MULTIROLL MILL STANDS
for stainless-steel strip
STAINLESS STEEL, a multipurpose material

FROM ARCHITECTURE AND HOUSEHOLD APPLIANCES TO VEHICLE CONSTRUCTION

Stainless steel is a premium material for a wide range of applications. Wherever there is a need for corrosion-resistance, aesthetics, and durability, stainless steel is the first choice. Also significant is its unlimited recyclability which notably helps protect our environment.

Architecture and façades
Beautiful and resistant to environmental impacts – stainless steel provides building protection in perfection.

Chemicals and petrochemicals
Resistant to corrosion, acid, and heat as well as extremely strong – stainless steel is ideally suited for the processes in the chemical and petrochemical industry.

Medical instruments and the food industry
Hygienic, clean, and robust – stainless steel meets indispensable requirements for applications in medicine and the food industry.

Household appliances
Ultra-polished or brushed matt finish, simple elegance combined with excellent formability – stainless steel is a fascinating material that brightens up even daily routines like cooking, doing the laundry, and washing the dishes.

Vehicle construction
High-strength, lightweight, energy-absorbing, and resource-saving – stainless steel comes with the ideal properties for automotive and vehicle construction.

Offshore technology and shipbuilding
Aggressive seawater, wind, and weather – the kind of environment where corrosion-resistant and robust duplex steels excel.
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TOP TECHNOLOGY
for top products

EXPERTISE IN PLANT TECHNOLOGY FOR STAINLESS STEEL

SMS group ranks among the leading suppliers of plant technology and equipment for the production of high-quality stainless-steel strip. Operating on a global scale, we have already supplied more than 100 cold-rolling mills for stainless, silicon, and standard steels. Yet also included in the SMS group portfolio are annealing and pickling lines for cold and hot strip, bright-annealing lines, skin-pass mills as well as preparation and finishing lines. Plus, in recent years, we have continuously expanded our Electrics and Automation as well as Service Divisions. That’s why SMS group is in a position to offer its worldwide customer base the full range of plant technology and equipment for producing high-quality stainless-steel products.

MONOBLOCK, SPLITBLOCK AND 18-HIGH COLD ROLLING MILLS

To enable our customers to produce stainless-steel cold strip, SMS group supplies powerful 20-high rolling mills as stand-alone systems operating in reversing mode. They come in two versions: the closed, robust MonoBlock design or the more flexible SplitBlock type. Both types of roll stand achieve minimum thicknesses down to 0.1 mm at rolling speeds of up to 1,000 m/min and maximum thickness reductions of up to 90%. Also available is the option to choose our 18-HS stands with 18-HS roll sets. They are particularly suited for integration and use in continuous production facilities.

Fully automated high-speed roll changing and ultra-dynamic control systems are a must for the implementation of a continuous production process. Using several stands in tandem arrangement forms the basis for a high-performance plant concept designed to produce premium-quality stainless-steel strip cost-effectively.

Moreover, the complete design of our 18-HS roll sets makes it possible to revamp existing four-high or six-high stands. That cuts investment costs compared to new plants.

Specifically for rolling a very wide product range covering everything from soft IF grades to high-strength steel including stainless steels, SMS has developed the CVC® plus M 18/4. This multi-function stand type can also be retrofitted into existing stands. An extra advantage are the rapid and easy-change roll set packages in CVC® plus four-high and 18-HS design. One problem steelmakers face is that it’s barely possible to make a profit when producing small batches on specialized rolling mills. Our solution means manufacturers can expand their product ranges at low investment costs.

EXPLANATION OF TYPE DESIGNATION

Example: SB22-52”: SB = SplitBlock; 22 = size identification code; 52” = rollable width in inches
SPLITBLOCK STANDS

- HYSCO,
  SB 22 - 52”, mills No. 1 + 2
- Chia Far Industrial Factory
  SB 22 - 54”, mill No. 2
- Yieh United Steel,
  SB 22 - 52”, mill No. 2
- Lianzhong Stainless Steel,
  SB 22 - 52”, mill No. 1
- VDM Metals GmbH,
  SB 33 - 30”
- Yieh United Steel,
  SB 22 - 52”, mill No. 1
- Outokumpu, SB 21 - 64”
- Posco, SB 21 - 52”
- Outokumpu Nirosta Krefeld,
  SB 21 - 53”

MONOBLOCK STANDS

- NAS (Acerinox Group),
  MB 22 B - 54”, mill No. 6
- Bahru Stainless (Acerinox Group),
  MB 22 B - 52”, mill No. 2
- Benxi Steel Group,
  MB 22 B - 54”, mills No. 1 + 2
- BSSB (Bao Steel),
  MB 22 B - 52”, mill No. 2
- ZJYTSS Zhejiang Yuantong Stainless
  Steel, MB 22 B - 54”, mills No. 3 + 4
- Acciai Speciali Terni, MB 22 B - 54”,
  mill No. 7
- ZJYTSS Zhejiang Yuantong Stainless
  Steel, MB 22 B - 54”, mill No. 2
- Lianzhong Stainless Steel,
  MB 21 BB - 63”, mill No. 2
- Shanxi Taigang Stainless Steel,
  MB 22 B - 52”, mill No. 4 bis 8
- ZJYTSS Zhejiang Yuantong Stainless
  Steel, MB 22 B - 54”, mill No. 1
- Shanghai Krupp Stainless,
  MB 22 B - 53”
- Acciai Speciali Terni, MB 21 BB - 62”,
  mill No. 6

18-HIGH STANDS

- Shanxi Taigang Stainless Steel,
  18-HS ZR 615 A - 64”,
  5-Stand WRAP Line
- POSCO,
  18-HS ZR 613 A - 52”,
  4-Stand CTCM Line
- Yieh United Steel,
  18-HS ZR 613 A - 52”,
  mill No. 5

Overview of mills supplied.

SplitBlock design.

MonoBlock design.
HANYANG STAINLESS STEEL COMPANY (HYSCO), China

SPLITBLOCK STANDS

Two 20-high cold rolling mills

We supplied these two plants to our Chinese customer HanYang Stainless Steel Company (HYSCO) near the capital city of Guangdong Province, Guangzhou, formerly known as Canton. HYSCO is a subsidiary of Yieh United Steel Co. (YUSCO). In recent years SMS group delivered as many as five multiroll cold rolling mills destined for the parent company and its subsidiaries.

The two new rolling mills cold-roll stainless-steel hot strip of series AISI 200, 300 and 400 with top-quality strip surfaces. Built in the proven SplitBlock design and SB 22 - 52” size, they are ideal for strip widths of 800 to 1,300 mm and a maximum entry thickness of 6.0 mm. The total drive power is 12,900 kW, with a maximum rolling force of 8,000 kN. Each of the stands comes with a capacity of some 80,000 tpy.

We manufactured and pre-assembled the 20-high cold rolling mill stands in our workshop in Hilchenbach.

This pre-assembly as well as extensive functional testing in our production shop guaranteed hitch-free installation and commissioning for a fast start of production by our Chinese customer.

Included in the scope of supply is our tried-and-tested SUPAFINE® filter system for cooling and ultrafine filtering of the rolling oil. What makes our SUPAFINE® filter systems stand out is their top cleaning performance at low operational costs. They do not require any filter aids, plus they generate little waste, while oil consumption is low. The system is fully automated for maximum operational safety.
**TWO 20-HIGH MILL STANDS**  
SplitBlock SB 22 - 52”

**Commissioning**  
2012

### Production data

<table>
<thead>
<tr>
<th>Material</th>
<th>stainless-steel strip AISI 200, 300, and 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>800 to 1,300 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td></td>
</tr>
<tr>
<td>ingoing</td>
<td>max. 6.0 mm</td>
</tr>
<tr>
<td>outgoing</td>
<td>min. 0.15 mm</td>
</tr>
<tr>
<td>Coil weight</td>
<td>max. 28,000 kg</td>
</tr>
</tbody>
</table>

### Technical data

<table>
<thead>
<tr>
<th>Stand type</th>
<th>SB 22 - 52”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling speed</td>
<td>max. 700 m/min</td>
</tr>
<tr>
<td>Rolling force</td>
<td>8,000 kN</td>
</tr>
<tr>
<td>Strip tension</td>
<td>max. 500 kN</td>
</tr>
<tr>
<td>Capacity</td>
<td>80,000 tpy</td>
</tr>
</tbody>
</table>

### Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A/D and F/G
- Shifting of first intermediate rolls by means of a push/pull system
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
Using its new X-Roll® cold rolling mill in SplitBlock design, the Taiwanese company produces superior-grade stainless-steel strip that meets the high surface quality requirements of the IT industry. The size-SB 22 - 54” cold rolling mill rolls austenitic and ferritic strip in widths from 650 to 1,350 mm with a maximum entry thickness of 5.0 mm down to a minimum final thickness of 0.15 mm. Extra special here is that the plant can handle thicker stainless-steel strip as input stock. This material is cheaper than thinner input stock.

There are further advantages due to the design of the stand. The split structure in an upper and a lower half means the stand opens wider. As a result, it can accommodate larger-diameter work rolls. Simultaneously, the design provides very easy access during roll changing.

Threading in the strip head end also gets easier. The cooling effect is enhanced because the heat can dissipate more effectively through the halves of the stand. We also added a roll changing robot for optimized, reproducible work roll and intermediate roll changing. The robot changes the work rolls in pairs fully automatically and in record time.

Included in the scope of delivery is our tried-and-tested SUPAFINE® filter system for cooling and ultrafine filtering of the rolling oil used. What makes our SUPAFINE® filter systems stand out is their top cleaning performance at low operational costs. They do not require any filter aids, plus they generate little waste, while oil consumption is low. The system is fully automated for maximum operational safety.
20-HIGH MILL STAND
SplitBlock SB 22 - 54”

Commissioning 2012

Production data
Material stainless-steel strip
AISI 300 and 400 series
Strip width 650 to 1,350 mm
Strip thickness
  ingoing max. 5.0 mm
  outgoing min. 0.15 mm
Coil weight max. 29,000 kg

Technical data
Stand type SB 22 - 54”
Rolling speed max. 800 m/min
Rolling force 8,000 kN
Strip tension max. 500 kN
Capacity 100,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A/D and F/G
- Shifting of first intermediate rolls by means of a push/pull system
- Fully automated roll changing robot
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
YIEH UNITED STEEL, Taiwan
Mill No. 2

SPLITBLOCK STANDS

Second 20-high stand from SMS

This size-22 SplitBlock stand is the second roll stand SMS group built for Yieh United Steel Corporation (YUSCO). Here again, due to its good experience with the first facility, our customer opted for this proven design.

Just like mill stand No. 1, this second cold rolling stand incorporates all the actuators or control elements required for roll-gap setting. This is ideal for processing all sorts of strip qualities into precisely rolled finished products.

Also included are a thickness and flatness control system as well as a mathematical model developed by SMS that preset all rolling parameters and controls them fully automatically during rolling. There was no need to install an extra uncoiling station because the starting material is introduced into the process directly at the reversing coilers.
20-HIGH MILL STAND  
SplitBlock SB 22 - 52”

Commissioning  2008

Production data
Material  stainless-steel strip  
AISI 300 and  
400 series
Strip width  800 to 1,300 mm
Strip thickness
  ingoing  max. 6.0 mm  
  outgoing  0.15 to 3.0 mm
Coil weight  max. 28,000 kg

Technical data
Stand type  SB 22 - 52”  
Rolling speed  max. 700 m/min  
Rolling force  max. 7,850 kN  
Strip tension  max. 500 kN  
Capacity  80,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)  
- Crown adjustment for backup shafts A/D and F/G  
- Shifting of first intermediate rolls by means of a push/pull system  
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used  
- Mathematical model  
- Thickness and flatness control systems
Lianzhong Stainless Steel Corporation (LISCO), a subsidiary of Taiwan’s Yieh United Steel Corporation, is a production facility built on a greenfield site in southern China. To equip this new plant, SMS supplied one size-22 SplitBlock stand for a rolling width of 1,300 mm as well as one size-21 MonoBlock stand for 1,600-mm-wide strip. Both stands were completed within a very short time and went on stream in 2006.

The 20-high SplitBlock stand, built in our Hilchenbach workshops, was completely preassembled, including entry and exit-end equipment as well as the stand platform. That allowed us to test the key motions and functions of the hydraulic system prior to final installation in our customer’s works. As a result, we managed to cut the original erection and commissioning schedule by several weeks.

There are also various actuators or control elements for roll-gap setting that ensure the cold-rolling stand can process a whole range of strip qualities. Also featured is a thickness and flatness control system. All rolling parameters are preset by SMS on the basis of a mathematical model and controlled fully automatically during the rolling process.
20-HIGH MILL STAND
SplitBlock SB 22 - 52”

Commissioning  2006

Production data
Material        stainless-steel strip
                AISI 300 and
                400 series
Strip width     800 to 1,300 mm
Strip thickness
inesis            max. 6.0 mm
outgoing            0.15 to 3.0 mm
Coil weight      max. 28,000 kg

Technical data
Stand type       SB 22 - 52”
Rolling speed    max. 700 m/min
Rolling force    max. 7,850 kN
Strip tension    max. 500 kN
Capacity         80,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A/D and F/G
- Shifting of first intermediate rolls by means of a push/pull system
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
20-high stand for foil production

SMS group received an order from VDM Metals, Germany to build a 20-high cold rolling mill. It is designed for the safe and reliable production of foils – especially ultrathin foils down to a minimum final thickness of 20 µm.

The foils consist of high-strength special alloys and are used for instance in automotive catalytic converters. SMS supplied the plant on a turnkey basis complete with mechanical equipment, utility systems, and electrics and automation.

Also featured are highly dynamic actuators and effective control systems in the roll stand that optimize the production of ultrathin foils with thickness tolerances down to 1 µm. To achieve this level of performance, the mill is equipped with feed-forward and feed-backward mass-flow control systems for thickness control. Here, for the first time in a cold-rolling facility, we incorporated our new SMS flatness measuring roll with closed roll surface.

The mill stand is fitted with all control elements required to produce super-flat strip. This includes crown adjustment on backup shafts A and D, shifting of the first intermediate rolls, and adjusting options such as tilting and swiveling of the top roll set by an AGC system.

The additional uncoiling station with pay-off reel and S-roll set reduces the nonproductive times during coil changing and ensures maximum strip tensions during the initial pass.
20-HIGH MILL STAND
SplitBlock SB 33 - 30”

Commissioning 2002

Production data

<table>
<thead>
<tr>
<th>Material</th>
<th>stainless-steel strip AISI 300 and 400 series, special steels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>350 to 750 mm</td>
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<tr>
<td>Strip thickness ingoing</td>
<td>max. 1.0 mm</td>
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<tr>
<td>Strip thickness outgoing</td>
<td>0.02 mm</td>
</tr>
<tr>
<td>Coil weight</td>
<td>max. 9,500 kg</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Stand type</th>
<th>SB 33 - 30”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling speed</td>
<td>max. 600 m/min</td>
</tr>
<tr>
<td>Rolling force</td>
<td>max. 2,100 kN</td>
</tr>
<tr>
<td>Strip tension</td>
<td>max. 27 kN</td>
</tr>
<tr>
<td>Capacity</td>
<td>5,000 tpy</td>
</tr>
</tbody>
</table>

Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A and D
- Shifting of first intermediate rolls by means of a push/pull system
- Additional uncoiling station with S-roll set
- Plate-type filter system for cooling and ultrafine filtering of the rolling oil used
- Complete automation including thickness and flatness control systems from SMS Siemag

Exit section.
YIEH UNITED STEEL, Taiwan
Mill No. 1

SPLITBLOCK STANDS

First SplitBlock stand in size SB22

The 20-high mill stand at Yieh United Steel Corporation is the first size-22 SplitBlock stand ever built by SMS group. Taiwan’s largest stainless-steel producer, Yieh United Steel Corporation (YUSCO) operates this 20-high mill to roll strip in widths of 800 to 1,300 mm down to final thicknesses of 0.15 mm.

Using its large number of actuators or control elements for roll-gap setting, the roll stand is able to process a whole range of strip qualities. This was the first time we positioned the hydraulic roll-gap adjusting cylinders in the upper part of the stand to provide ready access for maintenance. All rolling parameters are preset by a mathematical model from SMS and controlled fully automatically during the rolling process. Also installed are control systems to ensure precise final thicknesses and perfectly flat strip.

The coils go directly on the reversing coiler, so there is no need for a separate uncoiling station with pinch roll leveler.
20-HIGH MILL STAND
SplitBlock SB 22 - 52"

Commissioning 2001

Production data
Material: stainless-steel strip
AISI 300 and 400 series
Strip width: 800 to 1,300 mm
Strip thickness:
  ingoing: max. 6.0 mm
  outgoing: 0.15 to 3.0 mm
Coil weight: max. 28,000 kg

Technical data
Stand type: SB 22 - 52"
Rolling speed: max. 700 m/min
Rolling force: max. 7,850 kN
Strip tension: max. 500 kN
Capacity: 80,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A/D and F/G
- Shifting of first intermediate rolls by means of a push/pull system
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
OUTOKUMPU, Finland

SPLITBLOCK STANDS

20-high stand for wide stainless-steel strip

The largest SplitBlock stand ever built by SMS group is in operation at Outokumpu (formerly Outokumpu Stainless Steel) in Tornio, Finland. It's the third 20-high roll stand at the Tornio location. Featuring a rolling force of 16,000 kN and a maximum strip tension of 600 kN, this powerful facility is able to process stainless-steel strip in widths of up to 1,625 mm and ingoing thicknesses of up to 8 mm. Coil handling is fully automated using self-driven coil cars.

The backup shafts are secured in the stand block by a hydraulic saddle clamping device, so there is no need for the maintenance crew to detach them manually. Equally impressive is a robot system that changes the work rolls and the first intermediate rolls fully automatically. The uncoiling station with leveler unit reduces idle times during coil changing.

A large number of actuators or control elements for roll-gap setting ensure perfect processing of a whole range of strip qualities. Also included are a thickness and flatness control system, a mathematical model for presetting the rolling parameters, and fully automatic rolling process control.
20-HIGH MILL STAND
SplitBlock SB 21 - 64”

Commissioning 1996

Production data

<table>
<thead>
<tr>
<th>Material</th>
<th>stainless-steel strip AISI 300 and 400 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>800 to 1,625 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td></td>
</tr>
<tr>
<td>ingoing</td>
<td>max. 8.0 mm</td>
</tr>
<tr>
<td>outgoing</td>
<td>min. 0.3 mm</td>
</tr>
<tr>
<td>Coil weight</td>
<td>max. 28,000 kg</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Stand type</th>
<th>SB 21 - 64”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling speed</td>
<td>max. 800 m/min</td>
</tr>
<tr>
<td>Rolling force</td>
<td>max. 16,000 kN</td>
</tr>
<tr>
<td>Strip tension</td>
<td>max. 600 kN</td>
</tr>
<tr>
<td>Capacity</td>
<td>150,000 tpy</td>
</tr>
</tbody>
</table>

Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A to D
- Shifting of first intermediate rolls by means of a push/pull system
- Fully automated roll-changing robot
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAMIC® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
POSCO, South Korea

SPLIT BLOCK STANDS

20-high stand for large coils

This 20-high rolling mill processes stainless-steel strip introduced in coils weighing up to 35 t, with diameters of up to 2,400 mm. Starting from a maximum entry thickness of 5 mm, the material is rolled to a minimum final thickness of 0.1 mm. Various actuators or control elements for roll-gap setting ensure a whole range of strip qualities can be processed with top results.

What also makes this mill stand out is the fact that the work rolls and the first intermediate rolls are changed fully automatically, while the second intermediate rolls and the backup shafts are changed in semiautomatic mode. The hydraulic saddle clamping device that holds the backup shafts in the stand block eliminates the need for the maintenance crew to unclamp them manually. Plus there is an automated transport system that supplies the paper winders with fresh paper coils from a store beside the roll stand.

To boost productivity, the mill is equipped with an uncoiling station and a leveler unit for shorter nonproductive times during coil changing. The coil loading and strip threading sequences are automated.

Also installed here is a thickness and flatness control system. All rolling parameters are preset using a mathematical model and controlled fully automatically during the rolling process.
20-HIGH MILL STAND
SplitBlock SB 21 - 52"

Commissioning 1995

Production data
Material stainless-steel strip
AISI 300 and
400 series
Strip width 600 to 1,300 mm
Strip thickness
  ingoing max. 5.0 (5.5) mm
  outgoing min. 0.1 to 2.0 mm
Coil weight max. 35,000 kg

Technical data
Stand type SB 21 - 52"
Rolling speed max. 800 m/min
Rolling force max. 12,000 kN
Strip tension max. 500 kN
Capacity 120,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A to D
- Shifting of first intermediate rolls by means of a push/pull system
- Fully automated roll-changing robot
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAMIC® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
OUTOKUMPU NIROSTA, Germany

SPLITBLOCK STANDS

20-high stand for maximum rolling speeds

This 20-high stand, the fourth at the Krefeld location, processes stainless-steel strip with ingoing thicknesses of up to 8 mm. Configured for top output and performance, the facility achieves a maximum rolling speed of 1,000 m/min. It comes with a large variety of actuators or control elements for roll-gap setting, so the stand can process a whole range of strip qualities.

The plant features fully automatic changing of the work rolls and first intermediate rolls, with semi-automatic changing of the second intermediate rolls and backup shafts. A hydraulic saddle clamping device secures the backup shafts in the stand block so that manual unclamping by the maintenance crew is unnecessary. Also featured is an uncoiling station with walking-beam coil conveyor and leveler unit that reduces the idle times during coil changing. This increases the mill’s productivity. The sequences for coil loading and strip threading are automated.

Easy maintenance and ready access are ensured by central arrangement of all hydraulic controls on a platform behind the stand. Finally, there is an extensive process control system consisting of an X-ray thickness measuring system, a thickness control system, a flatness measuring roll, and a control system as well as a mathematical model for presetting and controlling all rolling parameters.
20-HIGH MILL STAND
SplitBlock SB 21 - 53”

Commissioning 1995

Production data
Material stainless-steel strip
AISI 300 and
400 series
Strip width 500 to 1,350 mm
Strip thickness
  ingoing max. 8.0 mm
  outgoing 0.2 to 3.0 mm
Coil weight max. 32,000 kg

Technical data
Stand type SB 21 - 53”
Rolling speed max. 1,000 m/min
Rolling force max. 12,000 kN
Strip tension max. 500 kN
Capacity 120,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts A to D
- Shifting of first intermediate rolls by means of a push/pull system
- Fully automated roll-changing robot
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAMIC® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness control system
- Flatness control system
NORTH AMERICAN STAINLESS (NAS), USA

MONOBLOCK STANDS

20-high stand for mirror finish grades

North American Stainless (NAS), USA, a subsidiary of the Spanish Acerinox Group, awarded SMS group a contract in 2015 for a 20-high MonoBlock cold rolling mill. NAS intends to use the size-MB22B-54” rolling mill in its state-of-the-art, high-performance production facility for bright-annealed stainless-steel strip in Ghent, Kentucky. Apart from the cold rolling mill, SMS group is supplying NAS with the most modern and powerful bright annealing line anywhere in the USA.

There is good reason for NAS to make this investment. It enables the company to expand into the production of bright-annealed stainless steel. This material is increasingly in demand in the USA, which currently relies partly on imports. Immediately striking about the cold-rolled stainless steel strip with BA surface quality is the mirror finish. Typical applications are household appliances and kitchen utensils. Furthermore, it’s a versatile material used for many other products that require not only the properties of stainless steel, but also high-quality, polished surfaces – for instance medical instruments or products in the transport sector.

The new plants will process both austenitic and ferritic grades (AISI 200, 300, and 400 series). The finished material will measure between 600 and 1,350 mm wide and between 0.15 and 1.5 mm thick. Not only responsible for the mechanical systems, process engineering, furnace technology, and electrics and automation, SMS will also provide commissioning support and operator training. The entire strip guide control system will come from EMG Automation.

The 20-high MonoBlock cold rolling mill of type MB22B-54” will process hot strip thicknesses of up to 6.2 millimeters. Characteristic of the compact and robust plant is the high stand rigidity. It achieves a maximum rolling rate of 800 meters per minute and a maximum roll separating force of 8,000 kN for impressive thickness reduction. Among the stand-out features are roll-gap control and crown adjustment for backup shafts B/C and F/G as well as first intermediate roll shifting. Also included in the supply package are the auxiliary and additional plants. For instance, the regenerative SUPAFINE® filter system ensures eco-friendly cleaning and efficient cooling of the rolling oil. Equally important for the plant’s green credentials is the extraction system. It complies with the strict local environment protection laws. To reduce idle times, the mill is equipped with two reversing coilers and an uncoiling station with a leveler and cropping shear.
20-HIGH MILL STAND
MonoBlock MB 22 B - 54”

Commissioning: 2017

Production data

Material: stainless-steel strip
AISI 200, 300, and 400
(mirror finish surface qualities)

Strip width: 600 to 1,350 mm

Strip thickness:
ingoing: max. 6.2 mm
outgoing: min. 0.15 mm

Coil weight: max. 30,000 kg

Technical data

Stand type: MB 22 B - 54”
Rolling speed: max. 800 m/min
Rolling force: max. 7,850 kN
Strip tension: max. 500 kN
Capacity: 95,000 tpy

Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C and F/G
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler and crop shear for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Oil mist extraction system with high filtration
- Mathematical model
- Thickness and flatness control systems
BAHRU STAINLESS,
Malaysia

MONOBLOCK STANDS

First SMS 20-high stand for Malaysia

Since 2012, Bahru Stainless SDN BHD has been operating Malaysia’s first 20-high cold rolling mill. The plant was supplied by SMS group. Prior to its long journey to South-East Asia, the machine was pre-assembled in the SMS workshop in Hilchenbach. As a result of the pre-assembly and subsequent functional tests, installation and runup in Malaysia went without a hitch.

Bahru Stainless ordered the 20-high cold rolling mill from SMS group for its new cold strip complex in Johor Bahru in February 2011. The Asian cold strip manufacturer is a member of the Spanish Acerinox Group, one of the world’s largest stainless steel producers. Demonstrating just how strong it is, the company built a facility in Southern Malaysia that will produce one million t of stainless steel strip per year in its final expansion phase.

SMS supplied the 20-high MB 22 B - 52” cold rolling mill. It processes austenitic and ferritic strip grades in widths of up to 1,320 millimeters and achieves maximum thickness reduction. Astonishing though it may seem, the minimum rolled final gage is 0.15 mm while rolling speeds of up to 800 meters per minute are possible.

Included in the scope of supply are the entry and exit groups with high-tension reversing coilers for strip tensions of up to 500 kN, the leveler, and the cropping shear. To ensure eco-friendly cleaning and cooling of the rolling oil, the plant also features our proven SUPAFINE® filter system.

As ever, the SMS workshop in Hilchenbach manufactured the key components of the cold rolling mill to high quality standards. They were pre-assembled including piping and cabling, then subjected to functional tests.
The “heart” of the cold rolling mill stand: the housing window in MonoBlock design. Equipped with hydraulic roll-gap control.

Pre-assembled platform module with integrated column-type valve units and piping.

20-HIGH MILL STAND
MonoBlock MB 22 B - 52”

Commissioning 2012

Production data
Material stainless-steel strip
AISI 200, 300, and 400
Strip width 800 - 1,320 mm
Strip thickness
  ingoing max. 6.35 mm
  outgoing min. 0.15 mm
Coil weight max. 31,000 kg

Technical data
Stand type MB 22 B - 52”
Rolling speed max. 800 m/min
Rolling force max. 7,850 kN
Strip tension max. 500 kN
Capacity 120,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C and F/G
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler and crop shear for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
BENXI IRON & STEEL (GROUP) CO., China

MONOBLOCK STANDS

Two 20-high stands for stainless steel start-up

When one of China’s largest steel producers, Benxi Iron & Steel (Group) Co., entered into the large-scale production of high-quality stainless steel strip, it was an exciting development on the Chinese steel market. To implement its plans, the group ordered two X-Roll® cold rolling mill stands in 20-high design from SMS group in April 2008. Following commissioning in summer and fall 2010, Benxi Iron & Steel boasted the capacity to produce a massive 200,000 t of stainless-steel strip per year.

The new 20-high MonoBlock cold rolling mill stands roll stainless-steel hot strip (annealed and pickled) of series types 300 and 400. They are capable of processing strip up to 1,350 mm wide and 6 mm thick. After processing, the minimum final gage is 0.2 mm. Each plant features a total drive power of 12,500 kW for rolling speeds of up to 800 meters per minute.

When deciding on the rolling mill technology, the steel giant considered not only the high quality of the final products, but also eco-friendly production methods. To save resources and protect the environment, both X-Roll® systems were equipped with modern SUPAFINE® filter systems.

SMS developed this solution specifically for ultrafine filtration of rolling oils. It operates without filter aids, so it generates no unusable waste products. Also included in our scope of supply is the extraction system.

Keen to successfully complete these strategically important plants, Benxi Iron & Steel relied on our comprehensive expertise. SMS designed and manufactured the mechanical equipment, supervised assembly and installation, and was also responsible for the commissioning on site.

Then, after manufacturing the core components in our workshops in Hilchenbach, we pre-assembled individual plant modules and put them through extensive functional tests. That ensured fast and smooth start of production in China.
TWÓ 20-HIGH MILL STANDS
MonoBlock MB 22 B - 54”

Commissioning 2012

Production data
Material stainless-steel strip
AISI 300 and
400 series
Strip width 1,000 to 1,350 mm
Strip thickness
ingoing max. 6.0 mm
outgoing min. 0.2 mm
Coil weight max. 31,000 kg

Technical data
Stand type MB 22 B - 54”
Rolling speed max. 800 m/min
Rolling force max. 7,850 kN
Strip tension max. 500 kN
Capacity 100,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts F/G)
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
MONOBLOCK STANDS

Multi-talent for stainless steel, titanium, and special grades

It was May 2011 when Chinese company Baoshan Special Steel Branch, or BSSB, issued us with the Final Acceptance Certificate (FAC) for the 20-high type-MB 22 B - 52” cold rolling mill we supplied. BSSB uses the mill to roll austenitic and ferritic stainless steel strip, special steel strip, and strip made of titanium and nickel special alloys. The strip widths vary between 600 and 1,300 mm and reach minimum final thicknesses of 0.3 mm. That is after a maximum ingoing thickness of 7.0 mm.

The core of the plant is the MonoBlock mill stand. This stand type comes with many advantages and ensures cost-effective production of cold strip made of stainless steel, titanium, and special steels. Particularly useful is the modular design. It means we can pre-assemble and test the plant in advance. This significantly reduces the manufacturing and final assembly times.

The rolling mill boasts a capacity of 60,000 tpy and is part of BSSB’s new production plant for high-performance materials. Incidentally, we also supplied a continuous annealing and pickling line for this facility.
### 20-HIGH MILL STAND

**MonoBlock MB 22 B - 52”**  

**Commissioning**: 2011  

#### Production data

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<tr>
<th>Material</th>
<th>stainless-steel strip AISI 300 and 400 series titanium strip and nickel special alloys</th>
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<tr>
<td>Strip thickness</td>
<td></td>
</tr>
<tr>
<td>ingoing</td>
<td>max. 7.0 mm</td>
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<tr>
<td>outgoing</td>
<td>min. 0.3 mm</td>
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<tr>
<td>Coil weight</td>
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</table>

#### Technical data

<table>
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<th>Stand type</th>
<th>MB 22 B - 52”</th>
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<tbody>
<tr>
<td>Rolling speed</td>
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<tr>
<td>Rolling force</td>
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<td>Strip tension</td>
<td>max. 500 kN</td>
</tr>
<tr>
<td>Capacity</td>
<td>60,000 tpy</td>
</tr>
</tbody>
</table>

#### Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts F/G)
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
Third and fourth 20-high stand from SMS

Seeing that we successfully set up the stainless-steel production at its Tianjin location, our customer decided to expand further into the profitable stainless-steel market. To ensure quick and smooth implementation of this project, ZJYTSS opted for us to supply two new 20-high rolling mills. They are planning to double the existing plant’s cold-rolling capacity to 400,000 t.

Just like mill stands No. 1 and 2, the new cold-rolling facilities are built in the proven MonoBlock design and equipped with cutting-edge technology from SMS group. The production range comprises stainless-steel strip with a maximum width of 1,350 mm and ingoing thicknesses of up to 6 mm rolled down to a final minimum thickness 0.15 mm.

Both sides of the roll stands are fitted with high-tension reversing coilers plus the entry and exit facilities required for cost-effective production of stainless steel strip. There was no need to invest in an additional uncoiling station because the input coils can be loaded directly onto the reversing coilers. Installed in both mills is not only a highly dynamic thickness and flatness control system, but also a mathematical model for presetting all process parameters, and fully automatic control of the rolling process.
To use resources as economically as possible and to protect the environment, the two mills are equipped with a modern SUPAFINE® filtration system for efficiently cleaning and cooling the rolling oil. Invaluable here is that our customer can draw on the proven equipment, vast experience, and special SMS know-how in the field of ultrafine filtration of rolling oil.
Acciai Speciali Terni, Italy, Mill No. 7

MonoBlock Stands

Seventh 20-high stand from SMS

Using proven plant technology and equipment made by SMS group, the Terni location in Italy is set to continue its success story. That’s because the new cold rolling mill incorporates leading-edge stand technology and is already the seventh MonoBlock our customer has ordered from SMS group for its Terni operations.

Acciai Speciali Terni is Italy’s largest stainless-steel producer and belongs to the ThyssenKrupp Stainless group, a European producer of high-quality stainless-steel strip designed to supply globally rising demand.

This mill in proven, compact MonoBlock design processes pickled stainless-steel strip of the AISI 400 (ferritic) and AISI 300 (austenitic) grades in widths of up to 1,370 mm and maximum ingoing thicknesses of 6.3 mm.

It took just 12 months to complete design, procurement, manufacture, and shop assembly. The MonoBlock – including the base frame and gear unit – was pre-assembled before transport to Italy, installed in record time, and commissioned several weeks ahead of the contracted deadline.

The mill consists of two reversing coil-ers, one uncoiling station with leveler unit, and a mobile crop shear to minimize the nonproductive times during coil changing. Fully automated control systems for precise strip thickness and optimal flatness ensure cold-rolled finished products of supreme quality. All rolling parameters are preset automatically by a mathematical model.

Included in the SMS supply scope were the design, manufacture, erection, and commissioning of the mechanical equipment including ancillaries such as hydraulic, rolling-oil, fire-extinguishing, and fume exhaust systems.
20-HIGH MILL STAND
MonoBlock MB 22 B - 54”

Commissioning 2006

Production data
Material stainless-steel strip
AISI 300 and 400 series
Strip width 650 to 1,370 mm
Strip thickness
  ingoing max. 6.3 mm
  outgoing min. 0.2 mm
Coil weight max. 30,000 kg

Technical data
Stand type MB 22 B - 54”
Rolling speed max. 800 m/min
Rolling force max. 7,850 kN
Strip tension max. 500 kN
Capacity 80,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts F/G)
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler and crop shear for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
MONOBLOCK STANDS

Second 20-high stand from SMS

It was just one year after branching out into the stainless-steel market in 2005 that Zhejiang Yuantong Stainless Steel, ZJYTSS, ordered and commissioned a further 20-high cold-rolling stand from SMS. Building mill No. 2 represented the next step in ZJYTSS’s expansion program. This helped the ambitious company to boost production by another 80,000 tpy of top-quality stainless-steel strip.

Identical in design to stand No. 1, mill stand No. 2 processes pickled stainless-steel strip with a maximum width of 1,350 mm and ingoing thicknesses of up to 6 mm.

What makes the “Zero-Crown” MonoBlock stand out is its high rigidity. Plus it features entry and exit-side high-tension reversing coilers as well as all the required auxiliary equipment.

An additional uncoiling station with pinch roll leveler increases productivity by allowing all preparatory work for the next coil to be done while rolling is underway.

To achieve closest thickness tolerances and optimal flatness, the plant comes with effective control systems. The mathematical model controls all the parameters required for reliable and precise rolling fully automatically.
20-HIGH MILL STAND
MonoBlock MB 22 B - 54”

Commissioning 2006

Production data
Material: stainless-steel strip
- AISI 300 and 400 series
Strip width: 800 to 1,350 mm
Strip thickness:
  - ingoing: max. 6.0 mm
  - outgoing: min. 0.3 mm
Coil weight: max. 30,000 kg

Technical data
Stand type: MB 22 B - 54”
Rolling speed: max. 800 m/min
Rolling force: max. 7,850 kN
Strip tension: max. 500 kN
Capacity: 80,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C and F/G
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
LIANZHONG STAINLESS STEEL, China, Mill No. 2

MONOBLOCK STANDS

20-high stand for wide stainless-steel strip

Lianzhong Stainless Steel Corporation (LISCO), a subsidiary of Taiwan’s Yieh United Steel Corporation, operates a production facility built on a greenfield site in southern China. Highly satisfied with the equipment at its main location in Taiwan, our customer decided to utilize once again SMS group’s proven 20-high stand technology and equipment at its new production plant in China.

Included in the SMS supply scope was not only the size-22 SplitBlock stand, but also a second cold-rolling mill in Monoblock design. This stand processes stainless-steel strip with a maximum width of 1,600 mm and ingoing thicknesses of up to 6 mm into high-quality cold strip.

The wide stand block is of “Zero-Crown” design and features excellent rigidity at minimum mill spring under rolling load. To provide for easier and reduced maintenance, the backup shafts are secured in the stand block by a hydraulic saddle clamping device.

Fully automated thickness and flatness control systems ensure precisely rolled cold strip with closest tolerances. The SMS mathematical model automatically presets all rolling parameters, which are then controlled online during the rolling process.

Preassembly and function test.

Hydraulic adjusting systems.

Stand block with rolls.
20-HIGH MILL STAND
MonoBlock MB 21 BB - 63”

Commissioning 2006

Production data
Material stainless-steel strip
AISI 300 and 400 series
Strip width 600 to 1,600 mm
Strip thickness
  ingoing max. 6.0 mm
  outgoing min. 0.3 mm
Coil weight max. 30,000 kg

Technical Data
Stand type MB 21 BB - 63”
Rolling speed max. 700 m/min
Rolling force max. 14,000 kN
Strip tension max. 600 kN
Capacity 150,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts A and D)
- Shifting of first intermediate rolls by means of a push/push system
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
Five 20-high stands for stainless-steel strip

Taiyuan Iron & Steel Co. Ltd. (TISCO), China’s leading stainless-steel producer, ordered five 20-high mills from SMS group at a stroke. This was the largest single order for 20-high roll stands ever awarded to any supplier. Even so, all of the stands went on stream ahead of the contracted deadline. Not only responsible for these five 20-high mills, SMS also supplied TISCO with an inline skin-pass mill for its hot-strip annealing and pickling line in 2005.

The MonoBlock cold-rolling facilities are designed to process very high coil weights of up to 35 t with a maximum coil diameter of 2,400 mm.

All of the 20-high stands feature high-tension reversing coilers on both sides as well as the necessary entry and exit equipment. The first mill additionally incorporates an uncoiling station for efficient and smooth processing of hot strip coils with maximum strip thicknesses.

To ensure closest tolerances, each of the cold-rolling stands features a thickness and flatness control system. A mathematical model presets all rolling parameters, which are then controlled fully automatically during the rolling process.
FIVE 20-HIGH MILL STANDS
MonoBlock MB 22 B - 52”

Commissioning: 2005

**Production data**

- **Material**: stainless-steel strip
  - AISI 300 and 400 series
- **Strip width**: 800 to 1,300 mm
- **Strip thickness**:
  - ingoing: max. 6.0 mm
  - outgoing: min. 0.3 mm
- **Coil weight**: max. 35,000 kg

**Technical data**

- **Stand type**: MB 22 B - 52”
- **Rolling speed**: max. 800 m/min
- **Rolling force**: max. 7,850 kN
- **Strip tension**: max. 500 kN
- **Capacity**: 80,000 tpy

**Technical features**

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts F/G)
- Shifting of first intermediate rolls by means of a push/push system
- One stand with additional uncoiling station including pinch roll leveler for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
ZJYTSS YUANTONG STAINLESS STEEL, China, Mill No. 1

MONOBLOCK STANDS

First 20-high stand for a “newcomer”

ZJYTSS Yuantong Stainless Steel Ware Corp., a young company on the Chinese stainless-steel market, is based in the Tianjin Economic Development Area. Right there, where even global players like Airbus are building an assembly plant, our customer chose this high-tech industrial park for its top-notch production facility.

To gain entry into the high-quality stainless-steel strip market, ZJYTSS opted for a 20-high cold-rolling mill that produces first-class cold strip. It’s designed to process pickled stainless-steel strip with a maximum width of 1,350 mm and ingoing thickness of up to 6 mm. Proven plant technology and equipment as well as easy operation smooth the way for successful production at this new location in China.

Central to the mill is an MB22 MonoBlock stand complemented by two high-tension reversing coilers and an uncoiling station to reduce idle times.

All rolling parameters are set by a mathematical model and controlled fully automatically during rolling.

One of China’s largest pipe makers, ZJYTSS Tianjin Pipe Corporation Ltd. has been cooperating closely with SMS companies for years. So it came as no surprise that our customer opted for SMS group to expand its product portfolio.
20-HIGH MILL STAND
MonoBlock MB 22 B - 54”

Commissioning 2005

Production data
Material  stainless-steel strip
          AISI 300 and
          400 series
Strip width  800 to 1,350 mm
Strip thickness
  ingoing  max. 6.0 mm
  outgoing min. 0.3 mm
Coil weight  max. 30,000 kg

Technical data
Stand type  MB 22 B - 54”
Rolling speed  max. 800 m/min
Rolling force  max. 7,850 kN
Strip tension  max. 500 kN
Capacity  80,000 tpy

Technical features
- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C and F/G
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
MONOBLOCK STANDS

20-high stand for German-Chinese joint venture

Ever since 2001, Shanghai Krupp Stainless Co. Ltd. (SKS) has been producing high-quality stainless-steel strip of austenitic and ferritic grades on a 20-high cold rolling mill manufactured by SMS group. SKS is a joint venture between Outokumpu Nirosta (formerly Thyssen Krupp Stainless) and Baosteel that produces stainless steel in China.

What began with its German operations in Krefeld, Benrath, and Dillenburg led to Outokumpu Nirosta’s logically consistent decision to equip the Shanghai plant with proven 20-high stand technology and equipment engineered by SMS.

The new mill in MonoBlock design processes pickled stainless steel strip with a maximum width of 1,340 mm from an incoming thickness of up to 5 mm.

To boost mill capacity, the cold-rolling stand incorporates an additional uncoiling station that reduces nonproductive times during coil changing.

As part of the stand automation, the thickness and flatness control system ensures precise strip dimensions with closest tolerances. All rolling parameters are preset and controlled fully automatically during rolling by a mathematical model from SMS.
20-HIGH MILL STAND
MonoBlock MB 22 B - 53"

Commissioning 2001

Production data

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<th>Material</th>
<th>stainless-steel strip AISI 300 and 400 series (mirror finish surface qualities)</th>
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</tr>
<tr>
<td>ingoing</td>
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</tr>
<tr>
<td>outgoing</td>
<td>min. 0.2 mm</td>
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<td>Coil weight</td>
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Technical data

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<td>Rolling speed</td>
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<td>Strip tension</td>
<td>max. 500 kN</td>
</tr>
<tr>
<td>Capacity</td>
<td>80,000 tpy</td>
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</table>

Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts F/G)
- Shifting of first intermediate rolls by means of a push/push system
- Additional uncoiling station with pinch roll leveler for coil preparation
- SUPAFINE filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
ACCIAI SPECIALI TERNI, Italy, Mill No. 6

**MONOBLOCK STANDS**

Large 20-high stand for wide stainless-steel strip

To be able to add even wide strip to the range produced at its Terni location, our customer once again opted for a plant made by SMS group.

The 20-high mill in the proven, compact MonoBlock design processes stainless steel strip in widths of up to 1,575 mm from ingoing thicknesses of max. 5 mm.

Special here is the “Zero-Crown” stand block design featuring maximum rigidity at minimum mill spring under rolling load.

It’s the sixth 20-high cold-rolling mill SMS has built for this customer.

To ensure easier replacement, the backup shafts are secured in the stand block by a hydraulic saddle clamping device. Also included in the mill is a fully automatic thickness and flatness control system. All rolling parameters are preset by a mathematical model and controlled online during operation.

What happens here is that the input coils are introduced into the process directly at the reversing coiler. That eliminates the need for extra investment in an uncoiling station.
20-HIGH MILL STAND
MonoBlock MB 21 BB - 62"

Commissioning 2000

Production data

Material stainless-steel strip
AISI 300 and
400 series
Strip width 900 to 1,575 mm
Strip thickness
  ingoing max. 5.0 mm
  outgoing min. 0.2 mm
Coil weight max. 33,500 kg

Technical data

Stand type MB 21 BB - 62"
Rolling speed max. 800 m/min
Rolling force max. 16,000 kN
Strip tension max. 590 kN
Capacity 150,000 tpy

Technical features

- Servohydraulic roll-gap control (AGC)
- Crown adjustment for backup shafts B/C (prepared for backup shafts A and D)
- Shifting of first intermediate rolls by means of a push/push system
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model
- Thickness and flatness control systems
SHANXI TAIGANG STAINLESS STEEL COMPANY, China

**18-HS STANDS**

Integrated tandem mill for stainless-steel cold strip

Chinese stainless steel producer TISCO (Shanxi Taigang Stainless Steel Company), a subsidiary of the Taigang Group International Trade Co. Ltd., awarded SMS group a contract for two fully continuous cold tandem mills in CVC® plus six-high and 18-HS design, both featuring a strip cleaning section. This investment gives TISCO an extra capacity of more than one million t of stainless-steel strip per year.

Each cold rolling mill forms the heart of an integrated, continuous production line for stainless-steel cold strip, also known as a white sheet rolling annealing and pickling line (WRAPL). The two new production lines will be erected by a consortium in Taiyuan city in the Chinese province of Shanxi. The WRAPL configuration ensures TISCO produces stainless steel especially cost-effectively because rolling, annealing, and pickling all take place in one pass.

As the supplier of the tandem mills, the two strip cleaning sections, and the tension roll sets, SMS group is a significant member of the consortium. Both tandem mills process hot strip pre-treated in a hot strip annealing and pickling line also supplied by SMS.

This TCM 300 tandem mill in 18-HS design is the second of its kind in the world. The first was built by SMS in 2009. It rolls AISI 300-series stainless-steel strip and has an annual capacity of up to 600,000 t.

The annealed and pickled stainless-steel strip enters the five-stand mill at a speed of up to 170 meters per minute.

Further down the line, the top process speed in the run-out area is 370 meters per minute. Here, the finished coils weigh a maximum of 35 t. The high-tech tandem line features five mill stands in 18-HS design (HS = horizontal stabilization). Particularly high reductions per pass result from the slimline work rolls, making production especially cost-effective.

Completing both tandem mills is a strip cleaning section from SMS. Some 30 meters long, the horizontal cleaning section removes residual rolling emulsion from the surface in several process stages. The stages are separated from each other by squeeze rolls, and each stage has its own circulation system.
Shanxi Taigang Stainless Steel contracted SMS group to supply two tandem mills for stainless steel cold strip to China. On the right, the TCM 300 with five stands in 18-HS design.

**FIVE 18-HS MILL STANDS**

**18-HS ZR 615 A - 64”**

- **Commissioning**: 2014

**Production data**

- **Material**: stainless-steel strip
- **AISI 300 and 400 series**
- **Strip width**: 1,040 to 1,650 mm
- **Strip thickness**
  - **ingoing**: 2.0 to 6.0 mm
  - **outgoing**: 0.6 to 2.0 mm
- **Coil weight**: max. 35,000 kg

**Technical data**

- **Stand type**: 18-HS ZR 615 A - 64”
- **Rolling speed**: 340 m/min. (outgoing)
- **Roll separating force**: max. 18,000 kN
- **Strip tension**: max. 400 kN (ingoing)
- **Capacity**: 600,000 tpy

**Technical features**

- Servohydraulic roll-gap control (AGC)
- HS shifting for the work rolls
- Intermediate roll shifting system
- Intermediate roll bending system
- Emulsion system for cooling and filtering the coolant-lubricant used
- Mathematical model for presetting all rolling parameters
- Thickness control systems
During a ceremony on December 16, 2009 attended by POSCO-Chairman Joon-Yang Chung, the new four-stand high-tech tandem cold rolling mill we built for POSCO was officially put into operation. POSCO exclusively uses this fully continuous tandem mill in 18-HS design that is unique in the world for stainless-steel strip. Much earlier, at the end of August, the mill was commissioned, and one-shift production had already started.

Immediately afterward, the plant achieved a model runup phase. It easily met all production requirements. The record production volume for a single day in this phase was around 1,500 t of rolled stainless strip. Some results were even better than the target, for example the work roll changing time was under the prescribed two minutes per roll set.

High reductions per pass. The core components of the high-tech tandem mill are the four stands in 18-HS design. Special features included are the small-diameter work rolls for exceptionally high reductions per pass. That ensures extremely cost-effective production of 500,000 t of stainless-steel strip per year. The slimline work rolls are supported at the sides to absorb the strong horizontal forces. They are driven by axially adjustable intermediate rolls.

Versatile as well as efficient, the tandem mill can process both hot and cold strip of AISI series 300 and 400. It produces stainless-steel strip in widths of up to 1,350 mm and a minimum final thickness of 0.4 mm. The maximum ingoing thickness is 5.0 mm.

Optimized with T-roll®. Applying our T-roll® process model, we set the plant parameters and calculated the optimal temperature pattern in the rolled material. This is also how we determined other factors such as suitable cooling and lubrication strategies to ensure maximum pass reductions under stable roll-gap conditions, and to limit the coiling temperature to a maximum of 100 °C.

Equipment in the entry and exit areas. The entry area of the continuous tandem mill consists of a payoff reel, a welding machine, and a horizontal looper. Also contracted to equip the run-out area, we supplied two coilers with continuous paper feed, a drum shear, and our integrated Rotary Inspect strip inspection line. There is no need to interrupt the process for wrapping, because the carousel-type paper winder ensures continuous operation, including automatic paper roll changing.

Inline inspection with Rotary Inspect. Rotary Inspect is an innovative quality assurance system that facilitates inline inspection of the rolled strip. It comes with several advantages over conventional inspection devices. Possibly the most impressive is that strip samples can be taken at rolling speeds of up to 100 meters per minute. Once the sample has been clamped into place, no further manual handling is necessary. The ergonomically designed inspection platform enables easy, reliable examination of both sides of the strip.
FOUR 18-HS MILL STANDS
18-HS ZR 613 A - 52”

<table>
<thead>
<tr>
<th>Commissioning</th>
<th>2009</th>
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**Production data**

<table>
<thead>
<tr>
<th>Material</th>
<th>stainless-steel strip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AISI 300 and 400 series</td>
</tr>
<tr>
<td>Strip width</td>
<td>600 to 1,350 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td></td>
</tr>
<tr>
<td>ingoing</td>
<td>max. 5.0 mm</td>
</tr>
<tr>
<td>outgoing</td>
<td>min. 0.4 mm</td>
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<tr>
<td>Coil weight</td>
<td>40,000 kg</td>
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**Technical data**

<table>
<thead>
<tr>
<th>Stand type</th>
<th>18-HS ZR 613 A - 52”</th>
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</thead>
<tbody>
<tr>
<td>Rolling speed</td>
<td>400 m/min. outgoing</td>
</tr>
<tr>
<td>Rolling force</td>
<td>max. 16,000 kN</td>
</tr>
<tr>
<td>Strip tension</td>
<td>max. 500 kN (ingoing)</td>
</tr>
<tr>
<td>Capacity</td>
<td>500,000 tpy</td>
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</tbody>
</table>

**Technical features**

- Servohydraulic roll-gap control (AGC)
- HS shifting for the work rolls
- Intermediate roll shifting system
- Intermediate roll bending system
- SUPAFINE® filtration system for cooling and ultrafine filtering of the rolling oil used
- Mathematical model for presetting all rolling parameters
- Thickness control systems
- Carousel-type paper winder
- Drum shear in the exit area
- Integrated strip inspection in the exit area
YIEH UNITED STEEL,
Taiwan

18-HS STANDS

18-HS stand for stainless-steel strip

To supplement its two 20-high stands from SMS group, Yieh United Steel Corporation contracted us to supply an 18-high cold-rolling mill. It’s a new type of stand SMS has added to its portfolio of state-of-the-art mill stand technology.

A special feature of the 18-HS design are the slim work rolls with a diameter of 120 mm. There is also horizontal support provided by adjustable supporting roller bridges. This ensures lateral stabilization of the work rolls during the rolling process.

Also incorporated in the mill stand are an HS shifting system for the work rolls as well as an axial shifting and bending system for the intermediate rolls. All actuators or control elements for roll-gap setting provide the capability to process a whole range of hot-strip grades into high-quality cold-rolled products. Due to a fully automated thickness control system, the stainless-steel strip produced features precise dimensions. All rolling parameters are preset by an electronic database system for many different rolling programs and pass schedule strategies.

It’s surprisingly easy to operate mills of this type both in reversing mode and as inline stands for rolling scale-affected hot strip or conventional cold strip. Installed in integrated rolling, annealing, and pickling lines, 18-HS roll stands in tandem arrangement comprise the technological unit for thickness reduction.

Reversing mill for stainless steel in 18-HS design.

18-HS roll set.
Pre-assembly and functional testing.
Precise rolling result due to fully automated thickness control.
### 18-HIGH MILL STAND
**18-HS ZR 613 A - 52”**

**Commissioning** 2007

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<tbody>
<tr>
<td>Material</td>
<td>stainless-steel</td>
</tr>
<tr>
<td></td>
<td>hot strip</td>
</tr>
<tr>
<td></td>
<td>AISI 300 and 400 series</td>
</tr>
<tr>
<td>Strip width</td>
<td>800 to 1,300 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td></td>
</tr>
<tr>
<td>ingoing</td>
<td>max. 6.5 mm</td>
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<tr>
<td>outgoing</td>
<td>1.5 mm</td>
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<tr>
<td>Coil weight</td>
<td>max. 28,000 kg</td>
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<table>
<thead>
<tr>
<th>Technical data</th>
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</thead>
<tbody>
<tr>
<td>Stand type</td>
<td>ZR 613 A - 52”</td>
</tr>
<tr>
<td>Rolling speed</td>
<td>max. 500 /min</td>
</tr>
<tr>
<td>Rolling force</td>
<td>max. 20,000 kN</td>
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<tr>
<td>Strip tension</td>
<td>max. 600 kN</td>
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<tr>
<td>Capacity</td>
<td>80,000 tpy</td>
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<table>
<thead>
<tr>
<th>Technical features</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>- Servohydraulic roll-gap control (AGC)</td>
<td></td>
</tr>
<tr>
<td>- HS shifting for the work rolls</td>
<td></td>
</tr>
<tr>
<td>- Intermediate-roll shifting system</td>
<td></td>
</tr>
<tr>
<td>- Intermediate-roll bending system</td>
<td></td>
</tr>
<tr>
<td>- Emulsion system for cooling and filtering the coolant-lubricant used</td>
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</tr>
<tr>
<td>- Electronic database system for presetting all rolling parameters</td>
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<tr>
<td>- Thickness control systems</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.