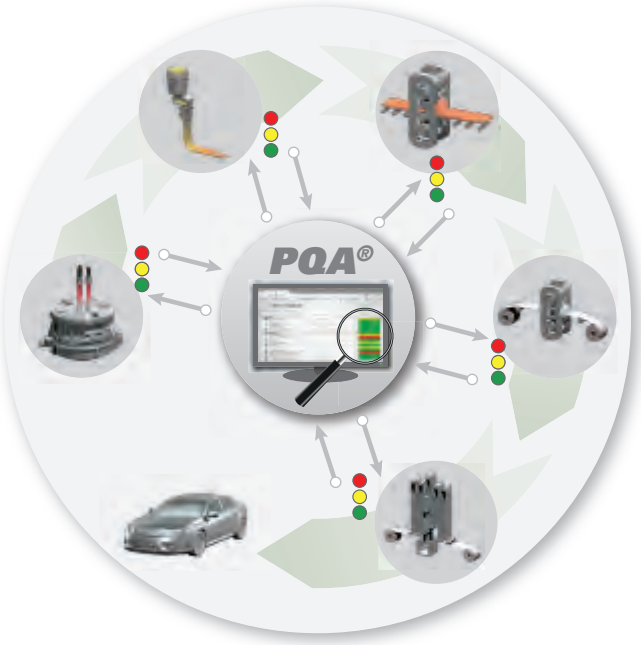
Thickness:	30 - 70 mm
Width:	900 - 1,900 mm

Shandong Iron and Steel
Rizhao, China

Shandong Iron and Steel, Rizhao, China, has contracted SMS group to supply a complete flat steel complex including a newly developed quality assurance system and special operational expertise in Shandong province on China's east coast. A special feature of the project will be its thoroughgoing-process knowhow covering simultaneous monitoring, documenting, and securing of product characteristics. The flat steel complex will comprise a hot wide-strip mill, a pickling tandem mill, as well as a hot-dip galvanizing line and two annealing lines.

Investing in high-quality equipment technology combined with extensive process analyses by MET/Con and an innovative quality surveillance system (PQA® = Product Quality Analyzer) means that Shandong will boast one of the most up-to-date plants worldwide. In addition to producing tube grades and cold strip for the construction and household appliances industries, the focus will be on sophisticated steel grades for the automotive industry. The steel complex commenced operation in 2017. Shandong can produce almost five million tons of hot strip and two million tons of surface-finished cold strip per year.

SMS group supplied a complete flat steel complex to Shandong Iron and Steel, Rizhao.

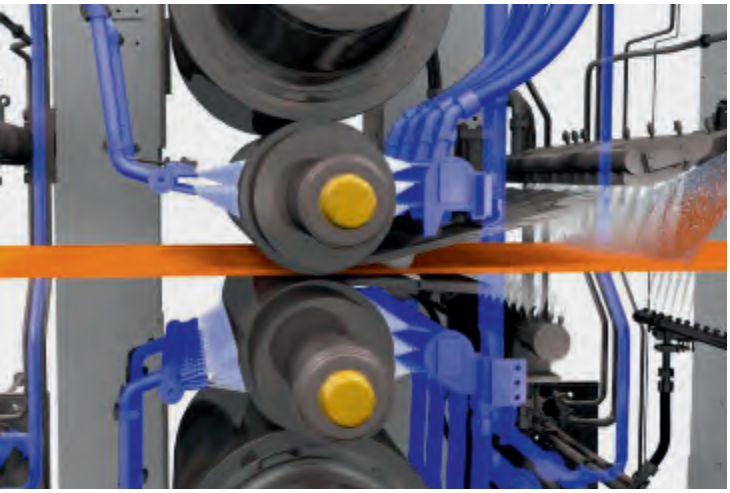


PQA® monitors product quality throughout the entire production process.

Technical Data: Hot Strip Mill

Commissioning	2017
Annual capacity	4.8 million t
Steel grades	Carbon steels, HSLA steels, tube grades, DP steels, stainless grades
Strip width	830 - 1,900 mm
Strip thickness	1.2 - 25.4 mm
Equipment	Descaler, slab sizing press, two-high reversing roughing stand, four-high reversing roughing stand with edger, heat panels, crop shear, 7-stand finishing mill with CVC®plus, laminar strip cooling, 3 downcoilers. All finishing stands are equipped with hydraulic screwdown, CVC®plus, work roll bending, and PCFC®.

The hot strip-mill is equipped with the newly developed work roll hybrid cooling system, which provides to reduce operational costs regardless of process and output.



Work roll hybrid cooling system.

Baosteel Zhanjiang Iron & Steel
Zhanjiang, China

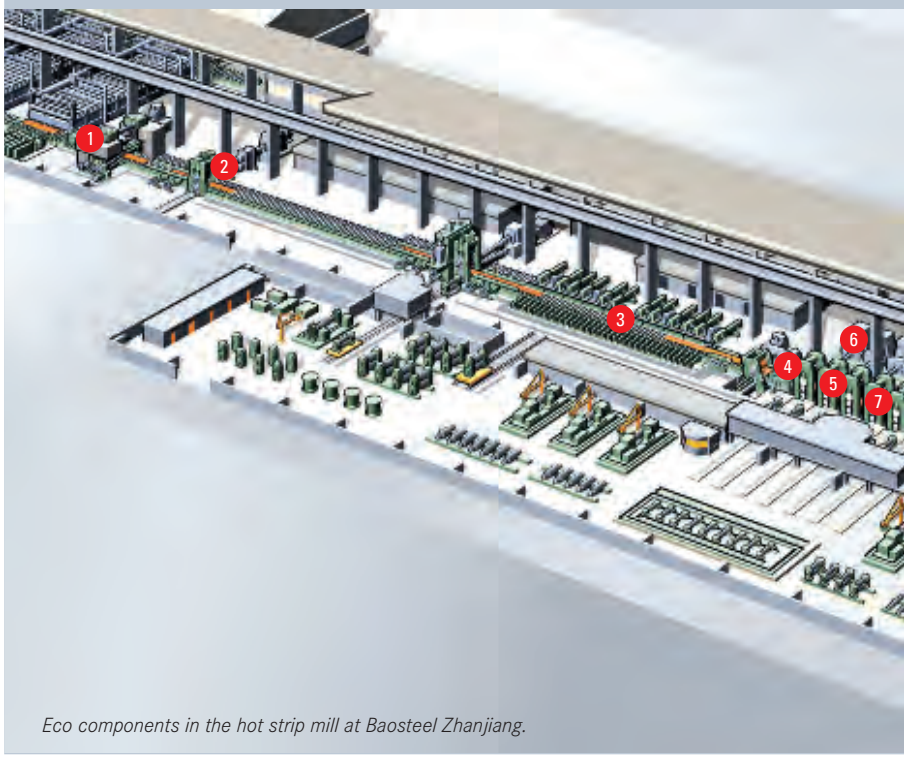
Hot-strip mill with eco components

In June 2013, Baosteel Zhanjiang Iron & Steel awarded us an order to supply a 2,250 mm hot strip mill. The rolling mill was erected at the new steel location in Zhanjiang in the south of China and went into operation in December 2015.

It will set a new standard for efficient and eco-friendly production of hot strip, since it is equipped with a large number of technology packages and Ecoplants components. Included here are heat panels between roughing and finishing mill as well as the CVC®plus system and hydraulic differential tension loopers in the finishing mill.

As the first new plant worldwide, all finishing stands have been 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. Furthermore, especially in the front stands of the finishing mill, the high-performance joint shafts apply the high rolling torques that are necessary to produce high-strength hot strip. Using Sieflex® HT toothed universal joint shafts also assists to provide more flexibility when selecting work roll diameters.

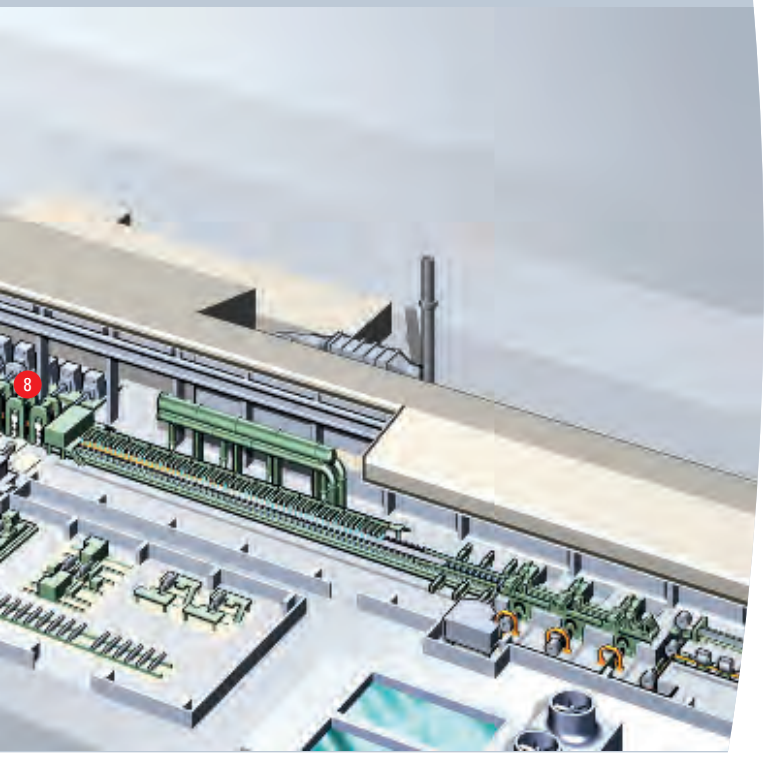
1 Slab sizing press
2 Camber-free rolling
3 Heat panels
4 Optimized work roll cooling
5 Work roll conditioning
6 Sieflex® HT shafts
7 CVC®plus
8 Intelligent utility systems



Eco components in the hot strip mill at Baosteel Zhanjiang.

Left: With the new Sieflex®-HT gear-type drive spindle, higher rolling torques than before can be safely transmitted in finishing stands.

Right: Heat panels between the roughing and the finishing mill will reduce the heat losses of the transfer bar.



Main components

- Slab sizing press
- Two-high reversing rougher with edger
- Four-high reversing rougher with edger
- Heat panels
- 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 and PCFC® model
  - 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

Technical Data

Commissioning	2015
Annual capacity	5.5 million t
Steel grades	Carbon steels, tube grades, shipbuilding steels, IF steel grades
Slab	
Thickness	210, 230, 250 mm
Width	900 - 2,150 mm
Length	4,500 - 11,000 mm
Weight	38.0 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	800 - 2,100 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	max. 38.0 t

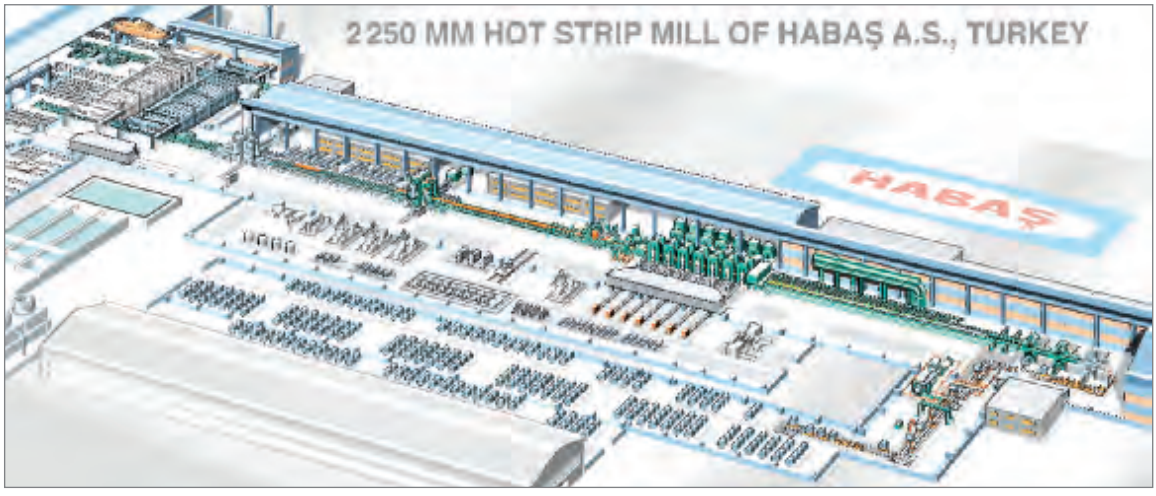
Habaş
Aliağa, Turkey

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 t and can later be expanded to 4.5 million t.

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

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

Customer training during the Plug & Work test.



Left: Mill layout.

Right: The mandrelless coilbox improves the conditions for finish-rolling.

Main components

- 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

Technical Data

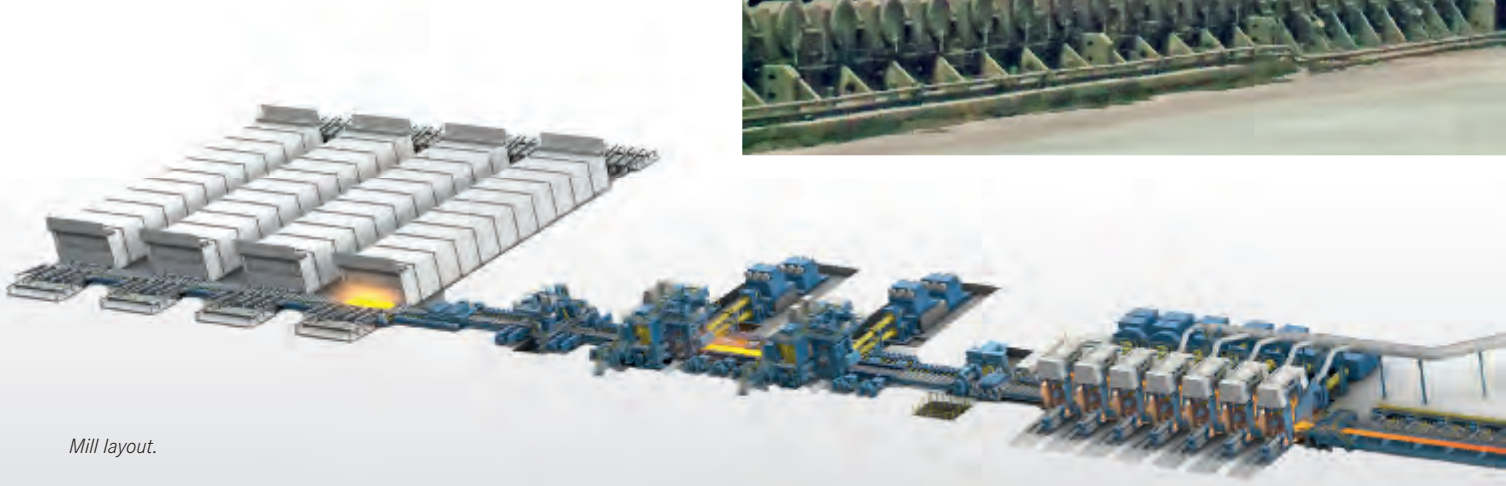
Commissioning	July 2014
Annual capacity	
Initial stage	2.5 million t
Expansion stage	4.5 million t
Steel grades	Carbon steels, HSLA steels, tube grades, DP steels, stainless grades
Slab	
Thickness	200 - 225 mm
Width	1,000 - 2,100 mm
Length	12,000 mm
Weight	max. 40.0 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	700 - 2,100 mm
Coil	
Outside diameter	max. 2,100 mm
Spec. coil weight	max. 22.0 kg/mm
Total weight	max. 40.0 t

Baotou Iron & Steel, Baotou
Inner Mongolia, China

Back in June 2011, the Chinese company Baotou Iron & Steel awarded us the order to supply a 2,250 mm high-capacity hot strip mill. The new rolling mill was built at the Baotou works in Baotou and went into operation in April 2013.

The hot strip mill for Baotou Iron & Steel sets standards for efficient and eco-friendly production of hot strip. It's equipped with a slab sizing press and a large number of technology packages as well as Ecoplants components. Included here are thermal insulation elements between the roughing and finishing mills, the CVC®plus system and hydraulic differential tension loopers in the finishing mill. The run-out table with the edge masking system in the advanced laminar cooling section provides sophisticated cooling strategies. That enables hot strip to be rolled to customized flatness figures.

The foundations for the future coilbox and the provision of space for installing edge heaters and a compact cooling device in the cooling train will be considered in the next phase.



Mill layout.

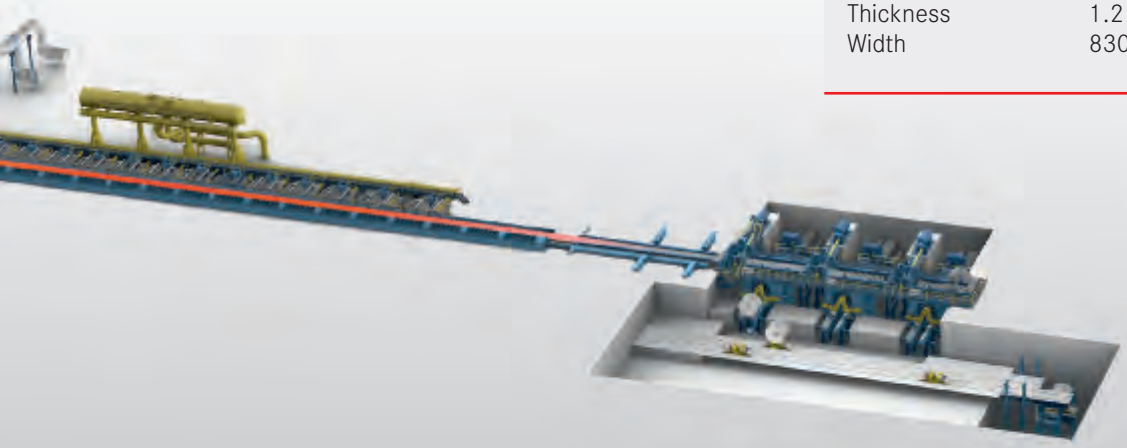
Roughing mill stand and edger.

Main components

- Primary descaler
- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Heat panels
- Foundations for future coil box
- Edge heater (provision of space)
- Crank-type crop shear
- High-pressure descaler
- 7-stand finishing mill
  - CVC®plus
  - Hydraulic roll gap adjustment (HGC)
  - Roll gap lubrication and interstand cooling
  - Hydraulic looper, differential-tension looper for last stands
- Advanced laminar strip cooling system, compact cooling, edge masking system
- 3 coilers with hydraulic step control (1 and 2 retractable)
- Pallet-type coil conveying system

Technical Data

Commissioning	2013
Annual capacity	
Initial stage	5.5 million t
Steel grades	Low carbon grades, medium carbon grades, HSLA grades, pipeline steel grades, ship plates, DQ materials
Finished strip	
Thickness	1.2 - 25.4 mm
Width	830 - 2,130 mm



Panzhihua Iron & Steel
Xichang, China

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

The finishing stands come with 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 strip profile, contour and flatness is adjusted using the CVC®plus system with integrated work roll bending and shifting. Based on 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. That means the roll gap can be ideally adapted to the changing conditions for each strip, so our customer can produce strips with close geometrical tolerances.

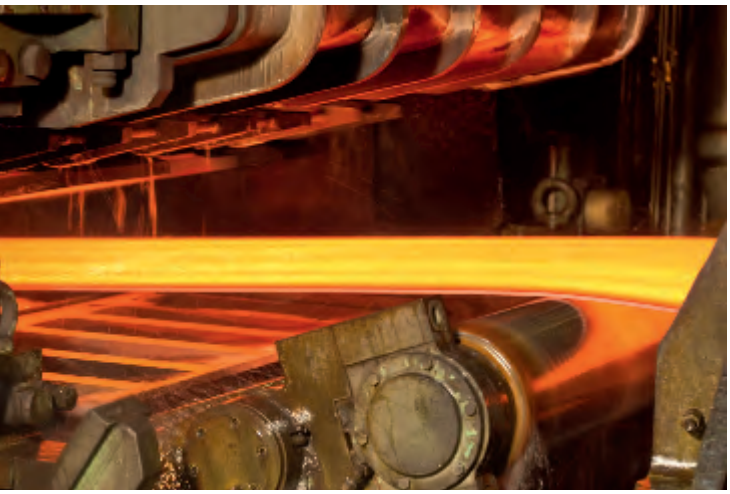
The finishing stands feature a compact and low-maintenance design. As an example, each hydraulic actuator is controlled by its own module. The individual modules are grouped in compact columns on the millstand service platform, where they are well protected yet easily accessible.

Using a slab sizing press, Panzhihua Iron & Steel can flexibly adjust the finished strip widths.

Top: The finishing train.

Left: Finishing stand with CVC®plus, work roll bending, and hydraulic roll-gap adjustment systems.

Right: Loopers ensure stable strip running.



Main components

- 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)

Technical Data

Commissioning	July 2011
Annual capacity	3.7 million t
Steel grades	Carbon steels, tube grades
Slab	
Thickness	230 and 250 mm
Width	900 - 1,930 mm
Length	max. 11,000 mm
Weight	38.1 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	900 - 1,900 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	max. 38.1 t

AM/NS Calvert (formerly ThyssenKrupp Steel USA)
Calvert, Alabama, USA

Works complex with SMS group technology

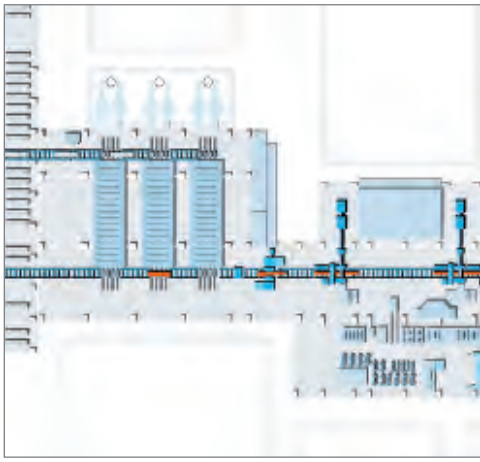
The new high-performance hot strip mill supplied by SMS group went into operation at ThyssenKrupp Steel USA in July 2010. Since 2014 it belongs to ArcelorMittal/Nippon Steel & Sumitomo (AM/NS) and is the core element of the new works complex in Calvert (Alabama). SMS also supplied a combined pickling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

The high-performance hot strip mill has an annual capacity of 5.3 million t, including one million t of stainless steel grades. This makes it one of the world's most powerful mills. In addition to the mechanical equipment, we also supplied the complete electrical and automation package and the drives, thus enabling all systems to be coordinated precisely with each other. Moreover, we were responsible for the reheating furnaces, the coil conveyor system, and the roll shop.

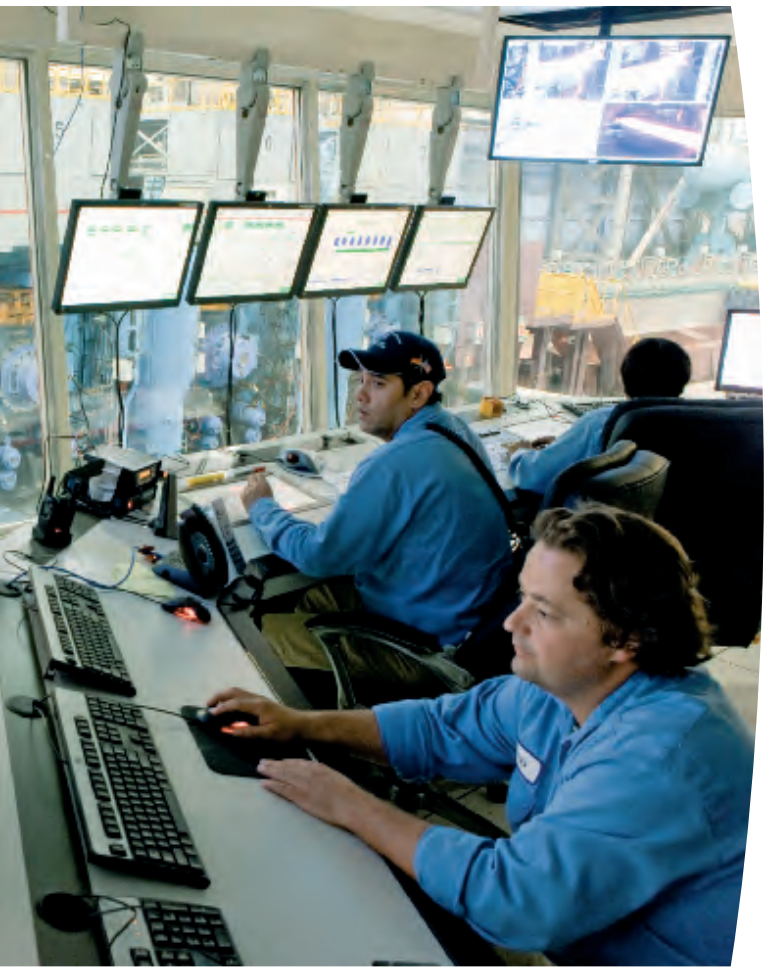
The main components of the X-Roll® hot strip mill are a slab sizing press, one two-high and one four-high roughing stand, each with an edger at the entry side, seven finishing stands, the laminar strip cooling section, and three downcoilers.

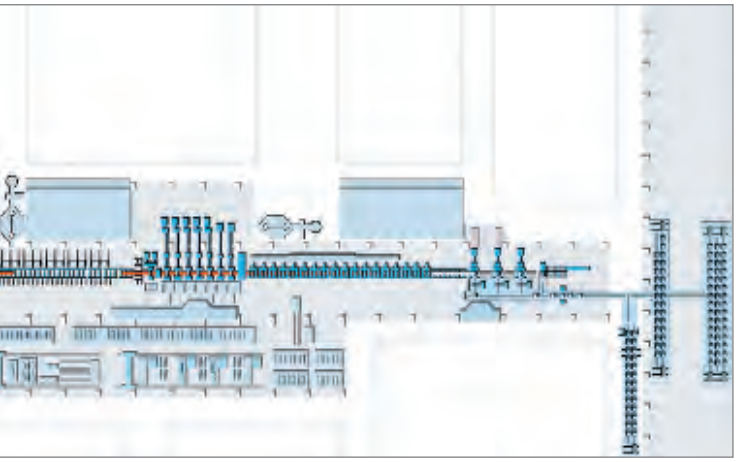
The hot strip rolling mill operates with the X-Pact® automation system.

Two-high roughing stand with edger.



Layout of the hot strip mill.





Main components

- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Heat panels
- 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 extraction system and 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 capacity	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 - 255 mm
Width	800 - 2,000 mm
Length	4,200 - 11,500 mm
Stainless steels	
Thickness	180 - 240 mm
Width	800 - 1,870 mm
Length	4,200 - 11,500 mm
Weight	max. 36.0 t
Finished strip	
Carbon steels	
Thickness	1.5 - 25.4 mm
Width	800 - 1,870 mm
Stainless steels	
Thickness	2.0 - 10.0 mm
Width	800 - 1,860 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 23.0 kg/mm
Total weight	36.0 t

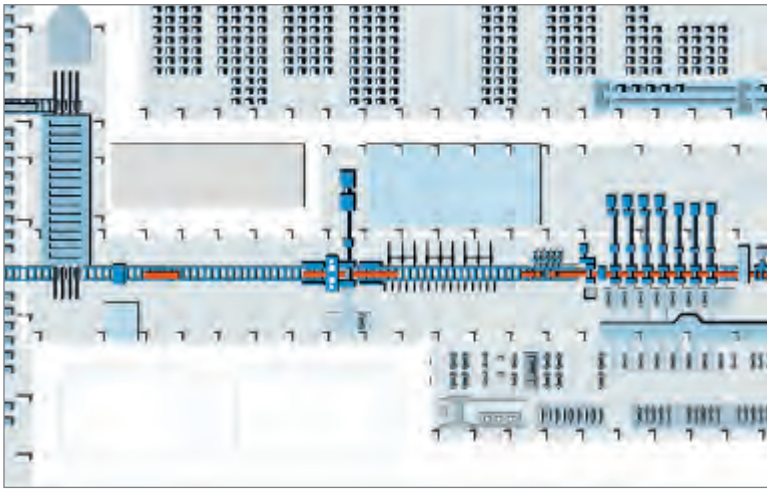
Çolakoğlu Metalurji
Gebze, Türkei

Entry into the flat product market

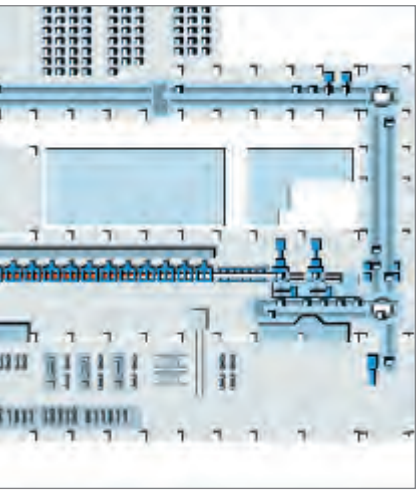
The plant at Çolakoğlu Metalurji A.S. in Turkey was the first conventional X-Roll® hot strip mill for which we supplied the mechanical equipment and the complete electrical and automation package. The new plant was built in Gebze, a port on the Sea of Marmara approximately 30 kilometers from Istanbul. Çolakoğlu Metalurji also operates an electric steelmaking plant with rolling facilities for long products here.
Supplying the complete plant engineering from a single source ensured all systems were optimally coordinated with one another. We tested the complete automation system prior to commissioning using our Plug & Work method.
Significant here were pre-optimization and pre-commissioning, so that the hot strip mill attained stable production within a very short time. The benefits in terms of strip quality of full-line supply by SMS group became evident straight away. Consequently, after only three weeks, 99 % of all strips produced were within the agreed tolerances for strip gage and width, as well as strip profile and flatness.

Drum-type crop shear.

Mandrelless coilbox.



Automatic work roll changing in the seven-stand finishing mill.



Layout of the hot strip mill.

Main components

- 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
  - 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

Technical Data

Commissioning	June 2010
Annual capacity	3 Mio. t
Steel grades	Carbon steels, HSLA steels, tube grades, DP steels, TRIP grades
Slab	
Thickness	180 - 250 mm
Width	800 - 1,650 mm
Length	max. 12,000 mm
Weight	max. 39.0 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	800 - 1,650 mm
Coil	
Outside diameter	max. 2,200 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	39.0 t

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. We supplied the CONARC®-based steelworks, two continuous slab casters and an X-Roll® hot strip mill for the new works complex.

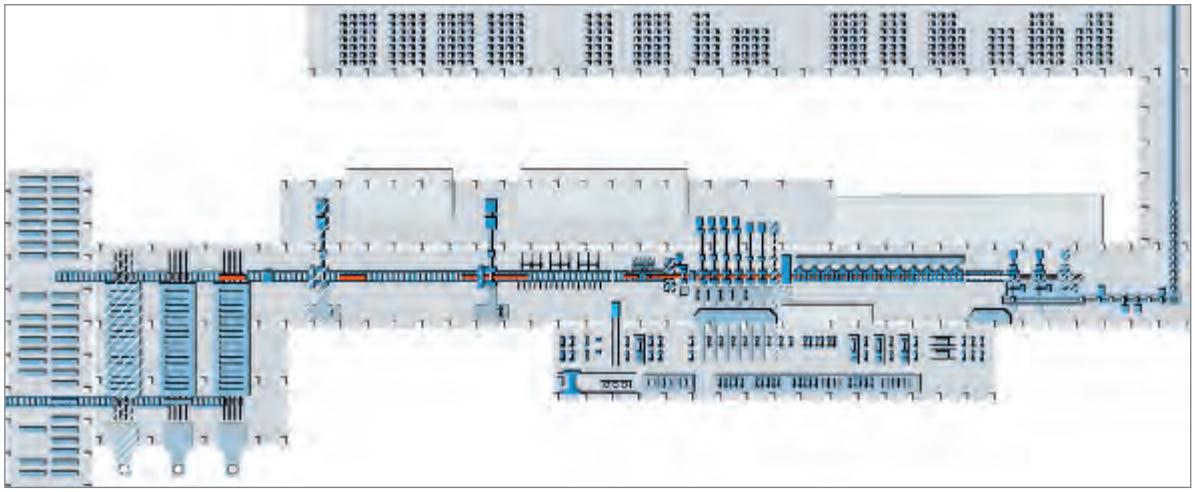
In the first construction stage, the compact hot strip mill includes a four-high reversing roughing stand, a mandrel-less coilbox, a six-stand finishing mill, and two coilers. It's designed for an annual production of three million tons. Similarly, Bhushan Steel also contracted SMS to expand the mill and increase its capacity to 4.5 million tons per annum. It comprises an additional two-high roughing stand, a seventh finishing stand, the expansion of the laminar cooling system by two cooling groups, and a third coiler.

Included in the production range of the hot strip mill is not only input material for the group's own cold rolling mills but also a range of high-quality products, covering HSLA steels, tube steels, and stainless steels.

Top: Roughing mill with edger.

Left: Layout of the hot strip mill.

Right: Pre-assembly of the coiler in the SMS workshop.



Main components

- 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 capacity	
1st construction stage	3 million t
2nd construction stage	4.5 million t (2016)
Steel grades	Carbon steels (low, medium and high carbon), tube steels, stainless steels
Slab	
Thickness	200 - 250 mm
Width	800 - 1,680 mm
Length	6,000 - 12,000 mm
Weight	37.0 t
Finished strip	
Thickness	1.4 - 25.4 mm
Width	800 - 1,680 mm
Coil	
Outside diameter	max. 2,100 mm
Spec. coil weight	max. 22.0 kg/mm
Total weight	37.0 t

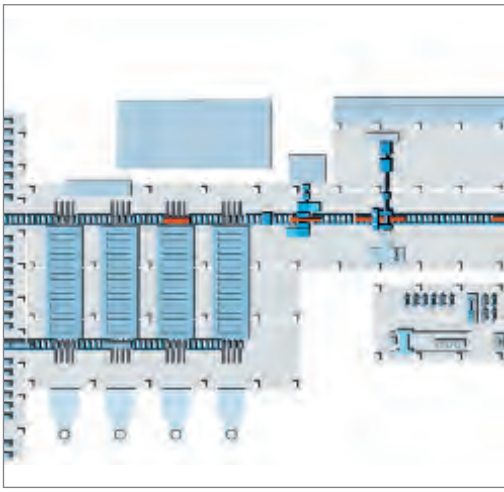
Shougang Jingtang United Iron & Steel, Caofeidian, China

Hot strip mill in new industrial complex

The high-capacity hot strip mill at Shougang Jingtang United Iron & Steel produced its first strip in December 2008. It's located on the island of Caofeidian off the coast of Hebei province, where the Chinese steelmaker Shougang Iron & Steel has erected a complete iron and steel works. We also supplied a combined pickling line/tandem cold mill and several strip processing lines for the works complex.

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 and shifting 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.

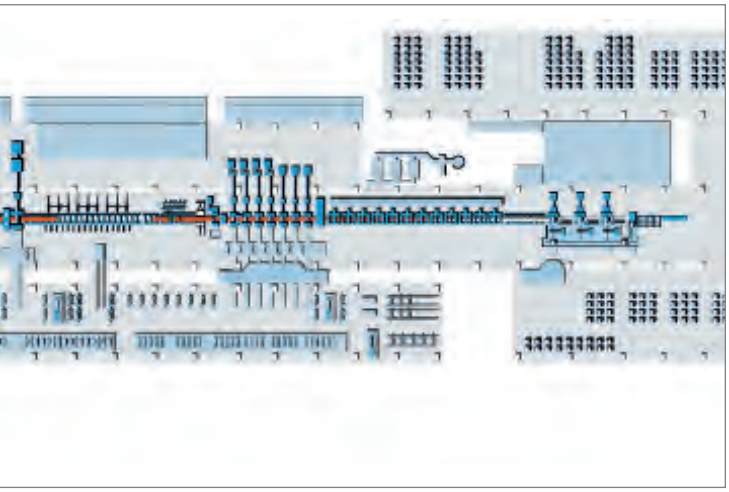
What clinched the deal were not only our highly developed, tried-and-tested components but also the positive experience that Shougang Iron & Steel had gained working with us. In addition to the X-Roll® hot strip mill at the Qian'an location, we also supplied the company with a heavy plate mill, a combined pickling line/tandem cold mill, and several facilities for strip processing.



Top: Automatic work roll changing in the seven-stand finishing mill.

Left: Drive engineering from SMS group.

Right: Layout of the hot strip mill.



Main components

- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Heat panels
- 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

Technical Data

Commissioning	December 2008
Annual capacity	5.5 million t
Steel grades	Carbon steels (low, medium and high carbon), tube steels, steels for automotive structural components
Slab	
Thickness	230 mm
Width	900 - 2,150 mm
Length	4,500 - 11,000 mm
Weight	40.0 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	830 - 2,130 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	40.0 t

Benxi Iron & Steel
Benxi, China

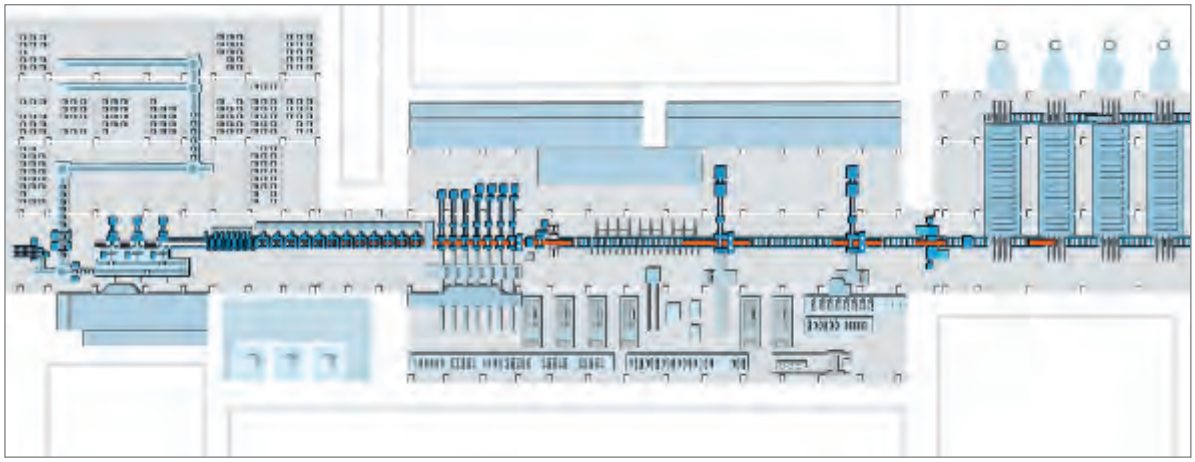
Modern cooling technologies

The high-capacity hot strip mill at Benxi Iron & Steel went into operation in November 2008. The new mill enabled the company to increase its hot strip capacity by 5.15 million tons, and it's now able to tap into 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, plus three fully hydraulic downcoilers.

The combination of laminar and compact cooling offers Benxi Iron & Steel 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 volumes of water, and therefore very high cooling rates. To ensure additional flexibility, SMS replaced the first five of the 20 cooling groups in the laminar cooling system with super-reinforced units.

The two-stand roughing train; in the background: the finishing train.



Layout of the hot strip mill.

Compact cooling system.

Main components

- Slab sizing press
- Two-high reversing roughing stand with edger
- Four-high reversing roughing stand with edger
- Heat panels
- 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 capacity	5.15 million 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)

Thickness	230 and 250 mm
Width	1,000 - 2,200 mm
Length	4,500 - 11,000 mm

Slab (stainless steels)

Thickness	180 and 200 mm
Width	1,000 - 2,150 mm
Length	4,500 - 11,000 mm

Finished strip (carbon steels)

Thickness	1.2 - 25.4 mm
Width	1000 - 2,150 mm

Finished strip (stainless steels)

Thickness	2.0 - 20.0 mm
Width	1,000 - 2,150 mm

Coil

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

Handan Iron & Steel
Handan, China

Hot-strip mill for 4.5 million t

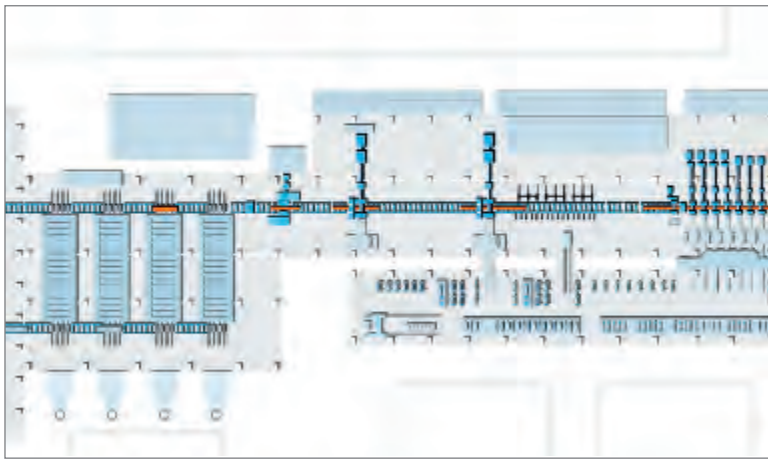
The X-Roll® hot strip mill at Handan Iron & Steel went into operation in August 2008. In addition to the mechanical equipment, we supplied the profile and flatness model for this mill and, as the consortium leader, coordinated the companies participating in the project.

The mill is designed as a high-capacity hot strip mill and features 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 a four-high construction give the mill a particularly high degree of flexibility in the drafting pattern for the roughing mill.

Automatic Step Control in the coiler unit allows careful winding of the strips. Special polishing devices regularly clean the pinch rolls, thereby preventing pick-ups that may cause damage to the strip surface.

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

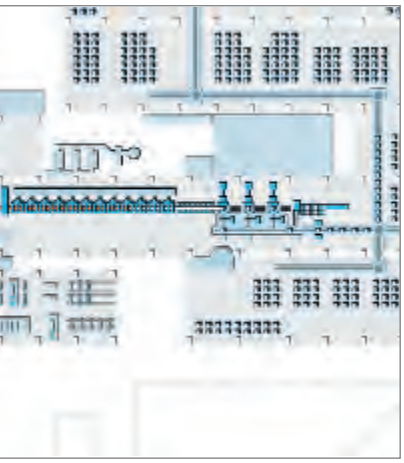
Laminar cooling system with edge masking.



Layout of the hot strip mill.

Main components

- Slab sizing press
- Two four-high reversing roughing stands with edger
- Heat panels
- 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



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

Technical Data

Commissioning	August 2008
Annual capacity	4.5 million 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 - 250 mm
Width	900 - 2,150 mm
Length	4,800 - 11,000 mm
Weight	40.0 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	800 - 2,130 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	40.0 t

Maanshan Iron & Steel
Maanshan, China

The first line with a pallet conveyor system

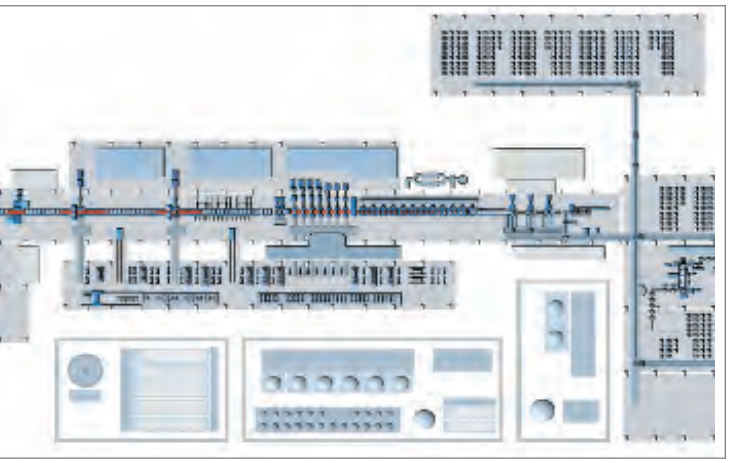
Within a few years, Maanshan Iron & Steel (Masteel) has become one of China's most important hot strip producers, thanks to plants from SMS group. Initially, the CSP® plant went into operation in 2004, followed three years later by the new X-Roll® hot strip mill.

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

Here at Masteel, for the first time, an innovative pallet conveyor system has been installed 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 conveyor system keeps investment, maintenance, and operating costs lower than for conventional systems and also provides for a flexible layout.

Roughing train with two four-high reversing stands

Pallet conveyor system.



Layout of the hot strip mill.

Main components

- Slab sizing press
- Two four-high reversing roughing stands with edger
- Heat panels
- 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, 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
- Three hydraulic coilers with
  - Automatic Step Control
  - Pinch roll polishing devices
- Pallet conveyor system

Technical Data

Commissioning	February 2007
Annual capacity	5.5 million t
Steel grades	HSLA steel, carbon steel grades (low, medium and high carbon), steels for automotive structural components, tube steels, steel for pressure purposes
Slab	
Thickness	230 and 250 mm
Width	800 - 2,130 mm
Length	4,800 - 12,000 mm
Weight	max. 45.0 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	800 - 2,130 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	40.0 t

- Cold charging of slabs
- Hot charging of slabs

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 mill reached its nominal capacity of 330,000 tons/month.

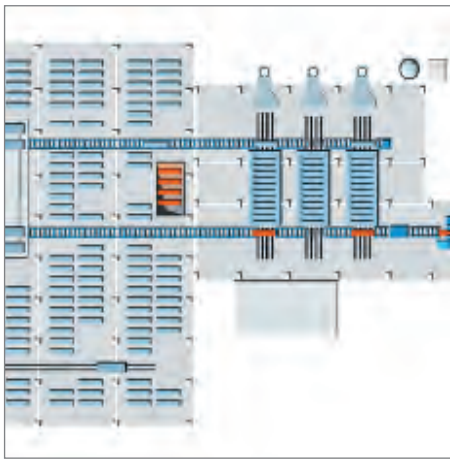
The powerful roughing train at Shougang Iron & Steel consists of a slab sizing press, plus a two-high and a four-high reversing roughing stand. This gives the line the potential for increased production in the future.

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

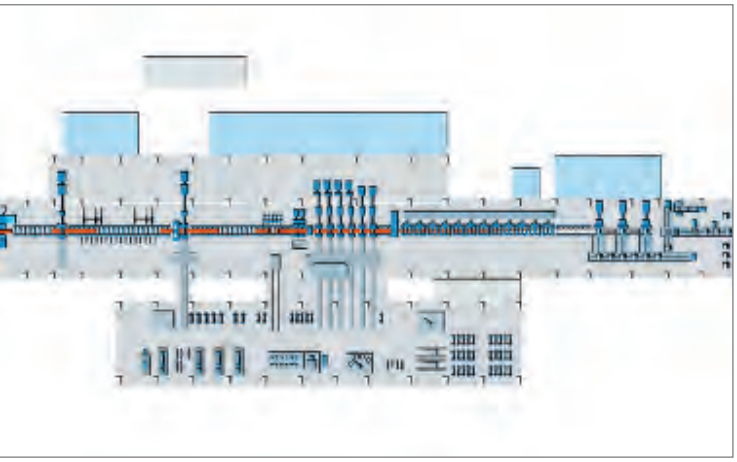
Here, Shougang produces not only strips for processing in the cold rolling mill supplied by SMS group, but also multiphase steel grades and high-strength tube steels. Even at the hot commissioning stage, Shougang Iron & Steel received the commercial certification for a tube steel in strength class X80.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

Six-stand finishing train with CVC® plus technology.

Exit side of the slab sizing press.



Layout of the hot strip mill.



Main components

- Slab sizing press
- Two-high reversing roughing stand
- Four-high reversing roughing stand with edger
- Heat panels
- 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
  - Roll quick-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 capacity	Initial stage 4 million t
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	
Thickness	230 (250) mm
Width	900 - 2,150 mm
Length	4,000 - 10,500 mm
Weight	max. 38.5 t
Finished strip	
Thickness	1.5 - 19.0 mm
Width	750 - 2,130 mm
Coil	
Outside diameter	max. 2,220 mm
Spec. coil weight	max. 24.0 kg/mm
Total weight	38.0 t

Taiyuan Iron & Steel
Taiyuan, China

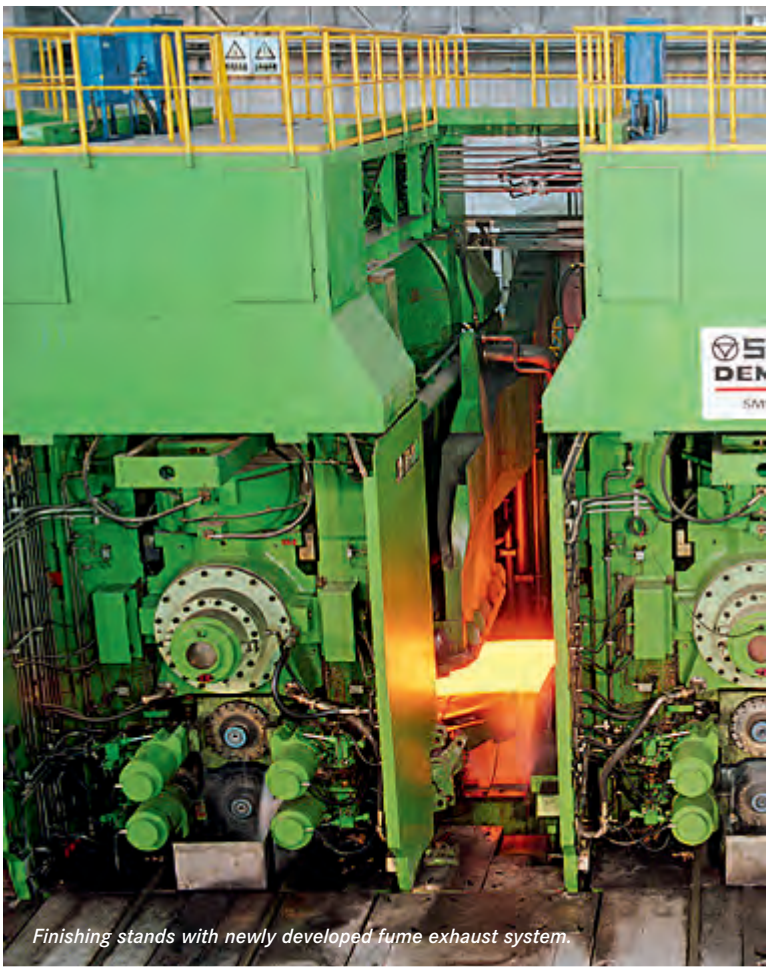
China's largest stainless steel producer

What began with the commissioning of the X-Roll® hot strip mill in the summer of 2006 was the fact that Taiyuan Iron & Steel took 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 equal proportions of stainless steel strips and carbon steel strips.

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, ensuring constant conditions during finish rolling. This enables Taiyuan Iron & Steel to produce stainless steel strip with a minimum gage of 2.0 millimeters.

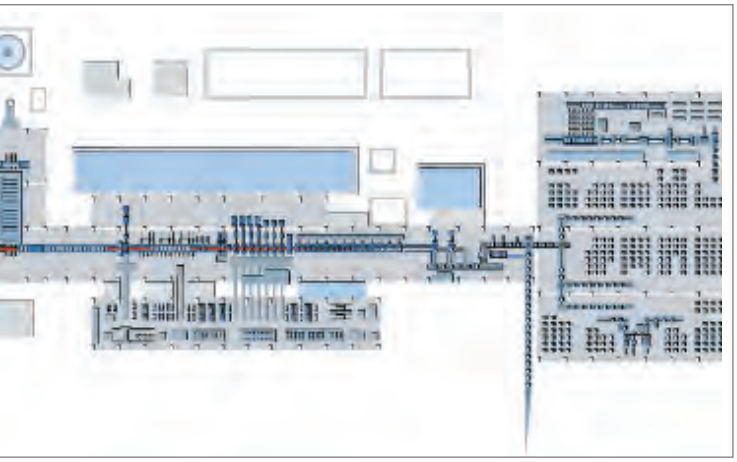
In order to extend the product range for high-strength steels, SMS modernized the laminar cooling system and supplied a UNI plus coiler in 2012. In the strip cooling section, the entire laminar cooling system was dismantled and replaced with reinforced cooling groups to increase the water volumes for faster cooling. Each row of cooling tubes can be switched separately, providing an extremely high degree of flexibility to implement a wide variety of cooling strategies.

The UNI plus coiler is one of the world's most powerful coilers. It's designed for coiling tube grades in strength classes X100 and X120 as well as for high-strength dual-phase steels. To ensure reliable discharge and safe processing of the coils, the coiler includes an innovative coil transfer trolley, a patented coil hold-down device, and an optimized coil strapping machine.



Finishing stands with newly developed fume exhaust system.

Coiler unit.



Layout of the hot strip mill.

Main components

- 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

Technical Data

Commissioning	June 2006
Annual capacity	4 million t, of which 2 million t stainless steels
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 - 250 mm
Width	1,000 - 2,130 mm
Length	4,800 - 12,000 mm
Stainless steels	
Thickness	180 - 200 mm
Width	1,000 - 2,100 mm
Length	4,800 - 12,000 mm
Weight	max. 40.0 t
Finished strip	
Carbon steels	
Thickness	1.2 - 25.4 mm
Width	1,000 - 2,130 mm
Stainless steels	
Thickness	2.0 - 20.0 mm
Width	1,000 - 2,100 mm
Coil	
Outside diameter	max. 2,150 mm
Spec. coil weight	max. 23.0 kg/mm
Total weight	40.0 t

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 we supplied. The mill was initially designed for an annual production of 3.5 million tons. Early on, in the same year as commissioning, Wisco decided to implement the second construction stage, increasing capacity to 4.5 million tons. In fact, Wisco now achieves an annual production of more than 5 million tons.

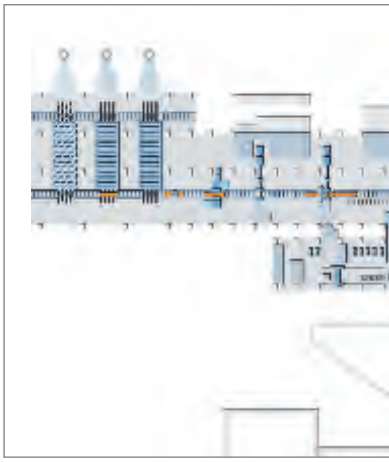
Wisco's hot strip mill was the first facility in China for strips with widths greater than 2,000 millimeters. Sales markets for strips of this width include the automotive industry.

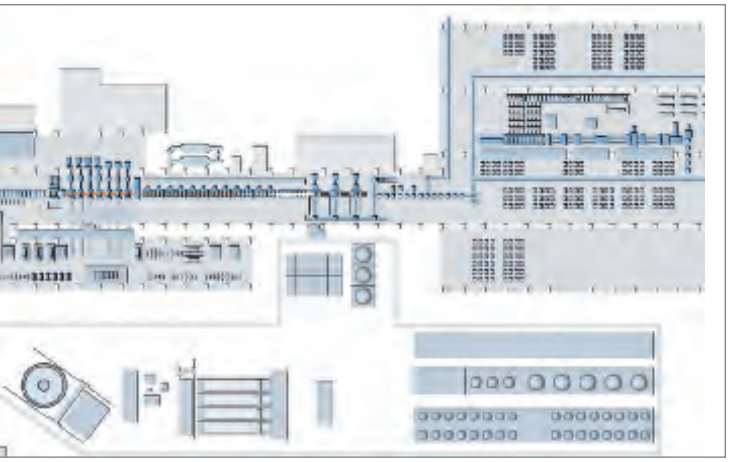
The Wisco plant was the first hot strip mill in China to be equipped with a slab sizing press. This gave it the unique capability of flexible coordination of the casting widths and strip widths. The four-high reversing roughing stand and the finishing stands are fitted with hydraulic roll-gap adjustment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

The CSP® facility we built went into operation at Wuhan Iron & Steel at the beginning of 2009. Wisco uses this line to manufacture products such as multiphase steels and magnetic steel strip.

Slab sizing press.


Roughing stand.


Layout of the hot strip mill.



Main components of the first construction stage

- Slab sizing press
- Four-high reversing roughing stand with edger
- Heat panels
- 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 of the second construction stage

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

Technical Data

Commissioning	March 2003
Annual capacity	
First construction stage	3.5 million t
Second construction stage (2004)	4.5 million t

- Cold charging of slabs
- Hot charging of slabs
- Direct charging of slabs

Steel grades	Carbon steels (low, medium and high carbon), IF steels, multiphase steels, tube steels up to X80
Slab	
Thickness	230 - 250 mm
Width	800 - 2,150 mm
Length	4,500 - 11,000 mm
Weight	38.5 t
Finished strip	
Thickness	1.2 - 25.4 mm
Width	700 - 2,130 mm
Coil	
Outside diameter	2,150 mm
Spec. coil weight	24.0 kg/mm
Total weight	38.5 t

Arcelor-Mittal Tubarão
Vitória, Brasilien

Turnkey facility

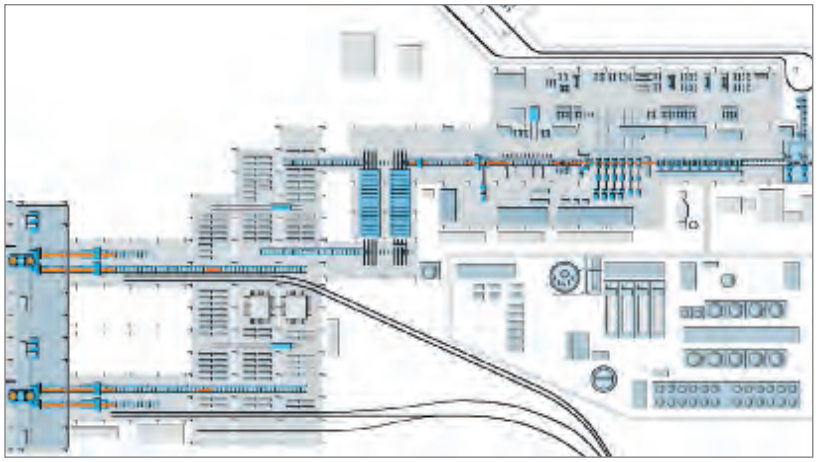
Since 2002, ArcelorMittal Tubarão (formerly CST) has been operating a compact hot strip mill supplied by us on a turnkey basis. This mill has enabled ArcelorMittal Tubarão to extend its good reputation as a manufacturer of top-quality slabs to the hot strip field.

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

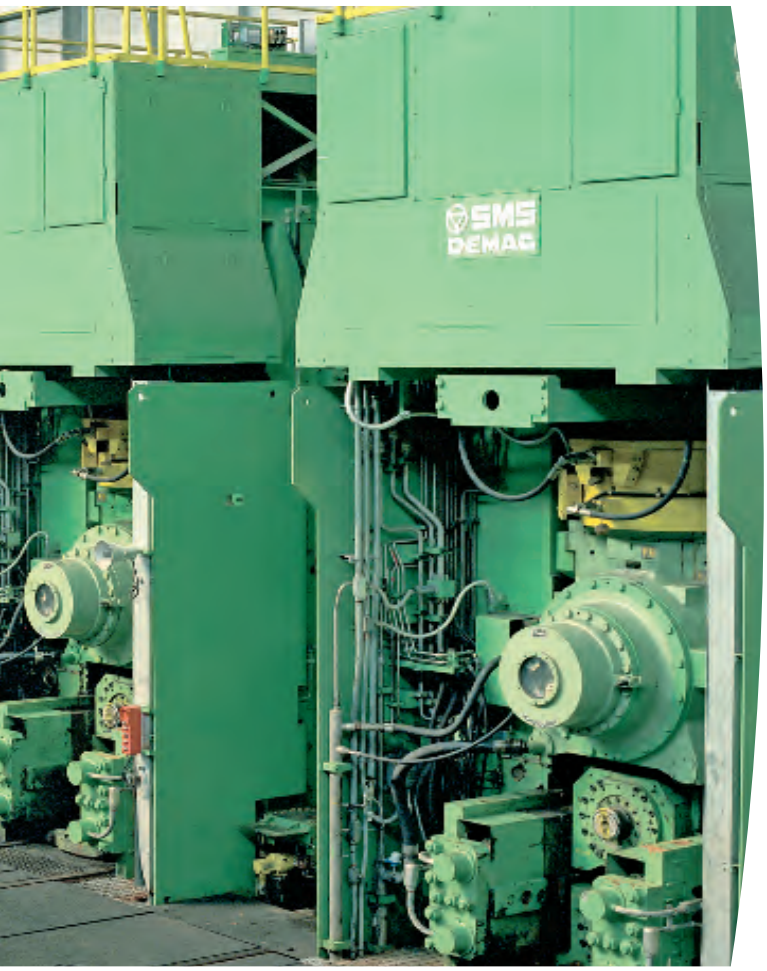
The slabs for the hot strip mill are produced by two continuous casters we supplied. These are arranged in such a way that the slabs can be fed into the hot strip mill by hot charging.

The mandrelless coilbox and the finishing stands – equipped with all the latest actuators – allow the production of hot strip with very close geometrical and metallurgical tolerances. A special thin-strip technology package enables our customer to produce minimal strip gages of just 1.0 millimeter. Included in this package are our high-speed gage control system (AGC) and looper technology.

Finishing train.


Layout of the hot strip mill.


Laminar strip cooling.



Mandrelless coilbox.

Main components

- Four-high reversing roughing stand with edger
- Mandrelless coilbox
- Drum-type 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 system, anti-peeling device, 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 with
  - PCFC® (profile, contour and flatness control system)
  - CSC (process model for laminar strip cooling)
  - TCS (technological control systems for the finishing train and coilers)

Planned extensions

- One walking-beam furnace
- One four-high reversing roughing stand

Technical Data

Commissioning	August 2002
Annual capacity	
First construction stage	2 million t
Second construction stage (2008)	4 million t

- Cold charging of slabs
- Hot charging of slabs

Steel grades	Structural steels, ULC steels, IF steels, high-carbon steels, high-strength low-alloy steels, tube steels
Slab	
Thickness	200 - 250 mm
Width	750 - 1,955 mm
Length	4,500 - 11,500 mm
Weight	max. 40.0 t
Finished strip	
Thickness	1.2 (1.0) mm to 16.0 mm
Width	700 - 1,880 mm
Coil	
Outside diameter	2,100 mm
Spec. coil weight	max. 22.5 kg/mm
Total weight	40.0 t

Further references prior to 2000

Baoshan Iron & Steel
Shanghai, China

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 system
- Three coilers

Annual capacity 4.2 million t

Steel grades Carbon steels, tube grades

Finished strip

Thickness	1.2 - 25.4 mm
Width	600 - 1,900 mm

Special features
- CVC® technology in all finishing stands for the first time
- Production of significantly more than 100 million tons of hot strip since 1989

Modernization
by SMS group in 2012 with
- New primary descaler
- New sizing press (SSP)
- Modernization of edger E2 and roughing stand R2
- New main drive for finishing stand F4
- New spindles for finishing stands F1 and F2

See our list of references for more hot strip mills supplied by SMS group.

Tata Steel
Jamshedpur, India

Commissioning 1993

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

Annual capacity 3.55 million t

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

Finished strip

Thickness	1.2 - 12.0 mm
Width	650 - 1,550 mm

Sahaviriya Steel Industries
Bang Saphan, Thailand

Commissioning 1994

Main components
- Four-high roughing stand with 2 edgers
- Coilbox
- Seven-stand finishing mill with CVC®plus
- Laminar strip cooling
- Three coilers

Annual capacity 2.4 million t

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

Finished strip

Thickness	1.0 - 19.0 mm
Width	750 - 1,550 mm

Essar Steel
Hazira, India

Commissioning 1996

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

Annual capacity 3 million t

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

Finished strip

Thickness	1.6 - 20.0 mm
Width	750 - 2,000 mm

China Steel Corp.
Kaohsiung, Taiwan

Commissioning 1997

Main components
- Two-high roughing stand with edger
- Four-high roughing stand with edger
- Seven-stand finishing mill
- Laminar strip cooling
- Two coilers

Annual capacity 2.7 million t
of which 160,000 t stainless steels

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

Finished strip

Thickness	1.2 - 12.7 mm
Width	914 - 1,880 mm

Arcelor-Mittal Eisenhüttenstadt
Germany

Commissioning 1997

Main components
- Four-high roughing stand with edger
- Mandrelless coilbox
- Five-stand finishing mill with CVC®plus
- Laminar strip cooling
- One coiler

Annual capacity 1.5 million t

Steel grades
Low-carbon steels, IF steel grades, (weatherproof) structural steels, high-strength and micro-alloyed steels, non-grain-oriented silicon steels

Finished strip

Thickness	1.5 - 13.0 mm
Width	600 - 1,640 mm

Saudi Iron & Steel Company
Al-Jubail, Saudi-Arabia

Commissioning 1999

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

Annual capacity 2 million t

Steel grades
Structural steels, steels for welded pipes, tube steels up to X60, HSLA grades

Finished strip

Thickness	1.2 - 16.0 mm
Width	900 - 1,650 mm

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