Strip casting plant for Salzgitter +++ Kazchrome orders ferrochrome works +++ Converters for SAIL and Dragon +++ Special-steel plant for Fuxin +++ RH plants for CSC and Masteel +++ Steelworks for Kamineni and Bahrain +++ Billet caster for Yonggang +++ Fourteen extrusion presses for Shandong and two for Jilin Liyuan +++ Daehan orders rebar mill
004 Corporate News
Baosteel and SMS celebrate hot strip mill

006 Aluminum Plants
SMS group at ALUMINIUM 2010
AsiaAlum: Erection in full swing
FAC from Chinalco for tandem cold rolling mill
Start-up at Xiashun and Qatar Aluminium
14 extrusion presses for Shandong and 2 for Jilin Liyuan

020 SAF and Electric Smelting Plants
Kazchrome orders Ferrochrome works

024 Steelworks
Order from Fuxin Special Steel for complete special-steel plant
LF for SAIL Group, converter for Dragon Steel
Tilt drives for converters

030 CC Technology
BCT strip caster for Salzgitter
Slab casters put on stream at Tokyo Steel and Salzgitter Flachstahl
Peiner Träger: Beam production from slabs
FAC from CSC for continuous slab caster

039 Secondary Metallurgy
CSC and Masteel order RH plants
Contract from BlueScope for LTS
Fifth RH-TOP plant on stream at Shougang
ArcelorMittal Dunkirk: RH-OB plant No. 2 running

045 Steelworks for Long Products
Steelworks plus caster for Kamineni Steel

046 SMS Concast: Steelworks for Long Products
Masteel orders 120-t electric steelworks
Conso system for Mid American Steel
SMS Concast and SMS Meer supply steel complex to Bahrain
Second steelworks for billets started up at Tianjin
Four steelmaking plants and one billet caster put on stream in six months
Safer EAF operation

057 SMS Concast: CC Technology for Long Products
JSPL orders further continuous billet caster
Technology report: Energy savings through electromagnetic stirrer
Basic agreement concluded with Tiangang Yonggang Steel orders eight-strand caster
SMS Concast in India: Special casters for the Indian market

066 CSP News
Record width on CSP® plant of Severstal Columbus
Ispat modernizes CSP® plant
Support from SMS Siemag for tube grades on CSP® plants

071 Hot Rolling Mills
New main gear put into service at ThyssenKrupp Steel Europe in Beeckerwerth
Bhushan Steel starts up hot strip mill
Commissioning of Maghreb Steel's Steckel mill underway
Innovation: Flat-neck spindles for heavy-plate and roughing stands
Qinhuangdao Shouqin: Heavy-plate rougher in operation
Assembly of largest mill stand in the history of SMS

090 Cold Rolling Mills
Erection of six-high mill underway at Chinalco
Shanghai Copper
18-HS cold rolling mill convinces Yieh United
Two-high skin-passing mill at Salem Steel running

095 Strip Processing Lines
Baosteel grants FAC for continuous annealing line
New in our portfolio: Know-how for CALs
Heavy shear line started up at Handan
Yichang orders six air-knife systems from FOEN
102 Electrics and Automation
Short profile of E&A Division
Four Electrics and Automation locations:
Germany, India, China and USA
System platforms as decisive modules
Integrative engineering for hardware design and
plant engineering
Power distribution and drive systems
Successful modernization concepts
Better cost-effectiveness and safety with real-time Ethernet
Selected references

116 Technical Service
SMS Siemag Serviços Industriais in Brazil
Hadeed, a major service customer
Inspection and maintenance of ladle turrets
Workshop audits: Russian tube mills start efficiency campaign
Training as a service technician
Latest services of our Technical Service

130 SMS Elotherm
Heller Automotive orders EloCrank™ hardening machine
Seven hardening machines for Shanghai GKN
Walzwerke Einsal invests in energy-efficient induction technology

SMS Meer
132 Forging plants
Saarschmiede inaugurates 120-MN open-die forging plant
Forging press at Buderus Edelstahl formally inaugurated
Wuxi Turbine Blade places modernization order

137 Minimills
Minimill – The highlight at Wire-Rod Symposium in Kolkata
Siam Yamato: Minimill for maximum benefits

142 Long-products Mills
Daehan Steel orders rebar mill with VCC®
Bar mill started up at ICSR

143 Service
Service and advice for wire-rod producers
New roller guides made by SMS Meer
South Steel orders new guide series
Commissioning of new finishing mill at Nucor Steel Darlington

146 Tube Plants/Service
Highest efficiency by individual operator training
Operator training for new 7-inch PQF® plant for Tenaris
New services offered for PQF® and MPM plants
PQF® goes west: Tube plants in Brazil and Mexico

150 Trade Fairs/Events
Cape Town: 16th International Wheelset Congress 2010
Tube & Wire in Düsseldorf
6th Shanghai Tube Expo & China Pipe Fittings Expo
Arab Steel Summit 2010 in Marrakech
Aluminium China 2010 in Shanghai
Metal + Metallurgy China in Beijing
SEAISI 2010 in Ho Chi Minh City
25th Aachen Steel Colloquium
AISTech 2010 in Pittsburgh
Preview:
Baosteel Bienal Academic Conference in Shanghai
CONAC in Monterrey
47th Rolling Seminar in Belo Horizonte
ICSR in Beijing

160 New Publications
Brochures and videos
100 million t of hot strip since production start

Baosteel and SMS celebrate 20th anniversary of hot strip mill

On April 7, 2010, a high-ranking delegation from Chinese steelmaker Baosteel visited our Hilchenbach location to celebrate with us the 20th anniversary of the start-up of the hot strip mill No. 1. The mill in Shanghai rolled the first strip in August 1989, and since then has produced some 100 million t of hot strip. We had received the order in 1984 provided, however, that we were prepared to have about 50% of the equipment weight manufactured in China. In view of the state of Chinese manufacturing shops at that time, this was a very hard decision for us. However, it marked the beginning of our cooperation with manufacturers in China, and provided the basis of our very close relations with the Chinese steel industry.

In their speeches at the 20th anniversary celebration of the hot strip mill, the former Chairman of the Baosteel Group, Li Ming, and Baosteel’s Vice-President Zhao Kun, emphasized the important role which this hot strip mill had played in Baosteel’s development into one of the world’s largest steelmakers. They went on to say that it still was the Group’s most successful hot strip mill.

Dr. Heinrich Weiss, Chairman of the SMS group, who at the time had been in charge of the difficult and lengthy contract negotiations, pointed out in his speech how significant this order had been for our company. “The commissioning of Baosteel’s hot strip mill No. 1 was a milestone for SMS Siemag because it established us as a leading supplier on the Chinese market.” Moreover, incorporating a series of innovative facilities and technologies, the mill set new standards. It was the very first hot strip mill to feature our CVC® system on all finishing stands.

Before the celebration, we took our Chinese guests on a tour of the Hilchenbach workshops and presented our latest technologies.

“This was the first time I’ve ever had a customer suggest we celebrate the anniversary of a mill that has done its job successfully for 20 years. I take this as an expression of special loyalty and our good relations with Baosteel,” says Heinrich Weiss.
On June 25, 2010, SMS Siemag officially opened its new training workshop in Hilchenbach. The inauguration ceremony of the 3,000-m² facility was attended by over 100 guests from the worlds of politics and business.

Large-scale investment
Dr. Heinrich Weiss, Chairman of the SMS group, pointed out that this workshop for top-quality, work-related training, built at a cost of some EUR 4 million, marked another milestone in an ambitious investment program due to be completed by 2012. In this way, we are safeguarding the competitiveness of our Hilchenbach location, he added. “The know-how of our employees and our firm commitment to training young career-starters are success factors that help secure our leading market position,” said Dr. Heinrich Weiss.

For many years, the SMS group has championed high-quality vocational and on-the-job training, often beyond its own demand. In 2009, the company trained over 350 young people in Germany. Dr. Kay Mayland, President & CEO of SMS Siemag AG, talked about how much the approach to training had changed over the past few decades. Today’s training relied on holistic thinking and action. Ultimately, it’s about apprentices attaining not only professional skills, but also a solid sense of responsibility for themselves, their work, the process, and the team.

Investment in Hilchenbach location

SMS Siemag: New training workshop inaugurated

New Consul General makes first visit

SMS and Russia – a strong bond for over 100 years. This tradition was continued soon after the new Consul General of the Russian Federation in Bonn, Evgeni Alexeevich Shmagin, had taken up office.

Visiting the headquarters of the SMS group in Düsseldorf as well as SMS Meer in Mönchengladbach on June 24, he was able to gain first-hand experience of the efficiency of our companies. Both SMS Siemag and SMS Meer currently handle a number of major projects for Russian customers, which were discussed in detail.

In Düsseldorf, E. A. Shmagin met with Burkhard Dahmen, Member of the Managing Board of SMS Siemag, and Reinhard Reddel, Manager Central Sales, Eastern Europe. In Mönchengladbach, Jens Barth, Managing Director Sales at SMS Meer, took our guest from Russia on a tour through the workshops. Communication was not a problem – Jens Barth had worked in Moscow for 20 years, where he headed the SMS Siemag sales office before changing to SMS Meer.

Former “SIEMAG” is now SMS Logistiksysteme GmbH

At the beginning of 2009, the former Netphen-based SIEMAG GmbH merged with SMS Demag AG which soon afterwards was renamed SMS Siemag AG. Since then, the former SIEMAG GmbH operated as “Logistics Systems” product area within SMS Siemag. Recently, in June 2010, the area became an independent subsidiary of SMS Siemag named SMS Logistiksysteme GmbH. The product portfolio remains unchanged: SMS Logistiksysteme GmbH supplies complex transport & handling systems and storage systems for use in rolling mills of the steel and nonferrous metals industries, packaging systems and marking machines for coils and plate & sheet packs as well as high-pressure grinding machines for blooms, billets and slabs.
Aluminum Plants

Essen, Germany: September 14 thru 16, 2010
SMS group at ALUMINIUM 2010

From September 14 to 16, 2010, international experts from the world of aluminum making and processing will come together at Aluminium 2010 in Essen. A biennial event, it has evolved into the industry’s leading trade fair, offering an excellent platform for suppliers of raw materials, semi-finished and finished products, as well as manufacturers of machines and equipment for the production, processing and finishing of aluminum products.

The companies of the SMS group will present their product and service portfolios for the aluminum industry plus their latest developments in this sector. In addition, we will provide information on our latest reference plants. Please visit us in Hall 3, Stand 3A40. We are looking forward to interesting and informative discussions with you.

Our services and products for the aluminum industry range from melting furnaces, homogenizing and sawing plants to continuous casting machines, hot and cold rolling mills and strip processing lines to rod and tube extrusion presses and inductive heating equipment.

Please visit our companies in Hall 3, Stand 3A40.
A wealth of expertise in plant technology
Aluminum plants made by SMS group

Hertwich Engineering
- Continuous homogenizing and sawing plants
- Batch homogenizing plants
- Ultrasonic testing equipment
- Horizontal/vertical continuous casting plants
- Remelt plants
- Melting and casting furnaces

SMS Meer
- Sheet and plate stretchers
- Inline scalpers for trapezoidal aluminum profiles
- Brazing facilities
- Scalpers and saws for aluminum ingots
- Extrusion presses

SMS Elotherm
- Inductive heating equipment
- Thixo-forming

SMS Siemag
- Reversing plate rolling stands
- Reversing hot-strip mills
- Hot-strip tandem mills
- Dividing shears
- Slitting shears
- Two-high cold rolling stands
- Four-high cold rolling stands
- Six-high cold rolling stands
- Single-stand mills and multi-stand tandem mills
- Thin-strip rolling mills
- Strip processing lines

SMS Logistiksysteme GmbH
- Flat- and high-bay storage systems
- Packaging lines
- Coil transport systems
- Grinding machines

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Weinberger Straße 6
5280 Braunau, Austria
www.hertwich.com

SMS Meer GmbH
Ohlerkirchweg 66
41069 Mönchengladbach, Germany
www.sms-meer.com

SMS Elotherm GmbH
In der Fleute 2
42897 Remscheid, Germany
www.sms-elotherm.com

SMS Siemag AG
Eduard-Schloemann-Straße 4
40237 Düsseldorf, Germany
www.sms-siemag.com

SMS Logistiksysteme GmbH
Obere Industriestraße 8
57250 Netphen, Germany
www.sms-logistiksysteme.com

Please visit our companies in Hall 3.
Hong Kong-based AsiaAlum Group is continuing its expansion project in Guangdong Province, China. To strengthen its position on the market for premium aluminum products, the Group is building a new rolling complex for the production of 400,000 tpy of hot and cold strips as well as sheets of aluminum and aluminum alloys.

Several companies of the SMS group are contributing production facilities for the new complex: SMS Meer supplied the ingot scalping and sawing machine and SMS Siemag the hot rolling mill, two cold rolling mills and all strip processing lines. The coil logistics and the high-bay store come from SMS Logistiksysteme GmbH.

Commissioning of the hot rolling mill, which comprises a four-high reversing roughing stand and a five-stand tandem finishing mill, recently began. And the cold rolling mill for which we supplied a tandem mill and a six-high cold rolling mill will follow soon.

A detailed report on the start-up of these mills will be included in one of the next issues of our Newsletter.
Layout of the aluminum hot and cold strip complex

1. Hot rolling mill with one rougher and a five-stand finishing mill
2. Continuous tandem cold rolling mill with five stands
3. Six-high cold rolling mill
4. High-bay store
5. Color coating line
6. Tension leveler
7. Dividing shears
8. Slitting shear line
9. Ingot scalping and sawing machine
AsiaAlum, China:

Erection of five lines for strip processing just underway

Broad spectrum of high-grade strip and sheet

SMS Siemag’s supply package for this new complex comprises a total of five strip processing lines: one color coating line, one tension leveler, two shear lines and a slitting line. The equipment for the lines has already been delivered to the works in China’s Guangdong Province and erection is in full swing. Commissioning is slated for Q3 and Q4 of this year.

The new works of AsiaAlum Group will produce a broad spectrum of high-grade strips and sheets of aluminum alloys. The main purchasers include the manufacturers of communication and transportation equipment, household appliances, vehicles, containers and packaging material. In addition, AsiaAlum is set to become the world’s third company moving into the market for premium aluminum products for the aerospace industry.

<table>
<thead>
<tr>
<th>Technical data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color coating line</strong></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Aluminum (1xxx, 3xxx, 5xxx series)</td>
</tr>
<tr>
<td>Capacity</td>
<td>93,000 tpy</td>
</tr>
<tr>
<td>Strip width</td>
<td>1,000 to 2,025 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td>0.2 to 1.5 mm</td>
</tr>
<tr>
<td>Process speed</td>
<td></td>
</tr>
<tr>
<td>- Entry</td>
<td>150 m/min</td>
</tr>
<tr>
<td>- Process</td>
<td>100 m/min</td>
</tr>
<tr>
<td>- Exit</td>
<td>150 m/min</td>
</tr>
</tbody>
</table>

Color coating line

The line is designed to coat aluminum strip for the construction industry and starting material for the manufacture of cans and containers for the food industry.

In the line’s process section, the strip is first subjected to spray cleaning using alkaline and acid media to remove surface impurities, for instance oil. After each spray-cleaning treatment, the strip is rinsed with water, and then dried. To prepare the strip for color coating, it runs through a vertical chem-coater which applies a 0.4 to 2-μm-thick conversion layer to both strip sides. Then, the strip is dried at a target temperature of 80 °C (PMT, Peak Metal Temperature). Next, a finish-coater applies a paint coat to the readily prepared surfaces. The paint coating on the strip top side may be up to 25 μm thick, and on the underside up to 10 μm. In total, a maximum of 27 μm of paint can be applied. The thickness of the coating can be set very precisely because SMS Siemag’s coaters are controlled by a high-precision electric-motor system.

Now, the still liquid paint is dried in a curing oven at a target temperature of 260 °C (PMT) for a period of 20 seconds. The line also incorporates a laminating machine to apply a protective film to the material surface, as required.

The entry and exit sections of the line each are equipped with two coilers and one vertical strip accumulator to ensure continuous operation during coil changing. A stitcher in the entry section joins the strips to an endless strip which is divided by a flying shear arranged in the exit section. The shear can also be used for sample cutting.
**Tension leveler**

The SMS Siemag tension leveler serves to level the strips, clean their surfaces and correct the strip edges. Leveling is important because high demands are made on the flatness of the strips. The tension leveler removes any unflatness such as waves, cambers or longitudinal bows and crossbows.

The tension leveler consists of various leveling rolls as well as one upstream and one downstream bridle roll set to build up the required tension. The application of tensile stress and bending stress results in the yield stress of the strip being exceeded as it runs through the leveling rolls. In this way, the lengths of the fibers are equalized over the full width of the strip and internal stresses in the material are eliminated. The result is perfectly flat strip.

Furthermore, the line is equipped with coilers and shears in the entry and exit sections, a stitcher to join the strips, and a trimming shear unit for trimming the strip edges. Strip cleaning takes place in an alkaline cleaning section, followed by rinsing and drying with hot air.

**Two shear lines**

In both shear lines, the aluminum coils are unwound, and then the strip is cut into sheets or panels which are leveled and piled into packs. Line 1 is designed for strips with a maximum thickness of 1.5 mm, while line 2 is able to divide strips up to 4.5 mm thick.

Each of the lines substantially comprises of an uncoiler plus crop shear, a leveler, a flying shear to cut strips running at high speed, as well as a piling machine. The shear line for light-gage strip is equipped with a 5-roll leveler while line 2 incorporates a leveler of change-cassette type comprising 19 leveling rolls. This leveler is able to also level thicker strips so as to produce flat sheets.

**Slitting line**

On the slitting line, the strips are divided in longitudinal sense, and are then coiled again. Slitting is important because many customers prefer narrow strips which are directly processed into profiles. The key components of the line are the rotating slitter knives which slit the strip in longitudinal sense into several narrow strips.

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### Technical data

**Tension leveler**

<table>
<thead>
<tr>
<th>Material</th>
<th>Aluminum (1xxx, 3xxx, 5xxx series)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>950 to 2,350 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td>0.15 to 0.8 mm</td>
</tr>
<tr>
<td>Process speed</td>
<td>max. 500 m/min</td>
</tr>
</tbody>
</table>

**Shear lines 1 and 2**

<table>
<thead>
<tr>
<th>Material</th>
<th>Aluminum (1xxx, 3xxx, 5xxx series)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width - Linie 1</td>
<td>900 to 2,350 mm</td>
</tr>
<tr>
<td>Strip thickness - Linie 1</td>
<td>0.15 to 1.5 mm</td>
</tr>
<tr>
<td>Sheet length</td>
<td>max. 12 m</td>
</tr>
<tr>
<td>Process speed</td>
<td>max. 100 m/min</td>
</tr>
<tr>
<td>Linie 2</td>
<td>900 to 2,350 mm</td>
</tr>
<tr>
<td>Strip thickness - Linie 2</td>
<td>0.5 to 4.5 mm</td>
</tr>
<tr>
<td></td>
<td>max. 80 m/min</td>
</tr>
</tbody>
</table>

**Slitter**

<table>
<thead>
<tr>
<th>Material</th>
<th>Aluminum (1xxx, 3xxx, 5xxx series)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>950 to 2,300 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td>0.2 to 1.7 mm</td>
</tr>
<tr>
<td>Process speed</td>
<td>max. 600 m/min</td>
</tr>
</tbody>
</table>
On July 2, our Senior Site Manager, Bernie J. Marrese, sent us the following e-mail: “I am pleased to inform you that AsiaAlum’s new hot strip mill has produced the first coil. A billet that was rolled in the rougher and then in the finishing stands was wound into a coil with an impressive outside diameter of 2,190 mm. The strip had a thickness of 5 mm and a width of 1,700 mm. The rolled stock was part of the 3104 series.”
Technical data

<table>
<thead>
<tr>
<th>Hot strip mill</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
</tr>
<tr>
<td><strong>Strip width</strong></td>
</tr>
<tr>
<td><strong>Strip thickness</strong></td>
</tr>
<tr>
<td><strong>Rolling speed</strong></td>
</tr>
</tbody>
</table>

The first coil featured perfectly straight edges.

The finishing mill with five four-high stands.

The first coil leaving the hot rolling mill.
In March 2010, Chongqing-based Chinalco-SWA Cold Rolling Company, a member of the Chinese Chinalco Group, issued the Final Acceptance Certificate for the successfully commissioned two-stand cold rolling mill for aluminum and Al-alloys built and supplied by SMS Siemag.

Central production unit

Being the key production facility, the two-stand tandem mill made it possible for our customer to boost cold-strip production to more than 500,000 tpy. It is the first rolling mill of this type in China and serves to produce strip for cans, cladding sheet and lithographic material for the printing industry. The finished products have a maximum width of 1,800 mm and a minimum thickness of 0.15 mm.

High-tech components

Both six-high roll stands are equipped with positive and negative bending systems for the work and intermediate rolls as well as CVC® plus equipment. In addition, the HES system (Hot Edge Spray) on the second stand ensures positive influencing of the strip edges.

Innovative interstand cooling system

Because the aluminum tandem cold mill uses low-viscosity, easily flammable rolling oil as cooling lubricant, the temperature evolution of the rolls and the material poses a technological challenge. Therefore, in addition to our highly efficient roll cooling systems on the roll stands, we installed our innovative cooling section between the stands which we developed to effectively reduce the strip temperature.

This interstand cooling system comprises two cooling modules, one on top and one at the bottom, which are both swingable for easier maintenance. When swung into working position, the modules jointly form a cooling chamber ensuring efficient strip cooling. During strip threading, the bottom cooling module also serves as carry-over table.
Powerful rolling-oil filtration system

Coil preparation station, coil handling system, inspection line and several utility systems complete the tandem cold rolling mill. Also included here is the rolling-oil filtration system which consists of three SMS Siemag Multi-Plate filters, each with a filtering capacity of 5,100 l/min.

Exhaust-air purification systems with a total capacity of 305,000 m³/h

To meet ever higher environment protection standards, the tandem cold rolling mill and a further cold rolling mill are connected to an SMS Siemag Airwash™ exhaust-air purification system. All exhaust-air purification facilities together have an exhaust capacity of 305,000 m³/h.

Wash oil made by SMS Lubrication to prevent stains

The wash oil used is SMS Lubrication’s new Airwash™ Oil 300 which was specially developed for use in our Airwash™ systems. Featuring a markedly higher initial boiling point (I.P.B.) than other products on the market, our wash oil also allows the recovery of the higher-boiling additives. The larger difference between the final boiling point (F.P.B.) of the rolling oil and the I.P.B. of the wash oil prevents that residual amounts of wash oil are left in the rolling oil. In this way, stain formation on the strip is prevented.

High cost efficiency plus long service life of the rolling oil

SMS Siemag’s Airwash™ system meets even the highest emission standards for air cleanness. The rolling oil recovered is fed back into the rolling process and hence improves the cost efficiency of both rolling facilities.

Tramp oils such as hydraulic or lube oil are removed from the rolling oil by means of our SMS Siemag Oildist system. It has a throughput capacity of 200 l/h and extends the service life of the rolling oil which in turn cuts operating costs and protects the environment.
Responding to an order from Xiamen Xiashun Aluminium Foil Co. Ltd., located in the province of Fujian in southeastern China, SMS Siemag designed and supplied the key equipment for a new aluminum cold strip mill with an annual production capacity of over 200,000 t. The four-high cold mill was started up on June 1, 2010.

Focus on quality

Xiashun, China: Aluminum cold rolling mill on stream

Hot plus cold rolling facility with CVC®. SMS Siemag’s package comprised the supply of a so-called “1+1” hot strip mill with one roughing and one finishing stand plus a single-stand cold rolling mill for the production of 2,150-mm-wide aluminum strips. Both rolling facilities incorporate our CVC® plus equipment and satisfy Xiashun’s high quality standards.

Eco-friendly technologies. Trendsetting features of the new equipment include cutting-edge filtration and purification systems. Our Airwash™ exhaust-air purification systems and Multi-Plate rolling-oil filters cut operating costs through improved recovery or recycling and reduced filter-media consumption, and protect the environment.

Xiashun, market leader in aluminum foils. Xiashun is a company of Hong Kong-based Daching Enterprises Ltd. and a global market leader in top-quality aluminum foils. The new rolling mills made by SMS Siemag will help Xiashun strengthen its position in the global market.

The project team, from left to right: Christoph Hauge, Commercial Project Manager; Jimmy X. Jiang, Vice-President, Xiashun; Guido Fick, Technical Project Manager; Harald Hirte, Site Manager.
In May, Qatar Aluminium Ltd. in Doha, Qatar, together with Hertwich Engineering, Austria, successfully commissioned a batch homogenizing line and three sawing and packing plants for the Qatalum project.

The scope of supply from Hertwich Engineering for this project included a batch homogenizing line and three sawing and packing plants as well as two continuous homogenizing lines and ultrasonic inspection stations. The two continuous homogenizing lines were installed at the end of 2009 and started production in February 2010.

All three lines are joined to a fully automated production facility with an annual capacity of 355,000 t of salable cut-to-length round billets.

The order for the supply of the plants was placed by Fata S.p.A., Italy.

The Qatalum project
It includes the construction of the world’s largest aluminum smelter in Mesaieed Industrial City in Qatar. The project is a 50/50 joint venture between Qatar Petroleum, Qatar, and Hydro Aluminium, Norway. Start of production was planned for 2010. The huge smelting facilities achieve an annual capacity of 585,000 t, however, the annual output of the smelters representing one of the largest “greenfield plants” worldwide can be increased to 1.2 million tpy.
Major order for extrusion presses from SMS Meer

China: Shandong Nanshan orders 14 press lines in one go

On April 21, 2010, Shandong Nanshan Aluminium Company, China, and SMS Meer signed the contract for the supply of a total of 14 Schloemann light-metal extrusion presses. Commissioning of the presses is scheduled for the Christmas/New Year period 2011/2012.

For press forces from 11 to 150 MN

The new light-metal extrusion presses cover the press force range from 11 to 150 MN. The machines are used to produce standard structural profiles, seamless aluminum tubes, heavy industrial profiles and profiles for the transport and railways sector.

Higher productivity with the 150-MN front-loading press. The 150-MN extrusion press is already the second front-loading press from SMS Meer of this size to be supplied to the Chinese province of Shandong. The SMS Meer front-loading extrusion presses offer the following advantages: High machine availability, large billet charge weights, safe loading procedure and short non-productive times with optimized process sequences. Compared with other machine concepts, this results in a generally higher productivity. In recent years, the front-loading presses have therefore established themselves as the preferred press type on the world markets.

A total of 28 modern extrusion presses from SMS Meer at Shandong Nanshan Aluminium Company. Shandong Nanshan Aluminium Company is the leading manufacturer of extruded aluminum products in China. Since 2004, the profile manufacturer has consistently relied on the extrusion technology from SMS Meer. With the 14 new machines, the customer will have a total of 28 modern Schloemann extrusion presses in operation.
China: Jilin Liyuan Aluminium orders two aluminum extrusion presses

At the end of May 2010, Jilin Liyuan Aluminium Company in Liaoyuan in Jilin Province, China, ordered two SMS Schloemann extrusion presses from SMS Meer. The scope of supply includes a 100-MN front-loading press and a 45-MN direct/indirect tube press. The presses are scheduled to go into production in October 2011 and January 2012.

Extremely large aluminum profiles

The 100-MN press will enable Jilin Liyuan Aluminium for the first time to produce extremely large aluminum profiles with a width of up to 700 mm. The privately owned company will therefore be able to expand its product range, in particular towards profiles for railway and ship construction.

Seamless aluminum tubes up to a diameter of 300 mm. The new 45-MN tube press is designed for profiles of special alloys. It is used first and foremost for the production of seamless aluminum tubes up to an outside diameter of 300 mm. An outstanding feature of the 45-MN press is its flexibility: It is designed for both "direct" and "indirect" extrusion of tubes or profiles.

Machine park totals 22 presses. With the two new extrusion presses, Jilin Liyuan’s machine park will grow to a total of 22 presses covering a press force range from 6 MN to 100 MN.
New DC technology for direct charging of fine ores

Kazchrome places order for new ferrochrome facility

Planned annual production: approx. 440,000 t. In May 2010, TNK Kazchrome JSC of Kazakhstan contracted SMS Siemag to erect a new ferrochrome facility in Kazakhstan. The new works No. 4 will be erected at the Aktobe site adjacent to what today is Kazchrome’s major production facility. It will cover a total area of some 500,000 m².

Annual output is planned to be around 440,000 t of high-carbon ferrochrome (H.C. FeCr). The smelting unit will comprise four DC furnaces, each with a capacity of 72 MW. The customer plans to start up the first of these furnaces at the end of 2012. Furnaces No. 2 through No. 4 are scheduled to commence production in 2013.

SMS Siemag’s supply scope comprises the basic engineering, which was already completed within the framework of a previous order, the detail engineering, the supply of the DC furnaces and additional mechanical and electrical core components.
Process route at Kazchrome: Direct charging of fine ores

TNK Kazchrome operates several ferrochrome facilities in northeast and northwest Kazakhstan. The company is one of the most important producers of ferrochrome worldwide. The process route currently in place at Kazchrome involves an ore preparation stage before the ores are processed into ferrochrome in the submerged arc furnaces. From this ore preparation process, very high-grade ore fines arise as a byproduct. Unfortunately, these ore fines cannot be directly charged into the customer’s existing furnaces.

In order for Kazchrome to be able to use these fine ores, it would have been necessary to invest additional capital in an agglomeration stage for fine ore enrichment. This stage – and likewise the investment – is no longer needed, as Kazchrome has decided in favor of SMS Siemag’s DC technology. This technology enables direct furnace charging of fine ores. Moreover, the customer will be able to process the fine ores without having to go through a preparation stage, with the benefit of markedly reduced production costs.

Before this recent order was placed with us, we had already been commissioned to draw up the basic engineering for a complete ferrochrome facility. The customer received the engineering documents after six months. They contain the basic engineering for the four furnaces including gas cleaning systems, all ancillary equipment, the buildings as well as infrastructure and logistics. Also a calculation of the total budget for the project supplied on a turnkey basis was provided. This underlines SMS Siemag’s competence in drawing up complex technological engineering studies for complete production facilities.

This recent order for the supply of the new facility builds on the results of the basic engineering study. The study also incorporates the option of an additional process step in which the carbon content of the ferrochrome is reduced to obtain medium-carbon ferrochrome (M.C. FeCr).

Delegates from Kazchrome visited us in Düsseldorf to discuss the basic engineering.
Kazchrome places order for new ferrochrome facility

Technology: DC furnaces

With the development of the DC technology, SMS Siemag has set a milestone in ferrochrome production, as it has paved the way for continuous charging of fine ores. This not only makes redundant the costly upstream process of ore agglomeration but also brings down the capital investment, as the expenditure is much lower than that on a conventional AC furnace.

Other technical features of the furnace lead to improved availability and lower specific production costs:

- **Current-conducting copper bottom** – Uniform energy distribution within the furnace, long service life
- **Innovative electrode column system** – Electrode resetting under full load
- **Roof center piece** – Replacement within a few hours, enhanced plant availability
- **Intelligent direction of the high-current line** – Minimal deflection of the electric arc, smooth process control for distinctly longer service life of the refractory lining
- **Intelligent cooling and relining concept** – Minimized heat loss and increase in specific furnace output

Description of the process

The major part of the raw materials is delivered to the ferrochrome facility by an existing railway line and deposited in a storage area. Downstream transport of the material to the day bins and mixing of the components for burdening take place fully automatically. The burden is then transported to the furnace bins.

From there, it is charged into the furnace by charging tubes arranged around the electrode. In the area of the free electric arc, the material is reduced to ferrochrome at temperatures of up to 1,900 °C. The metal and the slag are tapped separately from each other (similar to a blast furnace). After the product has been teemed and cooled down, it is crushed, screened and packed for shipment.

The planned annual production will total some 440,000 t of H.C. ferrochrome. This will make the Kazchrome works one of the biggest single-location ferrochrome production facilities.

Also the environmental equipment of the plant will be of the latest state of the art: SMS Siemag will supply a gas cleaning plant with a wet-type scrubber for clean-
ing the high-energy CO gas and bringing the residual dust content down to less than 10 mg/m³. The thermal and chemical energy contained in the cleaned furnace offgas can also be used for drying raw materials or for electricity generation.

**EPCM: Integrated project management – a service provided by SMS Siemag**

Kazchrome also commissioned us with the coordination of the overall project. To this end, the Integrated Plants/Turnkey Services department of SMS Siemag is at the head of an international consortium that may refer to the internal specialist departments, the other consortium partners or the local contractors for specialist competences.

EPCM stands for “Engineering, Procurement and Construction Management”. This type of project management service offered by SMS Siemag has been designed to support our customers in implementing their respective “turnkey portions” within the framework of a turnkey supply of a complete works. Typical examples are the concrete and steel construction work, infrastructure and office buildings, air conditioning and water treatment equipment. SMS Siemag asks for tenders, evaluates these tenders and makes recommendations to the customer. Building on many years of project management activities throughout the world, we are in a position to offer our customers optimal advice in the selection of reliable project partners.

This form of project coordination, as selected by Kazchrome, facilitates a smooth project management, as all planning activities lie in one hand. Also for other projects our customers go for EPCM services provided by SMS Siemag. They benefit from this cost-saving solution in various respects; for example, they can use their own resources for other project tasks.

With over 500 references in the field of submerged arc furnace metallurgy, SMS Siemag is a leading manufacturer of ferroalloy production plants. This project for Kazchrome is further proof of SMS Siemag’s market leadership in DC technology for high-capacity furnaces.
Chinese Fuxin Special Steel Company has commissioned us with the design and supply of a complete steelworks for special steels. The works, to be erected in Zhangzhou in the south-east of the Chinese province of Fujian, will be made for a steel production capacity of 720,000 tpy. Commissioning of the new special-steel plant is scheduled for the end of 2012. In the layout of the works, provision will be made for a second construction phase, which – when realized – will double the initial production capacity.

**Scrap-based steelworks, slab casting plant and environmental equipment.** During the first construction phase, all equipment for scrap-based production of special steels via the duplex route, a continuous casting plant for special-steel slabs as well as a comprehensive package of environmental equipment for gas cleaning and energy recovery at the EAF and AOD converter will be installed.

**Steelmaking equipment.** The meltshop for special steels will be made up of a 160-t EAF with tapping spout, a 180-t AOD-L converter and a 180-t ladle furnace. Converter vessel change will be based on the proven changing-car concept. Versus conventional systems, this solution requires only half the time for a vessel change.

**Suction systems for removal of primary and secondary emissions and dust.** A variety of technical features will make the steelworks compliant with stringent environmental regulations. Primary emissions will be sucked off via cooled stacks into two bag-filter houses. For most effective collection of the arising dust-containing secondary emissions, both the EAF and the AOD converter will come with a dog house. Additional dust emissions are collected and extracted at the points where they arise, for example, at skulking stands.

The gas cleaning plants are designed for a filter capacity of more than 2.3 million m$^3$ of air per hour.
Innovative energy recovery. To exploit the waste heat from the metallurgical processes, the steelworks will receive an innovative X-e² energy recovery plant. Conventional systems lower the temperature of the furnace gas by means of cooling water, which releases the thermal energy unused to the environment via heat exchangers. In contrast to this, the energy recovery system which we will install at Fuxin Special Steel will use the thermal energy contained in the hot gases of the EAF and AOD converter to generate superheated steam.

The two energy recovery systems will deliver 36 t per hour of saturated steam fed into the internal steam network of the works for various technical purposes. For the customer this provides the benefit of reduced energy consumption and lower CO₂ emissions.

Range of steel grades and slab formats. The grades produced by the steelworks will encompass ferritic, austenitic and martensitic special steels, which will be cast on the continuous casting plant into 200- or 220-mm-thick slabs. The slab width can be infinitely adjusted during casting within a range from 800 to 1,600 mm.

Excellent slab quality thanks to ISC®. The plant will be equipped with ISC® modules (Intelligent Slab Casting) of the latest generation, such as hydraulically actuated mold oscillation, position-controlled Cyberlink segments and the metallurgical process model Dynamic Solidification Control (DSC) for secondary cooling control. In combination with the electro-magnetic strand stirrer (EMS), a joint development by SMS Siemag and SMS Elotherm, these modules provide the basis for the production of excellent quality slabs.

Supply complete with electrics and automation. We will provide the complete basic and detail engineering and supply mechanical and electrical core components, the X-Pact® electrical and automation system including process automation for level 1 and metallurgical process models for level 2, all auxiliary components as well as supervision of erection, and commissioning.

Fuxin Special Steel is part of the Formosa Plastics Group, a private group of companies headquartered in Taipei, Taiwan.
Our Indian subsidiary, SMS India Pvt., has been contracted by the SAIL Group to supply a ladle furnace (LF) for a steelworks at Durgapur, West Bengal. Here, SAIL operates the Alloy Steel Plant for high-alloyed steels and special steel grades. Expansion of the steelworks by an additional 60-t ladle furnace will optimize heat planning and lead to higher utilization of the continuous casting plant.

Supply package
The supply package for this order comprises, in addition to the LF, a gas cleaning plant and an X-Pact® electrical and automation system. Also erection and commissioning – which is scheduled for the end of 2011 – are included in the scope of supply.

Taiwanese Dragon Steel Corporation has contracted us for the supply of the third 230-t converter as part of the expansion of the carbon-steel plant in Taichung (Phase II). The SMS Siemag supply scope comprises – in addition to the 230-t converter with lamella suspension, bottom tuyeres and a sublance with robot – the complete bin system for ferroalloys, the gas cleaning system with primary and secondary dust collection as well as the gas recovery system and all vehicles, ladles and slag pots.

For visualization and control, SMS Siemag will supply the complete X-Pact® automation system (level 1) and the instrumentation for the electrical equipment.

Commissioning of converter No. 3 is scheduled for 2012. With three converters up and running, the meltshop will have an annual capacity of 6 million t of steel.

In February 2010, SMS Mevac had already received the order for the supply of the RH-TOP degassing plant No. 2 for the same plant.
ArcelorMittal Asturias has contracted us to supply the new converter vessel No. 2 for its works in Gijon, Spain. Asturias belongs to Flat Carbon Europe (FCE) of the ArcelorMittal Group. The steelworks produces steels for the production of plate and rails in two 120-t converters equipped with bottom stirrers. Already in 2004, we had upgraded converter No. 1 by installing the lamella suspension system developed by SMS Siemag. Commissioning of the second converter is scheduled for the end of 2011.

Second converter with lamella suspension for Spanish works


text from page

ArcelorMittal Asturias: Gijon receives new converter vessel

Enlargement of converter volume. With this system the vessel can be suspended in an unrestricted manner. A system of vessel guides accommodates any thermal expansions, no matter in which direction. Compared to conventional systems, the lamella suspension is of compact design. This provides the advantage that existing foundations can be reused while expanding the converter volume.

Based on the positive experience with converter No. 1, ArcelorMittal Asturias decided to equip the second converter likewise with a new vessel featuring our lamella suspension system. The about 25% larger specific volume will provide the customer with the benefit of a higher yield as a result of the reduced slopping loss and the increased availability of the converter.

Scope of supply

SMS Siemag will provide the basic and detail engineering and supply the converter vessel complete with slag skirt, trunnion ring, lamella suspension system and the converter tilt drive.

works. RH-TOP plant No. 1, which was likewise supplied by SMS Mevac, and converters No. 1 and No. 2 were successfully put into operation early this year. The best performance in 24-hour operation achieved since then has been a production rate of 34 heats per converter.

Dragon Steel Corporation, Kaohsiung, is a company of the CSC Group, which is one of Asia’s most important steel producers.

1. Current tap weight with conventional suspension system
2. Possible tap weight with lamella suspension

A proven SMS Siemag development: Installation of a lamella suspension system provides numerous benefits especially as part of revamping projects in converter steelworks.
In older LD steelworks, the large-size bearings in the converter tilt drives may become weak points and cause problems. A replacement of these bearings is very complicated and normally requires a long and expensive downtime of several weeks. SMS Siemag has developed a concept which reduces the revamping time considerably. In March 2010, we implemented this concept for the first time at ArcelorMittal Asturias in Avilés, Spain.

New revamping concept implemented

ArcelorMittal Asturias: Large-size bearing of converter tilt drive replaced in four days

What made the replacement of a bearing of a converter tilt drive so time-consuming was that the entire gear unit had to be removed and dismantled into its individual components. Such a repair job took about two to three weeks which of course led to considerable production losses.

To tackle this issue effectively, we teamed up with a bearing manufacturer and developed a revamping concept allowing the bearings to be replaced in just a few days. The bearing is designed as a split cylindrical roller bearing and delivered in the form of a ready-for-installation complete unit including associated bushes, covers and other components.

This revamping concept was implemented for the first time in March 2010 on the converter A of ArcelorMittal Asturias in Avilés. Thanks to meticulous preparation of the revamping job by the customer and our experts and the good cooperation of all persons involved, removal of the old and installation of the new bearings took no more than four days. Preparatory work is already underway for replacement of the bearings in the second converter.
Responding to an order we received from India’s Rourkela Steel Plant in January 2010, SMS Siemag will supply a BOF converter including tilt drive. This is the 20th SMS Siemag converter tilt drive for India in less than five years.

The tilt drive will be manufactured and completely assembled in our Hilchenbach workshops at the beginning of 2011. All wheels, shafts and bearings will be set or adjusted so that all that needs to be done later in the customer’s plant is to install the main gear on the converter pins and to screw-connect the brackets, the primary reducer and the motors.
Salzgitter Flachstahl GmbH, Germany, the biggest steelmaking subsidiary of the Salzgitter Group, has awarded us the contract to erect a strip casting plant with Belt Casting Technology (BCT). With this plant a fundamentally different casting concept will be realized for the first time on an industrial scale, enabling the casting of high-strength steel strip in the gage range from 8 to 15 mm. The plant is scheduled to be ready for commissioning in 2012.

The plant

Energy savings of up to 60 % in the process stages of casting and hot rolling. Compared with the conventional steel-plate production process, the belt casting technology can save up to 60 % of CO₂. This corresponds to 2.1 Gigajoule or 170 kg CO₂ saved per t of hot strip (Source: German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety).

Commenting on this order Christian Geerkens, Executive Vice-President of the Steelmaking Plant/Continuous Casting Technology Division of SMS Siemag, states: “With this project, our customer Salzgitter is realizing a plant with incredibly high energy saving potential. This plant concept fulfills all criteria of economy and ecological efficiency. We are very proud to realize this project together with Salzgitter.” Jochen Schlüter, responsible for the development of the strip casting process, adds: “This is another breakthrough step in the development towards near-net-shape casting. We are entering new terrain: the strip is cast without any stresses, casting fluxes are no longer required. For the implementation we will need a good deal of pioneering spirit.”

Production of HSD* steels. The industrial-scale pilot plant is designed for a production of 25,000 tpy of strip, the majority being made from HSD* steels. In addition to extraordinary formability properties, HSD* steels (High Strength and Ductility) have a high potential for light-weight construction and feature high strength. This makes them ideally suited for automotive applications.

Joint development by Salzgitter and SMS Siemag

Salzgitter: Strip casting plant with Belt Casting Technology will be built

Construction of strip casting plant. The order for the erection of the strip casting plant encompasses the basic and detail engineering, the supply of the mechanical equipment, the electrics and the automation system. Also all ancillary units as well as erection and cold commissioning at the site in Peine will be included in the supply.

Conversion and expansion of Steckel mill. For rolling, the cast plates will be transported to the Steckel mill at the works in Salzgitter. To this end, the four-high roll stand will be converted and expanded. Our scope also comprises the basic and detail engineering, all mechanical and electrical equipment, all ancillary plants as well as erection and commissioning.

The process

The novel BCT process differs from conventional continuous casting in that a pouring system pours the liquid steel horizontally and in a freely running flow directly onto a moving transport belt. The circulating transport belt is tightened between two rollers and water-cooled from below. Side containment is by means of two synchronously traveling block chains, which are also water-cooled. After solidification the cast strip is directly rolled down to hot strip with the option of being further processed into cold strip. The cast
HSD® steels (High Strength and Ductility) feature high contents of manganese and distinguish themselves by high strength combined with good formability (ductility). These steels are developed for a variety of applications, especially for those calling for complex geometric shapes and high strength.

The casting machine of the BCT strip casting plant (side view).

The casting machine of the BCT strip casting plant (side view).

strip is produced without any bending stresses. No casting fluxes are needed. Complete production steps can be dispensed with and strip from innovative steel grades can be produced.

Concept for the development of an industrial-scale plant

The concept prepared by the cooperation partners for the implementation of the pilot plant aims at optimizing investment costs, achieving production on an industrial scale, and improving the cost effectiveness of the process. Here is an example: The plant will not cast sequences but single batches, i.e. only one ladle will be cast per production cycle. For this, no ladle turret is required. Moreover, a roll stand already existing in the Salzgitter mill will be upgraded. Hence, during this phase, operation will still be based on the offline concept, which – with a view to the existing equipment – is an economically reasonable solution.

Objective of the development activities. The objective is to conceive a concept for industrial-scale production on an in-line plant with a length of 120 m. At the latest at this stage all requirements will be fulfilled, be it the call for low capital investment or for energy-saving technologies. The cooperation partners reckon that the in-line concept will be realized after successful testing of the pilot plant.

Steel grades and environmental aspects

Energy savings in the production and use of strip made of HSD® steels. Due to the horizontal casting direction and the likewise horizontal process layout, a higher product quality can be achieved on a BCT plant: the solidifying cast strip need not be bent – as in a continuous casting plant – and the mold, which serves as the transport belt, is movable. This avoids relative movements between the cast strip and the mold. All this will enable the production of steels prone to cracking and of HSD® steels which would react with casting fluxes.

After the steel has solidified to strip in an inert gas atmosphere, the sufficiently thick cast strip can be directly rolled down to hot strip, without reheating. Versus conventional continuous casting processes, this process achieves major savings in energy consumption. Due to the small thickness of the cast strip, temperature homogenization prior to rolling takes distinctly less time. BCT reduces the overall length of strip casting lines and cuts investment costs.

In view of the envisaged eco-friendly impacts on the environment, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety sponsors this project with an investment of EUR 19.0 million.
German continuous casting technology successful in Japan

Tokyo Steel, Japan: Two-strand slab casting plant up and running

In mid-June 2010, we successfully started up a two-strand slab casting plant at Tokyo Steel Manufacturing Company in Tahara, Japan. The plant features 16 strand guide segments and has a metallurgical length of 35 m. Annual capacity: 2.4 million t of steel slabs.

With a maximum casting speed of 2.2 m/min, the vertical bending machine produces quality slabs, predominantly for the production of steel strip used in the automotive industry. A major part of the produced slabs is directly fed to the rolling mill. To ensure a high surface quality, the slabs are heavily cooled down in a quenching box. Tokyo Steel is the only steel producer worldwide to apply this special process. SMS Siemag has now successfully engineered this technique into the new continuous caster. SMS Siemag supplied the complete engineering and all mechanical and electrical components from the ladle turret through to the runout roller table. Our supply package also encompassed the X-Pact® electrical and automation system, including the process models, and services such as training of the customer’s personnel, supervision of erection, and commissioning.

Tokyo Steel is Japan’s largest producer of electric steel with meltshops at five locations, namely in Okayama, Kyushu, Takamatsu, Utsunomiya and Tahara. The Tahara works is the most recently established production site of Tokyo Steel. It was erected in 2007.

Cost savings in the production process

Start-up of handling system for hot slabs

For a customer in the Middle East, SMS Innse has supplied, installed and successfully started up a new system for automatic removal of hot slabs from the existing slab casting plants of the steelworks.

As it is now possible to warm-charge the slabs, the energy requirement for reheating the slabs can be substantially reduced. The hot slabs coming from the two twin-strand continuous casters can be directly delivered to a hot-slab pit. From there the slabs are transferred in the warm state to the reheating furnaces of the existing 2,032-mm hot strip mill. The hot strip mill was also supplied by SMS Innse back in the 1990s.

The lower energy input necessary to reheat the slabs to the required rolling temperature directly translates into reduced production costs.
Salzgitter Flachstahl GmbH, Germany, has successfully commissioned the fourth continuous slab casting machine supplied by SMS Siemag. The bow-type, single-strand caster produces slabs in widths between 1,100 and 2,600 mm and in two different thicknesses, 250 mm and 350 mm. The slab cross-section of 350 mm x 2,600 mm is presently the biggest casting format of a continuous casting plant in Central Europe.

Photo showing the 210-t ladle with the steel being poured into the tundish.
Largest slab cross-section: 350 mm x 2,600 mm

Checking of the machine head during supervision of cold commissioning.

Our supply scope comprised the basic and detail engineering, the delivery of all mechanical components and the complete X-Pact® electrical and automation system including the technological control systems and process models. On top of that our supplies included the solid-construction portion and structural steelwork, new water-treatment equipment as well as erection and commissioning and the associated supervision services.

Salzgitter Flachstahl uses this plant to produce demanding micro-alloyed steels, heavy-plate grades and tube grades resistant to sour gas to API-5L and HIC standards. Especially thanks to the possibility of casting a thickness of 350 mm, heavy-plate production can now benefit from slabs catering to new plate size ranges with a highly promising future potential. The casting plant is equipped with various quality- and production-enhancing ISC® modules (Intelligent Slab Casting), such as resonance oscillator, mold with remote-adjustable narrow sides, position-controlled Cyberlink segments, air-mist secondary cooling and the process model for “Dynamic Solidification Control”. This guarantees the production of slabs with very good internal quality.
To ensure safe and economical casting also of steel grades susceptible to cracking, the caster was designed as a bow-type plant with a constant radius of 11.5 m. This concept minimizes stresses in the strand shell for the attainment of very good surface qualities.

The continuous slab casting plants No. 1 through No. 3 of Salzgitter Flachstahl GmbH were also supplied and commissioned by us.

Finish-assembled strand guide system.

Automation hardware supplied by SMS Siemag.

The dummy bar chain.

Erection of strand guide system.

Slabs feature uniform temperature distribution.

Discharge roller table.
Efficiency guarantees competitiveness. This is why Peiner Träger GmbH has always heavily invested in continuous modernization of its complete beam production chain. As a result, the production equipment is today of the worldwide latest state of the art.

Beam production from slabs

**Steel plus technology:** The key to success for Peiner Träger

Major steps of this continuous modernization process were the commissioning of the new electric steelworks in 1995, the erection of the beam blank casting plant in 2001, modernization of the continuous bloom caster with expansion of formats in 2005 by SMS Concast as well as the conversion of the beam blank caster into a combi-caster designed to produce slabs in addition to beam blanks. The latter project was realized in 2009/2010. This ongoing optimization process, which embraces all key production units, is a precondition for long-lasting business success.

The two-strand combi-caster is now designed for both the production of slabs 250 mm thick and between 500 and 1,100 mm wide and of beam blanks (BBL) in formats up to 1,150 mm x 490 mm x 130 mm. This beam blank caster produces the widest BBL format in the world.

The photos show key components of the converted combi-caster, which produced the first slabs in February 2010 (see NL 1/2010, page 24).
A ladle above the tundish: the existing equipment can be further used.

Modular strand guiding for both the slab and the BBL caster. In the previous pure BBL casting plant the segments were fix-mounted.

View of the plant: from the casting platform to the strand guide.

Discharge area of the two-strand casting plant.

Beams rolled from slabs. 7-m-long slabs rolled into 50-m-long beams.
China Steel Corporation (CSC) of Kaohsiung granted us the final acceptance for its new two-strand slab caster. The casting equipment had been commissioned in the late summer of 2009. This is already the fifth continuous casting plant installed by us in Taiwan’s biggest integrated steel plant. The new caster is used to produce 2.6 million t of steel slabs annually in the thicknesses of 230 and 250 mm. It is designed for a maximum casting speed of 2.2 m/min.

Since commissioning of the No. 7 caster, slabs have been produced from the following steel grades: 50 % low-carbon steels, 17 % ultra-low carbon grades and 20 % peritectic steels. Our supply package encompassed the basic and detail engineering as well as the delivery of all mechanical core components and the complete electrics and automation, including the technological control systems.
Taiwanese China Steel Corporation (CSC), located in Kaohsiung, has ordered its sixth RH degassing unit from SMS Mevac. The contract covering the supply of the 250-t RH degassing plant comprises the engineering, supply of all plant components, comprehensive supervision services as well as personnel training.

The new plant will be installed at the converter steelworks No. 2. The production range will include ultra-low carbon steels for the automotive industry and non-grain-oriented silicon steels for electric sheet, for example for the manufacture of transformers.

The plant is slated to go on stream in the second quarter of 2012. This contract marks the successful continuation of the longstanding partnership between China Steel and SMS Mevac.

370-t RH-TOP plant at MMK, Russia

A class of its own

Since the end of February 2010, a 370-t duplex RH-TOP plant supplied by SMS Mevac has been in operation at MMK in Magnitogorsk, Russia. This plant has a number of special features. Equally remarkable is the photo of the two snorkels below the vessel bottom. It shows the refractory-lined snorkels while the RH vessel is being heated up by the TOP lance.
Expansion of wheel production for high-speed trains

Masteel orders 120-t duplex RH plant

On May 11, 2010, during a festive ceremony at the Chinese city of Maanshan, SMS Mevac and Masteel International Trade & Economic Corporation signed the contract for the supply of a 120-t duplex RH plant. Masteel intends to use this RH plant, which will form part of the new electric steelworks, to fulfill the superior quality demands required for the production of wheels for high-speed trains. Additionally, the company wants to further strengthen its market leadership position in this product segment.
Chinese long-term planning provides for the current railway network to be expanded to 120,000 km by the year 2020.

Investments will not only be geared towards the mere expansion of the network. There are also plans to modernize and electrify the railway lines and push the construction of high-speed lines. Today only around one third of the Chinese railway network is electrified and there are only very few high-speed lines, such as the one between Beijing and Tianjin. Priority is given to prestige projects such as the high-speed line between Beijing and Shanghai. The central government has set aside an investment sum of more than RMB 220 billion for this project. When the line is completed, speeds of up to 350 km/h are expected to be reached. According to the plans, there will only be 21 stations along the 1,318-km-long line, three of which will be in Tianjin, Jinan and Nanjing. Completion of the entire line is expected for April 2013.

To promote modernization and expansion of the railway network, China’s biggest development base for high-speed trains and wagons is currently being set up in the north-western province of Jilin. Completion of the production facility is expected for summer 2010. Changchun Railway Vehicles (CRV) plans to invest RMB 2.5 billion by then. According to the plans, the facility will be laid out for an annual production capacity of 500 regular trains (locomotives plus wagons) for passenger transportation, 800 China Railway High-Speed Trains (CRH) for speeds of more than 200 km/h and 800 intra-city trains for more than 120 km/h.

(Excerpt from “Germany Trade & Invest Online News No. 11”)
SMS Mevac UK successful in Australia

BlueScope Steel orders injection and treatment station

BlueScope Steel in Wollongong, Australia, has awarded SMS Mevac the contract for the supply of a new injection station for steel melt treatment. SMS Mevac had previously completed a feasibility study for the project and the basic engineering for the plant.

The new plant will treat the steel in ladles with a capacity of 300 t. For desulphurization and inclusion modification the unit will deep-inject calcium silicide powder using the dense phase injection technology. The use of the low nitrogen pick-up ladle cover, an SMS Mevac development, ensures that demanding nitrogen requirements are satisfied.

In addition to injection, the unit incorporates a wire feed system, argon stirring by both top lance and porous plug and a comprehensive ferro-alloy addition system. This makes the unit a very flexible secondary steelmaking asset.

The new plant will be designed to be run by a single operator and incorporate an advanced robotic system for steel sampling. SMS Mevac will carry out the detail design and supply key mechanical components plus the control system software and metallurgical models. BlueScope Steel will carry out the complete plant erection and supply the hydraulic system, heavy fabrications and all electrical and control system hardware.

The plant is due to be commissioned in December 2011.

Additionally fitted with desulphurization function

Shougang Group: Fifth RH-TOP plant from SMS Mevac on stream

On April 7, 2010, SMS Mevac and Shougang Iron & Steel successfully started up the fifth RH-TOP plant of the Shougang Group. Since 2005, SMS Mevac has supplied four RH-TOP plants to Shougang Qian An and one to the Shougang subsidiary Qinhuangdao Shouqin.

All five RH degassing plants are equipped with metallurgical TOP lances. For the fifth plant the customer requested that the lances at both treatment positions be additionally fitted for desulphurization treatment. This is achieved by blowing powdered material onto the steel bath under vacuum, a technology developed by SMS Mevac. The lances naturally also feature the typical TOP lance functions for oxygen blowing and heating of the vacuum vessel.

Two silos are provided for storage of lime and fluorspar. The silos are filled by a pneumatic conveying system. The powder required for the injection process is withdrawn from the silos into an injection dispenser arranged below. Conveying gas
blown into the injection dispenser transports the powder over a distance of approximately 150 m to a second dispenser located inside the RH degassing plant. From there the material is injected via either of the two TOP lances.

The material flow rate is regulated via a special control valve developed by SMS Mevac. This valve dynamically adapts the powder flow to the process requirements.
ArcelorMittal Dunkirk, France: June 30, 2010

SMS Mevac: RH-OB plant No. 2 starts up

News from the ArcelorMittal management. “On Wednesday, June 30, 2010, at 08:45 h we treated the first ladle on the new RH-OB plant No. 2 here at ArcelorMittal in Dunkirk. With this, we have concluded – on schedule – a highly important project. This is an accomplishment that would not have been possible without the great commitment and effort of all involved. Thank you all for a job well done.”

“The erection of the second RH-OB plant forms an integral part of our “Steelworks for the Future” project, together with the modernization of our three continuous casting plants No. 21, No. 22 and No. 23. These measures will strengthen the competitiveness and enhance the product and service quality of ArcelorMittal Atlantique. All in all, five years of work were needed to realize the overall project, among others due to the interruption of the construction work in 2009. A total of 473,000 working hours were dedicated to this project to take it to successful completion.”

“The management of ArcelorMittal Dunkirk congratulates all who have contributed to the success of this project, from the construction department, the operators and the support departments of the works through to the external companies involved.”


During commissioning of the RH-OB plant No. 2, SMS Mevac provided effective support.
Kamineni Steel, India: 350,000 t of round blooms per year
Steelworks with continuous caster

SMS Siemag, SMS Concast and SMS Mevac will supply a steelworks and a continuous casting plant to Kamineni Steel & Power Ltd. The plants will be erected at the Narketapally site in the Indian state of Andhra Pradesh. The annual capacity will total about 350,000 t of round blooms. Commissioning is scheduled for the end of 2011.

The steelworks. SMS India Pvt. Ltd. will supply a 60-t Arccess electric arc furnace with eccentric bottom tapping (EBT), a 60-t ladle furnace, a gas cleaning plant and the electrical and automation systems (level 1 and 2). SMS Mevac will deliver a VD vacuum tank degasser for the production of high-grade steels.

The continuous casting plant. The two (three)-strand continuous casting machine to be supplied by SMS Concast will come with Convex® round tubular molds, electromagnetic mold stirrers, compact hydraulic oscillation systems and multi-point unbending modules. The caster will also be equipped with level-1 and level-2 automation. Fitted with these technical features, the plant will be able to fulfill the customer’s very exacting quality requirements. The caster will produce round blooms in 180, 200, 280 and 320 mm diameter for the group’s own consumption.

Use for pipe production. The produced blooms will be processed into seamless tubes in a rolling mill of the Kamineni Group. For this purpose the Kamineni Group has established a seamless tube mill under the name United Seamless Tubular Pvt. Ltd. This mill will produce 300,000 t of tubes in the 127 mm to 355.6 mm (5” to 14”) size range. Commissioning is planned to take place in the second half of 2010. As the seamless pipes will be used in the oil exploration and drilling industry, they must meet the API specifications for casing, tubing and drill pipes.

Successful expansion. This project is the consistent continuation of the Group’s expansion course. When placing the order, it was important for the Kamineni Group to get a complete solution for the new steel-making plant from a single source.

Tube finishing facility. The Group already operates a tube finishing facility, Oil Country Tubular Ltd. Here a wide range of tube finishing activities are performed as, for example, internal plastic coating and reconditioning or rethreading of drill pipes. Also services such as on-site inspections are offered.
Up to 40 % hot metal charging

Masteel, China:
120-t electric steelworks ordered

Chinese Maanshan Iron and Steel Co. Ltd. and SMS Concast have concluded a contract for the supply of a 120-t electric arc furnace. The contract covers the engineering and a major part of the equipment supply for the Super-High-Power EAF.

The furnace will be operated by a 100-MVA transformer and equipped with an SMS Concast electrode positioning control system and six Conso injectors for introducing chemical energy.

The electric arc furnace can be charged with up to 40 % hot metal. A high hot metal rate in the charge enables the production of a great variety of steel grades with low contents of residual elements.

Commissioning is planned to take place in fall 2011.
Conso system for optimization of production costs

Mid American Steel selects Conso system for boosting EAF operation

Mid American Steel, USA, a division of Oklahoma Steel & Wire, plans to bring back on stream – before the end of this year – its melt shop in Madill, OK/USA, which is currently being revamped by SMS Concast. The melt shop is based on a 50-sht EAF upgraded with a Conso system to reduce the cold spots in the furnace and improve the decarburization process.

During the first period of operation, the electrical power input will be limited due to grid constrains. During this phase, the use of Conso burners and injectors will allow compensating for the lack of electrical energy by valuable chemical energy.

In a second stage, when power availability will be increased, the Conso system will markedly contribute to optimizing production costs, as it can be used to make up for fluctuations in utility costs, for example, for electrical energy, gas, coal and oxygen.

The range of supply for the Conso system will initially comprise:
- Three Conso burners/injectors of the SMLZ type
- Three BRT boxes (short type)
- Refurbishing and revamping of the valve trains to include a new oxygen regulation line
- Implementation of Conso process control and automation
- Modification of the existing water-cooled panels to fit in the new Conso system
- Engineering for the new carbon injection system
SMS Concast and SMS Meer supply steel complex to Bahrain

The contract is for the construction and supply of one 120-t electric arc furnace, one ladle furnace, one bloom/beam blank casting plant and one heavy-section rolling mill. The order will be realized in cooperation with Samsung Engineering as EPC partner (Engineering, Procurement & Construction). Commissioning of the overall plant is planned for the second half of 2012.

With the awarding of the order for the technological core equipment including the complete automation system to SMS Meer and SMS Concast, United Steel selected best performing production technology for long products.

United Steel Company (Sulb) in the Kingdom of Bahrain awarded SMS Concast and SMS Meer the order to design and supply on a turnkey basis a steelworks for blooms/beam blanks and heavy sections. The minimill will be part of the new, fully integrated steel complex in Al Hidd, a town on a sand spit on the south-eastern extremity of Muharraq Island.

SMS Concast will supply a state-of-the-art steelworks with an annual capacity of 850,000 t. It will comprise one 120-t Ultra-High-Power EAF for continuous DRI charging, a ladle furnace and a three-strand continuous casting machine for various near-to-net-shape bloom and beam blank sections. The delivery also includes the material handling system for ferroalloys addition and a powerful dedusting system.
On the occasion of the signing ceremony, Dr. Joachim Schönbeck, President & CEO of SMS Meer, stated: “We feel honored to have been selected by United Steel and its shareholders Foulath and Yamato Kogyo for this important project. Together with our sister company SMS Concast, we will deliver a true benchmark plant, which will set new standards. With Foulath’s existing pelletizing plant, this will be one of the most efficient production sites in the GCC region.”

Jacques F. Zuber, President & CEO of SMS Concast, added: “As pioneer and market leader in the field of continuous casting technology, SMS Concast is pleased to have the opportunity to provide its latest melting and casting technology to this outstanding project. We view the award of the contract as recognition of our competence in the key markets for our products.”

The here realized beam blank casting technology was launched onto the market by SMS Concast, a pioneer in continuous casting technology.

The heavy-section rolling mill to be supplied by SMS Meer will feature the latest state of the art in rolling mill technology. The mill stands will come with hydraulic roll adjustment systems, while the roller straightener will be equipped with hydraulic roller adjustment. Designed for an initial capacity of 600,000 tpy, the plant will boast high flexibility in terms of product mix and format changes. For example, a program change will be realizable within 20 minutes.

Planning and civil engineering, erection and ancillary equipment will be provided and coordinated by Samsung Engineering. For many years, Samsung Engineering has been active in the region as a project partner.

Together with Foulath’s existing pellet plant, which will be further expanded for the new steelworks project, and the DRI plant awarded to Kobe/Midrex, a remarkable fully integrated steel complex will be established at Al Hidd, covering the complete production chain from pelletizing to the finish-rolled product. This excellent setup allows highly efficient production at low operating costs.

Furthermore, this investment will create 1,000 new jobs in the Kingdom of Bahrain. The total order volume for the project amounts to some EUR 1.2 billion. With the new steel facility, United Steel plans to cover about 15 % of the current imports of steel beams and sections into the countries of the Middle East.
On March 12, Tianjin Iron & Steel Company commissioned its second SMS Concast-supplied steelworks. The plant was handed over to the customer after the first heats had been successfully cast. This steelworks has the same layout as the first one supplied by SMS Concast, which started operation in October 2009 at the same location. Its main components include an electric arc furnace, a ladle furnace with VD plant and a continuous casting facility. The plant is operated with a hot metal rate of up to 40%.

110-t EAF with Conso oxygen technology

Tianjin, China: Second steelworks for billet production in operation
The steelworks

The electric arc furnace, designed for a tapping weight of 110 t, is equipped with a 6 x 6 MW Conso oxygen system. The secondary metallurgy area includes a ladle furnace and uses the degassing plant of the first steelworks for steel refining. The vacuum degassing plant is of the tank design equipped with steam-ejector pumps.
Tianjin, China: Second steelworks for billets in operation

The continuous casting plant

Whereas the first SMS Concast casting machine for Tianjin is designed for the production of blooms, the second machine produces round billets of 200 mm and 150 mm diameter and square billets in the format 160 mm x 160 mm on six strands. Like the first plant, the second one also has a casting radius of 10.25 m and is equipped with mold stirrers and spring-guided mold oscillation systems.
Ladle turret.

Withdrawal and straightening units.

Start of casting was smooth. The first ladles were successfully cast into 200-mm-diameter rounds.

The six-strand casting machine.

Round billet of 200 mm diameter.
Four complete steelworks and one continuous caster

Plants for 5.1 million t of steel brought on stream in six months

At the end of May, SMS Concast successfully commissioned a further steelworks at Tung Ho Steel in Taiwan. This brings the number of complete SMS Concast steelworks commissioned in Asia during a half-year period to four – plus an additional continuous casting plant, started up during the same period. The individual plants are in operation at Siam Yamato Steel (Thailand), Tianjin Iron & Steel, Works No. 1 (China), Sumitomo Metals Kokura (Japan), Tianjin Iron & Steel, Works No. 2 (China) and Tung Ho (Taiwan), see table.

These plants have a combined annual capacity of 5.1 million t of billets, square and round blooms and beam blank formats. All four of the steelworks feature high-power electric arc furnaces of the latest generation fitted with oxygen technology and secondary metallurgy stations such as LF and/or VD. The transformer capacities range from 80 to 100 MVA.

Together, the five continuous casters installed by SMS Concast feature 25 casting strands. They process grades ranging from structural steels through to highest-grade quality steels, which are formed directly in the withdrawal and straightening units using the process of dynamic mechanical soft reduction.

SMS Concast also provided the equipment for the electrical systems and level-1 and -2 automation. The automation solutions for these plants are the result of SMS Concast’s combined competence in engineering, process know-how and excellence in plant manufacturing. This integrative approach is one of the keys in making these state-of-the-art steelworks a success story.

The fact that the commissioning activities were conducted in parallel at various plants demanded a huge effort above all from the SMS Concast staff at Udine in Italy. This is where the electrical engineering and automation specialists as well as the minimill team of SMS Concast and SMS Meer are located.
Major orders received by SMS Concast

<table>
<thead>
<tr>
<th>Customer</th>
<th>Plant</th>
<th>Commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>JSPL Raigarh/India</td>
<td>One 6-strand billet caster</td>
<td>End of 2010</td>
</tr>
<tr>
<td>TerniumPuebla/Mexico</td>
<td>Revamp of a cooling bed</td>
<td>End of 2010</td>
</tr>
<tr>
<td>Yonggang/Lianfeng, China</td>
<td>One 8-strand billet caster</td>
<td>Mid-2011</td>
</tr>
<tr>
<td>Masteel, China</td>
<td>One 120-t EAF</td>
<td>End of 2011</td>
</tr>
<tr>
<td>JSPL Patratu/India</td>
<td>Two 8-strand billet casters</td>
<td>Early in 2012</td>
</tr>
</tbody>
</table>

The five plants brought on stream

Siam Yamato Steel, Thailand:
80-t EAF, LF and one five-strand caster for billets, blooms and beam blanks
Annual capacity 700,000 t. (commissioned November 2009)

Tianjin Iron & Steel, China:
110-t EAF, LF, VD and one six-strand caster for round blooms
Annual capacity 1,150,000 t.
(commissioned December 2009)

Sumitomo Metals Kokura, Japan:
One three-strand caster for blooms, with dynamic mechanical soft reduction. Annual capacity 900,000 t.
(commissioned December 2009)

Tianjin Iron & Steel, China:
110-t EAF, LF and one six-strand caster for billets.
Annual capacity 1,150,000 t. (commissioned March 2010)

Tung Ho, Taiwan:
120-t EAF, LF and one five-strand caster for billets.
Annual capacity 1,200,000 t. (commissioned May 2010)

Total: 5,100,000 tpy.
Safety is becoming an increasingly important issue in steelworks. Especially for electric arc furnaces with high power inputs, short tap-to-tap times and continuous DRI and hot metal charging, safety aspects are becoming more and more important. Due to the limited time available for sampling, the large amounts of slag and the need to take several samples to control the process, the sampling process should be automated as much as possible. This avoids the presence of operators around the furnace. With the objective of improving safety and reliability in EAF operations, SMS Concast developed numerous furnace features, including a new automatic sampling machine.

Examples: Shagang and Siam Yamato

Safer EAF operation with new sampling machine

No more powering off and interruptions

The sampling machine developed by SMS Concast is designed to take temperature measurements, determine carbon and oxygen contents and take samples of the melt for off-line chemical analysis. It guarantees utmost safety and speeds up operations as it is no longer necessary to power off the furnace or stop deslagging.

Machine features

The machine can handle a single lance or a multiple lance. In the latter case up to three lances can be used. In a multiple-lance arrangement, it is either possible to use each lance separately or have a cartridge construction for combined operation of the lances.

All components are enclosed within a supporting structure, shielded from slag splashes and hot and combustible gases that may be released from the furnace during operation. A compressed-air cooling system protects the plant against excessive heat.

The machine is compact with a small footprint. It is installed at a safe distance from the slag door in order not to disturb access and the operations in that area.

A special system of bearings and guides allows movements in all directions. The system is electrically actuated and the position of the sampler is controlled by encoders. An anti-collision system prevents damage of the machine in the event of wrong operation.

The system can also be implemented with an automatic cartridge exchanger, reducing to a minimum the presence of operators near the furnace.
Jindal Steel & Power Ltd (JSPL) and SMS Concast signed a contract for the supply of a continuous billet casting plant. This is the fourth continuous billet caster in a row ordered by the Indian Jindal Group from SMS Concast. The first one is already up and running since 2009 at JSW Steel Ltd in Torangallu. The second and third machine with eight strands each are still under construction. They will be installed at Jindal Steel & Power Ltd in Patratu, some 40 km from Ranchi, the capital of the state of Jharkhand. Commissioning of the two plants is scheduled to take place in 2012. The recent order for the fourth caster with six casting strands will be erected at Raigarh, the headquarters of the Raigarh District in the state of Chhattisgarh.

The plants for Patratu

This order covers the supply of the process technology and equipment for two identical eight-strand continuous billet casters for a production volume of 3.0 to 3.7 million tpy.

The plants will have a casting radius of 12 m. Being equipped with electro-mechanical tundish stoppers, Convex® molds, electro-magnetic mold stirrers and secondary cooling, the plants will produce billets of 165 mm x 165 mm sq.

The plant for Raigarh

With this new plant JSPL will boost its production capacity by up to 1 million t. The plant will be designed to produce mild and high-carbon steels, ball bearing steels and free-cutting steels. The casting radius of 9 m gives the plant much flexibility and ensures that critical straightening strains and strain rates in the cast billets are avoided. Billet formats of 130 mm, 150 mm and 165 mm sq. will be produced. To feed the six casting strands, the tundish will be laid out for a capacity of 30 t of liquid steel. The machine will be equipped with Convex® cartridge molds, electro-mechanically driven mold oscillation systems and electromagnetic mold stirrers.

Also a secondary spray cooling system for intensive cooling and withdrawal and straightening units for safe unbending of the billets are included in the scope of supply. The use of a rigid dummy bar with a permanent head enables automatic disconnection of the hot strand and thus reliable start of casting with minimized re-stranding and machine preparation times.

In realizing this project for JSPL, SMS Concast builds on its vast experience in continuous casting technology, steel preparation and quality assurance. SMS Concast has accumulated its comprehensive know-how over several decades, giving the company a technology leadership position in continuous casting of long products.
In 1999, SMS Concast started to supply self-manufactured electro-magnetic stirrers (EMS). Meanwhile the vast majority of modern continuous casting plants for long products are equipped with EMS. Today, almost 700 electro-magnetic stirrers built by SMS Concast are in operation at steelworks around the globe. Actually, the systems can be installed at three different positions, ensuring that the steelmakers' specific quality requirements are complied with in each case.

**Up to 15 % savings on energy**

**Electro-magnetic stirrer technology from SMS Concast**

Three stirrer types are available for different tasks: mold stirrers (M-EMS), strand stirrers (S-EMS) and final stirrers (F-EMS).

The **mold stirrer (M-EMS)** has not only positive influence on the cleanliness of the final product. It also has the task to transfer the heat from the internal strand area to the peripheral zone, as this markedly improves the microstructure of the steel. Down the casting strand, below the mold, is the position of the **strand stirrer (S-EMS)**. The S-EMS is used whenever re-stirring of the liquid core in the strand is necessary for metallurgical reasons. When about 50 % of the cast cross-section has solidified, a **final stirrer (F-EMS)** is used to influence final solidification in the strand core. This is an important factor in preventing undesired segregation and shrink hole formation. The combination of the various stirrers and their exact positions along the casting strand depend on the steel grade to be produced, the casting speed and the product cross-section.
Finite element analyses.

Look into a stirrer.

Design criteria

The key criterion for the design of electromagnetic stirrers is the to-be-achieved intensity of flow of the still liquid steel. The movement of the steel is controlled with very high precision by means of the rotating magnetic field of the EMS.

SMS Concast offers electro-magnetic stirrers for small and large cross-sections, from 100 mm x 100 mm sq. up to diameters of 800 mm for round formats. Thus an extremely wide range of formats can be produced, while meeting any quality specifications of our customers. The upper size limit is constantly being expanded. Such stirring systems are today designed and constructed for the specific conditions and requirements on hand using state-of-the-art 3D software and finite element calculations.

Highest energy efficiency and long service life

Combining practical application experience, an analytical approach and use of special materials results in highest energy efficiency. On average an SMS Concast stirrer consumes up to 15 % less electrical energy than other systems for the same stirring effect. Every customer, needless to say, is offered a comprehensive service package to maximize the service life of the stirrers. The monitoring system integrated into the stirrers indicates at an early stage when it becomes necessary to re-coat the core of the stirrer. Even after ten years of operation, stirrers from SMS Concast are still in permanent use – thanks to the excellent quality of the equipment and service.

Strand stirrer prior to delivery.

Finite element analyses.
Supply of spare and wear parts

Basic agreement concluded with Tiangang

In mid-April 2010, SMS Concast and Chinese Tianjin Iron & Steel Company (Tiangang) signed a basic agreement covering the supply of spare and wear parts, especially mold tubes. The contract governs the general commercial terms and conditions applicable to all future orders. This simplifies the effort involved in handling individual orders and optimizes administrative procedures.

Tian Lei, Manager, Foreign Economic Management Department, and Beat Kündig, Managing Director, Business Unit Service Center, shake hands on the successful conclusion of the contract negotiations.

Being a major customer of SMS Concast for spare and wear parts, Tianjin will thus benefit from comprehensive advantages in the procurement of these parts. As Tianjin operates a great number of SMS plants for the manufacture of long products at its works (see info box), this agreement will pay off soon.

The contract is the logical consequence of a longstanding partnership, providing both partners savings on resources, as it will streamline procurement processes and the preparation of offers. Tianjin can now order certain parts on a call-off basis without having to go through the enquiry and negotiation procedure all the time. For SMS Concast the agreement has the positive effect that the effort involved in sales handling and procurement planning can be reduced, which in turn is also to the customer’s benefit.

This successful agreement seals the excellent and longstanding cooperation between both companies.

SMS Concast-supplied plants used at Tianjin for the production of long products

**Melting plants**
- 110-t EAF for hot metal charging, equipped with six Conso injectors; tap-to-tap time 40 min (commissioned in 2009)
- 110-t EAF for hot metal charging, equipped with six Conso injectors; tap-to-tap time 40 min (commissioned in 2010)

**Secondary metallurgy**
- 110-t ladle furnace (commissioned in 2009)
- 110-t ladle furnace (commissioned in 2010)
- 110-t degassing plant with steam ejectors (commissioned in 2010)

**Continuous casting**
- Four-strand billet caster; 35-t ladle; 5.3 m casting radius (commissioned in 1982)
- Six-strand billet caster; 100-t ladle; 9.0 m casting radius (commissioned in 2003)
- Six-strand bloom caster; 110-t ladle; 10.25 m casting radius (commissioned in 2009)
- Six-strand billet caster; 110-t ladle; 10.25 m casting radius (commissioned in 2010)
In March 2010, Jiangsu Yonggang Group Company, in short Yonggang Steel, contracted SMS Concast to supply an eight-strand continuous casting plant for the production of billet formats 150 mm and 180 mm sq. The plant will be designed for an annual capacity of 1.5 million t. The product range will comprise a great variety of steel types from carbon steels through to special steel grades.

SMS Concast will supply the following equipment:

- the entire mold technology
- equipment for casting flux feeding
- stopper mechanism complete with stopper control system
- hydraulic oscillation systems
- mold stirrers
- primary and secondary cooling systems
- equipment for multi-point straightening
- torch-cutting machines
- marking machines

The level-2 automation installed by SMS Concast will monitor and control the complete casting process. Commissioning is planned for mid-2011.
SMS Concast can look back on more than 50 years of experience in the design of plants for continuous casting of steel and has been driving the worldwide industrial-scale use of continuous casting technology. In India, SMS Concast has been present from the beginnings of modern steelmaking.

In February 1999, SMS Concast founded its own 100% subsidiary, SMS Concast Engineering (India) Pvt. Ltd., in Pune. Since its establishment the company has pursued a clear global approach with a strong local focus.

**Global approach:** Worldwide export of engineering services for continuous casting projects.

**Local focus:** Supply of latest continuous casting technology to the Indian steel industry.

**The global approach**

As a global service provider, SMS Concast Engineering (India) has become a key organization within and important backbone of SMS Concast during the more than ten years of its existence.

SMS Concast Engineering (India) has some 80 employees, 50 of which are experienced engineers with profound technical know-how. They plan and provide overall layout and conceptual designs, feasibility studies, design and calculation of technological structures in steel and/or RCC, basic and detail engineering of core and auxiliary equipment for continuous casting plants as well as piping and electrical engineering.
The organization is divided into six “competence area teams”. The specialization into areas of engineering competence guarantees achievement of excellence through in-depth know-how, continuous improvement, standardization and multiplication. Young engineers are fast and efficiently integrated into the teams by experienced mentors.

An identical organization structure has been established in the other engineering centers of SMS Concast in Zurich, Barcelona and Udine. This permits close interaction from specialists to specialists, fast transfer of latest technology and successful implementation of best practices.

Besides the close interaction between the teams and the very important and well established exchange of engineers between Europe and India for training purposes or for setting up project teams, the management and synchronization of data exchange including the establishment of a common IT tool platform have become key elements of the collaboration. 3D tools for design, simulations and calculations have proven to be efficient tools in accelerating engineering processes and preventing errors and loops.

Additionally, SMS Concast has established a so-called PLM (Product Lifecycle Management) system on SAP basis at all engineering locations. This allows the engineers in Switzerland or Spain to work on truly the same “virtual workbench” with their colleagues in Pune.

The same “virtual workbench” and database is used by the project managers, the procurement and shipping departments, the quality assurance engineers, the site engineers, metallurgists, after-sales service, finance and administration and, last but not least, by the sales departments. The benefit for the customer is that he receives a product of highest quality, based on latest technology, plus fast and efficient project execution.

Besides the core engineering services, SMS Concast Engineering India has been providing more and more project management, procurement, quality assurance and site services for projects in Asia, but also in Europe and South America. These activities have made SMS Concast Engineering (India) a truly global service provider and competence center.

The local focus

The global approach adopted by SMS Concast Engineering India, the company’s regular involvement in the SMS Concast group’s international continuous casting projects for billets, blooms, rounds and beam blanks as well as the understanding of the requirements of the local Indian market are key preconditions for successful and cost-efficient implementation of latest technological solutions at Indian steel plants.

Besides the SMS Concast Engineering India office in Pune, SMS group is present in India in New Delhi with SMS India Pvt. Ltd. and in Kolkata with SMS India Pvt. Ltd. and SMS Meer India Pvt. Ltd. These three companies may act independently in their respective market segments or jointly under the SMS group brand.

Besides the synchronized market approach, the three Indian SMS group subsidiaries utilize synergies in IT, HR, administration, procurement and vendor management.

Reception area of SMS Concast Engineering (India) in the Cybernex building in Pune.
SMS Concast in India: Global approach with local focus

SMS Concast products for the Indian market

Alongside the big government- and private-owned steel companies in India, decentralized small and medium producers (SMEs) account for a major percentage of the steel output with production capacities ranging from 50,000 to 500,000 tpy. Especially for this market segment SMS Concast offers smaller casting plants with casting radii between 2.5 and 6 m.

Modular compact casters with casting radii between 2.5 and 4 m

With factory-assembled continuous caster modules (MCC, Modular Compact Casters), SMS Concast offers its customers a cost-efficient “plug and cast” solution. This makes it easy for mill operators to enhance their competitiveness by changing from traditional ingot casting to continuous casting.

Such modules, consisting of a single strand, are designed for production capacities of up to 100,000 tpy, which can be multiplied by additional strand modules. Together with SMS India, complete packages including EAFs with capacities of 20 t and upwards, steel refining plants and all auxiliary equipment can be offered.

High-speed casting plants with two to four strands and radii between 6 and 11 m

Within the very popular segment of 6- to 11-m-radius casters, SMS Concast has developed a new solution based on the “high-speed casting technology”. This solution incorporates experience from and technological features of the larger six- to eight-strand billet casting plants. Equipped with the SMS Concast developed Convex® mold technology, such casters are capable of producing beyond 200,000 tpy per strand, giving the Indian steel producers the right technology for increased productivity and improved billet quality.

As additional features the casting plants can be supplied with a rigid dummy bar system, automatic torch cutting machines, automatic mold level control and submerged casting. Also in this plant segment, complete packages are offered which come with the associated steel melting and secondary refining units.
High-productivity casting plants for SBQ billets with five to eight strands and radii between 9 and 16 m

Thanks to the tremendous progress in high-speed casting, especially through the Convex® and Invex® technologies developed by SMS Concast, production rates of 300,000 tpy per strand have become reality. Through such production rates the output of a single eight-strand caster may reach in excess of 2 million tpy.

In 2009, SMS Concast erected the first eight-strand billet casting plant on Indian soil in Toranagallu. Also the next two eight-strand casting machines in India will be built by SMS Concast. They will be supplied to Jindal Steel & Power Ltd. in Patratu before the end of this year.

While increasingly higher casting speeds are realized, the handling of the hot billets is becoming an ever more important issue. Therefore also the demand for suitable discharging systems is growing. Thanks to the vast experience accumulated during many years of activities in the design of highly efficient casting plants, SMS Concast can develop optimal solutions also in this field.

Due to the higher casting speeds, it is also possible to direct-charge the downstream hot rolling mill with hotter billets. This reduces the required energy input in the reheating furnace. SMS has developed innovative direct feeding concepts based on induction heating technology for the equalization of billets. This maximizes energy efficiency and significantly reduces emissions. Such solutions eliminate completely the need for a reheating furnace, the advantages for the operator being lower investment costs and reduced space requirements in the works.

Continuous casting machines for blooms, rounds and beam blanks

During the last few years, no other single supplier has erected more specialized continuous casting machines for large blooms, rounds and beam blanks worldwide than SMS Concast. Special highlights are, for example, the eight-strand jumbo bloom caster (400 mm x 500 mm) supplied to Posco in South Korea, a two-strand round caster (600- and 800-mm-diameter) for Dongbei in China and a beam blank caster for Peiner Träger in Germany (1,150 mm width).

Sophisticated strand guiding and straightening concepts as well as integrated automation models for electromagnetic stirring, secondary cooling or mechanical soft reduction have been developed for such applications. Also in this field the Indian steel industry can benefit from solutions based on latest technology adapted and specifically tailored to the requirements of the local Indian market.

SMS Concast will continue to provide the Indian steel industry with modern continuous casting equipment which, while having excelled on the global market, takes particular account of the requirements of the Indian steel industry.
On November 10, 2009, Severstal Columbus, USA, produced hot strip with a final width of 1,922 mm. This is a new record, as it is the widest hot strip ever produced on a CSP® plant.

The single-strand CSP® plant at Severstal Columbus in Mississippi had been commissioned in September 2007. Designed for a nominal width of 1,880 mm, it is the widest CSP® plant worldwide. With the recent record of 1,922 mm, this width was surpassed by another 42 mm. During that day, Severstal Columbus produced a total of five coils of this width.

The casting width was 1,968 mm at the upper edge of the mold and 1,951 mm at the mold outlet. The casting sequence ran absolutely smoothly and without any problems.

“The best hot mill in the world”
Another remarkable feature is the constantly high rate of hot strip production of Severstal Columbus. During the twelve months between June 2009 and May 2010, the plant produced 1.5 million t of hot strip, clearly exceeding the design capacity of 1.35 million tpy. During the last three months, actual production was above the nominal capacity by an impressive 19 %. The record month was May 2010 with a monthly output of 138,000 t, conforming to an annual production of nearly 1.65 million t.

Against these impressive facts, Dan Lambert, manager of the hot strip mill, expressed his satisfaction with the CSP® plant in a single sentence:

“In my opinion, you have given us the best hot mill in the world.”
New drive train for stand F1

Ispat Industries modernizes CSP® plant

In April 2010, Indian Ispat Industries in Dolvi near Mumbai contracted us for the renewal of the drive train for stand F1 of its CSP® plant. With the installation of a new main gear unit, a new pinion gear, new drive spindles and Sieflex couplings, Ispat will be able to boost production and expand its product range.

More than 3 million tpy of hot strip
The CSP® plant of Ispat Industries has been in operation since 1998. With an annual production of some 3 million t and a maximum strip width of 1,560 mm, it is one of the world’s most productive CSP® plants. The plant had originally been designed for thin slab thicknesses of up to 60 mm. During the last few years, the maximum slab thickness has been gradually increased to 70 mm, achieving higher throughput rates with the same casting speed. The upgraded drive train will provide Ispat the possibility of expanding the share of thicker slabs. This will raise the production capacity without limiting the range of final gages. A higher rolling torque in F1 also provides advantages for the production of wide strip of high-strength tube grades.

Higher rolling torque without replacement of motor
The new main gear unit and the different transmission ratio will raise the rolling torque on F1 by about 30 %, while relieving the motor. The new drive train will be rated for a constant output torque of 4,000 kNm. The new main gear unit will be of a two-stage design with top-mounted drive shaft. Thanks to this design, the existing foundations can be used to accommodate the new gear unit despite its larger transmission ratio.

For drive torque transmission, Ispat Industries selected Sieflex gear-type self-aligning spindles of the latest design. The integrated, continuous circulating oil lubrication of these spindles guarantees high protection of the spindle equipment. As the oil circulates completely inside the spindle, the service effort is minimal.

Conversion already in 2011
The main gear unit, the pinion gear, the drive spindles and the couplings will be manufactured in our Hilchenbach workshops. As the equipment can be delivered within a period of only twelve months, the conversion can take place as early as in mid-2011.

Similar modernization projects involving an increase in the drive power of F1 have already been realized on the CSP® plants of Megasteel and Nucor Steel Hickman.
Support for product launch from SMS Siemag

Strip of tube steels on CSP® plants

Expanding the product portfolio to include higher-grade steels safeguards the steel producers’ competitiveness as it provides them access to new market segments with higher margins.

An important focus of attention is the production of hot strip from high-strength tube steels, as has for many years been successfully produced on CSP® plants. We boast comprehensive experience in this field and, building on this expertise, we can support our customers in speedily adding these products to their production range.

Since its introduction in 1989, the technology of CSP® plants has evolved into a cost-efficient production process for hot strip of a wide range of steel grades. Today there is growing demand for strip of superior steels with homogeneous internal quality, good surface quality and specifically tailored mechanical properties. This, in connection with the low transformation costs and the excellent features of the CSP® plant process, holds great potentials.

Especially strip of high-strength, micro-alloyed steel grades, as have been used in welded tube production, are a growth market. Produced by thermomechanical rolling, they feature good strength and toughness properties. Plus, they can be produced at favorable costs as thermomechanical rolling permits to reduce the necessary amount of expensive alloying elements.
Requirements on tube grades

The standards for tubes used to transport oil, gas and water are specified by the American Petroleum Institute (API). API standard 5L specifies in great detail the chemical analysis as well as tensile strength and toughness requirements of the material. On the basis of the API standards, companies in the energy industry often stipulate further reaching specifications for material intended to be used in tube and pipe production. Steel grades for tubes are generally required to have both sufficiently high strength and toughness values, good weldability and resistance to corrosion. Extremely exacting requirements must be complied with by grades to be used in the low-temperature range and for the transport of gases containing hydrogen sulfide (sour gas).

Successful production on CSP® plants

CSP® plants for the production of hot strip used in tube and pipe manufacturing differ from plants producing conventional hot strip in various respects. The main differences are the smaller slab thickness usually ranging between 50 and 90 mm and the cast microstructure of the thin slab when it runs into the rolling mill. Thanks to an intensive R&D effort, jointly with operators of CSP® plants, we successfully developed suitable alloying strategies for the meltshop and adapted the pass schedules and cooling patterns so that high-strength tube grades up to strength class X70 to API 5L standards can be produced. These grades are used to produce longitudinally and spiral-welded pipes.
Tubes grades on CSP® plants

Support by SMS Siemag

Thanks to our experience in the production of hot strip made of tube grades we can assist our customers in launching these products. This starts with the clarification of the special requirements to be observed in the production of tube steel grades. In addition to this, our experts optimize alloying concepts, pass schedules and cooling strategies for individual CSP® plants. A critical factor is that the slab is reduced at high rates in the first stands in order to transform the cast microstructure into a completely recrystallized austenitic microstructure.

In older CSP® plants the available rolling torque in stand F1 is often a limiting factor as to the maximum slab thickness and width. Therefore we have developed a modernization concept achieving a substantially increased rolling torque by installing a more powerful main gear unit without having to replace the motor.

We advise our customers during rolling tests and render support in laboratory analyses, material testing and material simulations. Our development engineers may make recourse to a network of international research institutes. "Thus we are in a position to analyze, simulate in models and optimize the specific metallurgical properties of the material in the various process steps speedily and under conditions that come very close to real process situations," explains Dr. Carl-Peter Reip, Material Specialist of SMS Siemag. "Unfortunately, at this point it is still not possible to derive all product properties, for example, the temperature influence of toughness, from the integrated material simulation models. Therefore, we use leading-edge methods for analyzing the microstructure such as EBSD (Electronic Backscatter Diffraction) technique. This enables optimal preparation of practical tests on the CSP® plant.

X80 grades already in the testing and development phase

Following the successful production of hot strip of strength class X70, API X80 grades with a bainitic microstructure and steel grades resistant to sour gas are already in the testing and development phase. Though extremely demanding in terms of the chemical composition and the secondary metallurgy processes, these grades are of great interest for many customers.
Hot strip mill revamped in a mere eight days

ThyssenKrupp Steel Europe: New main gear unit in service

In April 2010, the finishing stand F1 of the Duisburg-Beeckerwerth hot strip mill of ThyssenKrupp Steel Europe received a new main gear unit which was installed in just eight days. Revamping of the finishing stand F1 completed, this drive train now meets all requirements for the transmission of higher torques.

Installation of the new main gear was the last step of the modernization of finisher F1. In 2009, we had already equipped this mill stand with a new hydraulic adjusting system and our CVC® plus system. In addition, we installed a new mill pinion gear as well as new Sieflex gear-type self-aligning spindles and couplings.

Installation completed in only eight days

Revamping work in the Beeckerwerth hot strip mill started on April 19, 2010, with the dismantling of the old gear unit. Owing to its great weight of over 200 t, the new main gear had to be carried in individual parts to its destination in the mill. After preparation of the existing foundations, the new gear was installed at its place of service, and aligned. The contact pattern had already been set in SMS Siemag’s shops during pre-assembly of the gear so that installation work in the customer’s mill took no more than eight days. Afterwards, the new gear unit was checked for suitable functional performance during a short test run.

Start-up ahead of schedule

The Beeckerwerth hot strip mill of ThyssenKrupp Steel Europe went back into operation a good 22 hours earlier than scheduled and attained full capacity shortly after the restart.

Coming revamp activities in December

The next revamping activities on the Beeckerwerth hot strip mill are scheduled for December 2010. During a one-week shutdown, we will install a new crank-type crop shear to replace the existing 30-year-old shear. At the same time, we will equip finishing stand F4 with a new main gear.
March 24, 2010, saw the successful start-up of the new hot strip mill of Bhushan Steel Limited (BSL) in Meramandali in India’s district of Dhenkanal. The mill is part of the Indian steelmaker’s new complex in the state of Orissa for which SMS Siemag also supplied the steelworks and the continuous casting plant.

**Hot strip mill put on stream**

**Expandable to 4.5 million t of strip per year**

**Bhushan Steel, India:**

Bhushan Steel, India: Hot strip mill put on stream

**Milestone for Bhushan Steel**

The new works creates a novel basis for BSL’s production operations. In recent years, the Indian company has already established itself in the fields of cold-strip production and strip processing, operating one plant for each of these applications in Sahibabad in the northern state of Uttar Pradesh and in Khopolo in the western state of Maharashtra. BSL’s new complex in the Indian “steel state” of Orissa comprises a complete integrated metallurgical plant for which SMS Siemag supplied not only the steelworks and the continuous slab caster but also the hot strip mill. And plans are already in the pipeline to extend the complex by a cold rolling mill and strip refining facilities.

**Compact hot strip mill for 3 million tpy**

The compact hot strip mill was designed for an annual production of some 3 million t in the first construction stage. Its key components include a four-high reversing roughing stand with edger, a mandrel-less coilbox, a six-stand finishing mill, a laminar cooling section, and two downcoilers. The provision of an additional reversing rougher in two-high design will make it possible to boost capacity to about 4.5 million tpy. Also, the foundations needed for a seventh finishing stand and a third coiler have already been built.

Bhushan Steel will use the new mill mainly to produce strip for the automotive and household goods industries. The maximum strip width is 1,680 mm, the final gages range from 1.2 to 25.4 mm.

From left: Dr. Heinrich Weiss, Chairman of the SMS group; Neeraj Singal, Chairman & Managing Director Bhushan Steel; SMS Siemag Board Member Burkhard Dahmen; General Site Manager Erwin Denkert during a site inspection in October 2009.
**Roughing mill with coilbox**

In the roughing mill, first all primary scale is removed from the material by a high-pressure descaler operating at a water pressure of maximum 200 bar. The four-high reversing rougher is equipped with hydraulic adjusting systems and rolls the slabs in five to seven passes down to transfer-bar thickness. The edger installed on the entry side of the roughing stand serves to set and control the transfer-bar width.

On its way from the roughing to the finishing mill, the transfer bar can be coiled in the mandrel-less coilbox. Thanks to this intermediate storage, the transfer bar undergoes temperature equalization. Before the material runs into the finishing mill, it is cropped by the drum-type shear and again descaled in the secondary descaler.

**Finishing mill with CVC® plus**

The roll stands of the finishing mill feature CVC® plus, work-roll bending systems and hydraulic adjusting systems enabling the production of hot strip with excellent contour, profile and flatness. Stands F2 to F4 are equipped with our roll-gap lubrication systems which spray an oil-water dispersion into the roll gap, thus reducing the rolling force.

For the drives of the finishing mill, we supplied gear units and our Sieflex gear-type self-aligning spindles which were manufactured in our Hilchenbach shops.

**Stronger coiler for tube/pipe grades**

The nearly 80-m-long laminar cooling section serves to cool the strip to coiling temperature, in which process the material properties of the strip are set. Two downcoilers, both equipped with our Automatic Step Control system, wind the strips into coils. One of these coilers features the UNI-plus design and is able to coil strips of tube/pipe grades of the X80 strength class up to a strip thickness of 25.4 mm.
Following the Arab Steel Summit held in Marrakech, Morocco, from March 7 to 10, 2010, its 400-or-so participants were treated to a special highlight. On the invitation of Moroccan model enterprise Maghreb Steel, they were witness to the successful commissioning of the Steckel mill at the company’s Casablanca works. Joe Dzierzawski, President & CEO of SMS Siemag LLC in Pittsburgh/USA, who was in charge of the construction of the Steckel mill, and Christian Geerkens, Executive Vice-President of our Steelmaking Plants/Continuous Casting Technology Division, underlined the importance of the event in short speeches.

Before that, at the conference, Christian Geerkens had presented a model of the complete new works to the Chairman of the Board of Management of Maghreb Steel, Fadel Sekkat. SMS Siemag’s supply package for the complex includes the key production facilities, from the steelworks with continuous slab casting machine to the Steckel mill and the heavy-plate mill.
Christian Geerkens (left) explains the model to Muhamed Laid Lachgar, Secretary General of the Arab Iron and Steel Union (center), and Fadel Sekkat, Chairman of the Board of Management of Maghreb Steel (right).

The model on a scale of 1:1,000 shows the entire works complex with all bays and traffic routes in the form it will have after completion in 2011. The talk presented by our customer Maghreb Steel, the co-organizer of this year’s Arab Steel Summit, gave an overview of the company’s success story so far, which has now reached a first highlight with the current investment project.

As part of this investment, SMS Siemag had received the orders for construction of the key production equipment in several packages. The first order, in 2007, was for the Steckel mill, followed by the order for the steelworks with continuous slab caster and finally, in 2008, the order for the heavy-plate mill. The scope of supply in each case includes the complete X-Pact® electrical and automation equipment inclusive of the process models. Maghreb Steel’s planned production program covers hot strip and heavy plate of low- and medium-carbon steels as well as of high-strength low-alloy steels.

Founded in 1975, Maghreb Steel is one of the largest producers of cold-rolled, galvanized and coated steel strip and tubes in North Africa. With the new complex, Maghreb will become Morocco’s sole manufacturer of flat products. Until now, the company has imported the required hot strip, but the new complex will make it possible for Maghreb Steel to cover its own demand and to produce hot strip for export. If demand goes up, the facility can be extended.
The first coil was produced on Maghreb Steel’s new twin-stand Steckel mill on March 2, 2010, following which the production was gradually ramped up. In this phase, a variety of different strips of the broad mix of products and sizes were produced. And as early as May 22, 2010, the mill rolled the first strip with the minimum thickness of 1.8 mm.

The maximum possible final strip thickness is 20.0 mm, the maximum width amounts to 1,575 mm. The twin-stand Steckel mill is designed for an annual production of 1.0 million t of hot strip, including strip of carbon steels with low and medium C-content and of high-strength steels.

Compact mill layout
Steckel mills of twin-stand design are a relatively young mill type and combine the Steckel technology with tandem rolling. A twin-stand Steckel mill consists of two identical four-high roll stands in tandem arrangement which roll the slab in reversing mode down to final thickness. As in “classical” Steckel rolling, the strip is coiled in the furnaces during finish-rolling.

Thanks to the combination of the roughing and finish-rolling stages, no separate rougher is needed which enables a very compact mill layout. In Maghreb Steel’s mill, the distance between reheating furnace and coiler is only 184 m.

Stands with CVC® plus and edger
The twin-stand Steckel mill of Maghreb Steel is the first to feature roll stands with our CVC® plus system. CVC® plus, the work-roll bending system and the associated PCFC® process model enable the roll gap for each pass to be set in such a way that the strips produced are well within the demanded profile and flatness tolerances. A vertical edger between the stands serves to control the strip width.

The Steckel furnaces are of enclosed design which makes them extremely energy-efficient. Plus, they enable optimal introduction of the material into the furnaces as well as reliable coiling and uncoiling.
It is standard at SMS that prior to commissioning, all key automation components are tested in our test centers under near-real conditions by means of our Plug & Work concept.

Needless to say that this standard procedure was also used for the systems of the 120-t EAF with modern Arccess technology, the 120-t ladle furnace, a gas cleaning plant, the materials management system for alloying agents, as well as the electrical and automation systems for the continuous slab caster. With these facilities, Maghreb Steel will be able to produce top-quality starting stock for the Steckel mill now on stream and for the future heavy-plate mill.

The photos give an overview of the extent of testing. By way of simulating all mechanical components, drive systems and the envisaged product, the complete automation equipment of a plant is tested under near-real conditions using the Plug&Work concept developed by SMS Siemag. 

Commissioning is slated for the beginning of 2011.
No other stage of steelmaking and processing places higher demands on the drive systems than the rolling of heavy plates. Stand drives with a power of 12,000 kW per motor are not uncommon today. Consequently, the demands made on the drive spindles are increasing as well. Therefore, we invested into the further development of the flat-neck spindle to make it even more powerful and easier to service.

**Innovations**

**Powerful, reliable and maintenance-friendly**

**Our new flat-neck spindle:**

The best drive solution for heavy-plate and roughing stands

Newly developed flat-neck spindle with length compensation in MMK’s heavy-plate mill.
Development goals

Our activities to improve the flat-neck spindle focused on three aspects:
- Reliable transmission of maximum drive torques
- Length compensation to enable CVC® shifting
- Easy and low-cost maintenance

Robust design

Flat-neck spindles have been successfully used for decades in heavy-plate roll stands and breakdown stands or heavy roughers of hot strip mills. While their mounting space remained unchanged, they have to transmit much higher torques today than in the past. That’s because the production volumes of strips and plates of high-strength steels have gone up and higher pass reductions have to be achieved to boost productivity. The peak loads in part markedly exceed the rolling torques specified in the pass schedules, but still have to be reliably transmitted. They are due to the so-called torque amplification during material entry and unthreading.

Owing to their design, flat-neck spindles are much better suited for such high loads than other spindles. The drive torque is transmitted, through form-fit connection, from large cross-sections of the spindle head to the flat neck of the roll wobbler. Thanks to this simple and robust design, flat-neck spindles are able to reliably accommodate overloads and shock loads in the elastic zone and feature an extraordinarily long service life.

Transmission of higher torques

To further increase the torque capacity of our flat-neck spindles, we carried out extensive FE analyses to optimize the load state in the wobbler and head. They showed that an improved design of the spindle head, the roll wobbler and the work-roll neck permits to transmit higher drive torques.

Our innovative flat-neck spindles outperform universal joint shafts (also called cardan shafts) to an even greater extent. These transmit the drive torque via a cross pin and flange to the wobbler. Additional components located especially in the sensitive area of power transmission, such as rolling bodies, bushes and axial rings, limit the performance of the universal joint shafts and make them vulnerable to damage. The superiority of flat-neck spindles over universal joint shafts or cardan shafts has been proved through numerous operating results.
Our new flat-neck spindle:
The best drive solution for heavy-plate and roughing stands

Length compensation for CVC® shifting

In the field of heavy-plate production, the introduction of CVC® plus has increased the standards for the plate profile and enables a highly flexible pass schedule. To implement work-roll shifting, the drive spindle has to reproduce or follow the shifting distance of the work rolls.

Our newly developed flat-neck spindle with length compensating function enables shifting by up to ±250 mm. Length compensation is accomplished by means of a spline connection and enables optimized length control of the spindles depending on the shifting position of the CVC® work rolls.

All spindles featuring length compensation are tested in a special test stand in our workshops to guarantee smooth performance right from production start. The first flat-neck spindles with length compensation were installed during a modernization we carried out at Dongkuk Steel, South Korea, at the end of 2008. Then, in 2009, three heavy-plate roll stands equipped with spindles of this design started up: at MMK (Russia), Hyundai Steel (South Korea) and Minmetals Yingkou (China). In all four mills, our flat-neck spindles with length compensation are producing excellent results even under roughest operating conditions.
**Easier maintenance and repair**

We achieved considerable improvements also with regard to maintenance and repair. This is due to the automatic continuous oil lubrication system which we developed for the drive side. It ensures precise dosing of the lubricant and reliable removal of frictional heat. On the roll side, the grease for lubrication of the sliding plates is continuously fed by means of a special HP pump. The design improvement lies in the fact that the grease is carried directly to the areas subject to highest loads. Thanks to these improvements, the service life of the sliding plates has been further increased while lubricant consumption was reduced.

We also developed an innovative connection between spindle head and shaft. A special front-face serration with screwed connection allows to dismount the spindle head without having to remove the spindle shaft. This is an advantage especially in mills where only narrow space is available, or for modernizations.

**Modernization package for universal joint shafts**

This design offers the possibility to modernize universal joint shafts or cardan shafts. The weakest point, the cardan joint, can be replaced by installing the spindle head and the roll wobbler of a flat-neck spindle. In this way, the performance and capacity of a universal joint shaft drive can be significantly improved at low costs.
Production boosted to 1.8 million tpy

Qinhuangdao Shouqin, China: Heavy-plate rougher in operation

On May 28, 2010, the new roughing stand made by SMS Siemag started production in the heavy-plate mill of Qinhuangdao Shouqin Metal Materials in China. This extension brings the mill’s capacity up from 1.2 to 1.8 million tpy.

Featuring a rolling force of 90 MN and hydraulic adjusting systems, the new four-high roughing stand makes it possible for Qinhuangdao Shouqin to raise production and expand its product range.

No production restrictions during installation

Thanks to a special revamping concept, production losses during installation of the rougher were prevented. Provisional roller tables, temporarily arranged alongside the rolling line, carried the slabs past the erection pit. Slab handling was done by cranes.

Expansion of production after successful start

The 4.3-m heavy-plate mill made by SMS Siemag is located in Qinhuangdao on the coast of China’s Hebei Province. On stream since October 2006, it decisively contributed to Qinhuangdao Shouqin’s market success so that the company decided in mid-2008 to extend the mill by the four-high roughing stand.

Shear line and cold-plate leveler soon going live

Simultaneously with the roughing stand, Qinhuangdao Shouqin contracted us to supply a second shear line comprising a double-side trimmer, a slitting shear and a dividing shear, as well as a cold-plate leveler in 9-/5-roll design. All three shears and the leveler will start up in fall 2010 as scheduled.
Qinhuangdao Shouqin Metal Materials is a joint venture between Chinese Shougang Corporation, Hong Kong-based Shougang Concord International Enterprise, and Hyundai Heavy Industries of South Korea, one of the world’s largest shipbuilders.

Slab handling during the revamp. In the background: the new rougher.

Installation of the roughing stand.

Layout of the heavy-plate mill.
The largest mill stand in the history of SMS Siemag

A new dimension in rolling force
Early in May 2010, our Hilchenbach workshops hosted a true giant – the largest mill stand ever built by SMS Siemag. With a rolling force of 120 MN and a total weight of 3,100 t, this mega machine sets new standards.

Following successful pre-assembly, the titanic structure was disassembled into its individual components for transport to Vyksa Steel Works in Russia some 400 km east of Moscow. Vyksa Steel Works is a member of the OMK Group. To master this demanding transport task, a whole team of SMS specialists were put to the job, using special erection and transport means.
Vyksa Steel Works: 5.0-m plate mill for tube/pipe grades

Vyksa Steel Works, on September 17, 2007, had signed the contracts for the supply of a complete 5.0-m heavy-plate mill including mechanical equipment, electrics and automation.

One of Russia’s oldest steelmakers, Vyksa Steel Works is based in Vyksa, an industrial city in the Nishni Novgorod region. Vyksa Steel Works is a member of the OMK Group, Russia’s leading producer of longitudinal SAW pipes.

From mid-2011, Vyksa Steel Works will use the new mill to start its own heavy-plate production for tube or pipe manufacture. And this on a large scale: after completion, the 1.0-km-long and some 200-m-wide heavy-plate mill will enable the production of plates up to the X120 strength class. First and foremost, production will focus on large-diameter pipes for pipelines allowing energy to be transported profitably also over extreme distances. In addition, it will be possible for Vyksa Steel Works to produce heavy plates for machine building, shipbuilding and the construction industry. To be able to roll plates of high-strength tube/pipe grades, the mill will be equipped with a four-high reversing roll stand coming with a rolling force of 120 MN and our proven CVC plus® technology and equipment.
Technical highlights

The technical project leader for the giant mill stand was Günter Thüs, General Manager, Design Hot Rolling Mills. He points out with pride that “the technical features of the single-stand rolling mill speak for themselves: the annual capacity of 1.2 million t of finished plates will make Vyksa Steel Works, practically overnight, a global player on the market for high-strength tube/pipe grades”.

The four-high reversing stand already stands out for its ingoing material: slabs up to 400 mm thick, 2,600 mm wide and 4,800 mm long can be handled. The maximum slab weight is 40 t. And even more impressive is the mill’s flexibility in terms of end products: plates between 1,400 and 4,800 mm wide and 7 to 150 mm thick can be rolled in the future. All this will help Vyksa Steel Works to open up a whole range of applications for the plates produced.

Despite its enormous dimensions of more than 15 m height and over 6 m width, the roll stand has great sensitivity or a “sure instinct” when it comes to rolling technique. Using mechanical screwdown from above and hydraulic adjustment from below – both systems operating at a pressure of 290 bar –, the plates are rolled to the desired shape with closest tolerances.

Advantages of the split housing design

As regards the design of the mill housings, both the location of the works and the envisaged quality spoke in favor of the split design. Firstly, this design permits the housings of the four-high reversing stand to be perfectly adapted to the occurring load. In this way, necking which is inevitable in the case of one-part housings (see sketch) can be reliably prevented. Secondly, the multi-part design of the roll housings (two housing posts and two crossheads each) offers huge advantages for the transport logistics in terms of costs and time.

The two housing posts, each with a weight of 169 t, were first transported by special railroad wagons from Hilchenbach to Gelsenkirchen, Germany, from where a river boat carried the two heavyweights to Hamburg. Following transloading to a seagoing vessel, the parts continued their voyage via Saint Petersburg and Russian inland waterways to Vyksa.

So, to save costs, it made good sense to chose the multi-part design. Ulrich Kähne from SMS Siemag who organized the transport job comments: “The costs to transport one housing post from Hilchenbach to Vyksa come up to nearly EUR 90,000. However, a one-part roll housing would have required a far greater extent of logistics: the transport of a roll housing with a weight of some 550 t is subject to approval. And, if possible at all from a transport point of view, it would have involved skyrocketing costs.”
Difficult pre-assembly

For pre-assembly in our Hilchenbach shops, SMS Siemag’s specialists had to use their best knowledge and experience. Except for the baseplates and roll sets, the entire stand – with a pre-assembly weight of 2,100 t – was assembled and tested. Supervisor Jürgen Sassmannshausen and foreman Horst Schneider, in charge of pre-assembly, report: “We had just little time so we had to give our all. But in the end, everything went perfectly.” Andreas Krex, the project manager for the stand, gives another example of the many challenges posed by the project: “The multi-part roll housings were joined together by means of bolts of the sizes M350 and M250. We had to use hydraulic preloading devices operating with a pressure of 1,500 bar to preload the tierods with a force of 27,000 kN. This is the only way to ensure that the components do not come apart during operation.”

Technical data of the four-high reversing stand

- Max. rolling force: 120 MN (12,000 t)
- Max. drive power: 2 x 12,000 kW
- Drive torque: 2 x 1,910 kNm
- Max. roll gap: 550 mm
- Housing distance: 7,000 mm
- Back-up roll dimensions: 2,300 mm x 11,300 mm
- Weight per back-up roll: 230 t
- Work-roll dimensions: 1,210 mm x 9,820 mm
- Weight per work roll: 63 t

Testing of the hydraulic system on the mill stand, including opening and closing of the mill guides.
XXL supply package

The SMS Siemag scope of supply for Vyksa’s new heavy-plate mill comprises not only the roll stand as such, but also all mechanical equipment including two slab reheating furnaces, plate cooling equipment, hot-plate leveler, cooling beds, shear line and plate finishing area with a 9-/5-roll cold-plate leveler. The machine can be operated with nine or five leveling rolls which gives it an extended leveling range. All leveling rolls can be separately hydraulically adjusted. In addition, our scope covers the complete electrical equipment, drive engineering & components, and all automation systems including production planning system (level 3).

Innovative plate cooling system

A decisive factor contributing to the function and performance of the heavy-plate mill is the two-part plate cooling system developed by SMS Siemag. Thanks to an extremely powerful HP station in combination with special cooling headers, the forward section of the cooling system achieves very high cooling rates as required for direct quenching (DQ) from rolling heat. Pinch rolls ensure good plate flatness also at high cooling rates. The rear part of the cooling system is fed from an elevated tank and operates at a pressure of about 1 bar and is, therefore, used for accelerated cooling (ACC).

Quality all the way from start to finish

When it comes to the plate quality during further processing, again nothing is left to chance. All downstream equipment is specially designed to process high-strength plates. The hot-plate leveler, for instance, has a maximum leveling force of 40,000 kN. The shears operate to the proven rolling-cut principle. The dividing and crop shears are of closed design to ensure precise and straight cutting edges even for high-strength plates.

Here’s how SMS project manager Günter Thüs summarizes the project:

“The four-high reversing stand for Vyksa’s new heavy-plate mill is a further milestone in the history of SMS Siemag. A total as-supplied weight of approx. 30,000 t – I think that says it all. That’s a dimension not many companies can handle.”

Supervisor/Shop Assembly Jürgen Sassmannshausen (right), part-project leader Andreas Krex (3rd from right), Tobias Treude (2nd from left), Quality Assurance, and the assembly crew with Horst Schneider (2nd from right).
The Chinese firm of Chinalco Shanghai Copper has ordered a six-high reversing cold rolling mill with CVC® plus technology from us. With this new mill, our customer will soon produce 100,000 t of copper strip per year. Erection of the mechanical equipment of the mill could be significantly shortened thanks to pre-assembled and pre-tested compact units such as the complete entry and exit modules and the stand including piping. The first strip is due to be rolled still this year.

SMS Siemag won the order because we are able to provide mechanical equipment, electrics & automation and process know-how from one source. This also includes the supply of cooling lubricants by our subsidiary SMS Lubrication. Furthermore, the deal covers erection supervision and commissioning by SMS Siemag. The mill incorporates a whole range of high-tech components made by SMS Siemag. Adjusting systems or actuators such as hydraulic adjusting system, CVC® plus, work and intermediate-roll bending system, multi-zone cooling system and special paper winders will enable Chinalco Shanghai Copper to meet the high demands made on the strip quality.
SMS Siemag is supplying the complete engineering, the mechanical components, the X-Pact® electrical and automation equipment for control and monitoring of the complete cold rolling process as well as all required utility systems. Also included is a pass-schedule calculation system which is tailored to this mill type. It is based on our technological experience with cold rolling mills for copper and copper alloys and on the findings and recognitions of our R&D experts.

Cleaning of the cooling lubricants is accomplished by means of our type MPF 1-16 Multi-Plate filter, a compact filter system featuring excellent cleaning efficiency, easy installation and little maintenance.

Incorporating CVC® plus technology and equipment, the reversing cold rolling mill will produce strip of copper and copper alloys with a maximum width of 880 mm and a minimum final thickness of 0.15 mm. To safeguard the high annual capacity of more than 100,000 t, the work and intermediate rolls will be changed fully automatically. With this new cold rolling mill, Chinalco Shanghai Copper will be able to boost its annual production of copper strip to a total of 200,000 t.

**Technical data**

<table>
<thead>
<tr>
<th>Material</th>
<th>Copper and copper alloys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>600 to 880 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td></td>
</tr>
<tr>
<td>- ingoing</td>
<td>max. 4.0 mm</td>
</tr>
<tr>
<td>- outgoing</td>
<td>min. 0.15 mm</td>
</tr>
<tr>
<td>Rolling force</td>
<td>8,000 kN</td>
</tr>
<tr>
<td>Rolling speed</td>
<td>600 m/min</td>
</tr>
</tbody>
</table>
Productivity tests confirm capability

Yieh United, Taiwan: 18-HS cold mill makes the grade

In February 2010, we ran a whole series of productivity tests on the new 18-HS reversing cold rolling mill of Taiwanese stainless-steel maker Yieh United Steel. The tests proved the excellent capability and performance of the mill and the very good quality of the strip produced.

The reversing mill is equipped with our newly developed intermediate roll which can be shifted axially under load. In this way, the flatness of the strip is significantly improved while roll wear is reduced.

The mill rolls unpickled stainless-steel strip of the AISI 200, 300 and 400 grades at a maximum rolling speed of 500 m/min. It attains reductions of up to 60% in two to four passes.
Part of the stainless-steel strip rolled on the 18-HS cold mill will be sold directly in unpickled state. The remaining stainless-steel strip will be annealed and pickled prior to further thickness reduction on the 20-roll mill.

Yieh United Steel Corporation is Taiwan’s largest producer of stainless steel. In Gangshan, the company operates several stainless-steel rolling mills made by SMS Siemag, including two 20-high rolling mills in Split-Block design and the 18-HS reversing cold rolling mill. With these rolling facilities, the company specifically increased and optimized its stainless-steel strip capacity in the last ten years.

### Technical data

<table>
<thead>
<tr>
<th>Material</th>
<th>AISI grades 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. 1.0 mm</td>
</tr>
<tr>
<td>Rolling speed</td>
<td>max. 500 m/min</td>
</tr>
<tr>
<td>Rolling force</td>
<td>max. 16 MN</td>
</tr>
<tr>
<td>Strip tension</td>
<td>max. 600 kN</td>
</tr>
<tr>
<td>Work roll diameter</td>
<td>min. 120 mm, max. 140 mm</td>
</tr>
<tr>
<td>Annual capacity</td>
<td>120,000 t</td>
</tr>
</tbody>
</table>
In March 2010, the two-high skin-passing mill made by SMS Siemag rolled the first special-steel strip at Salem Steel Plant (SAIL Group) in the province of Tamil Nadu in the southwestern part of India. Erected and commissioned in minimum time, the skin-passing mill rolls ferritic and austenitic materials. The two-high mill is part of an extensive project to expand the production of the Salem location, and was the first facility to go on stream.

**Short and successful start-up**

**Salem Steel, India:**

**Two-high skin-passing mill running**

High-gloss finish through technical highlights. The skin-passing mill is equipped with:

- a mathematical model for pass-schedule calculation to safeguard productivity and the quality of the special-steel strip
- an automatic cleaning system for the strip surfaces to achieve high-quality strip
- a hydraulic roll adjusting system for optimal adaptation of the roll gap to the material
- a polishing device to remove dirt particles from the top and bottom high-gloss rolls

Pre-assembly and function test. The mill stand was manufactured in our Hilchenbach shops and pre-assembled together with the entry- and exit-end equipment to ensure quick and successful erection & commissioning. In this process, all hydraulically and electrically operated motions were tested.

A new roll set ready for roll changing.

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>AISI grades 200, 300 and 400</td>
</tr>
<tr>
<td>Strip width</td>
<td>600 to 1,300 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td>0.3 to 4.0 mm</td>
</tr>
<tr>
<td>Degree of skin-passing</td>
<td>0.2 to 2 %</td>
</tr>
<tr>
<td>Roll diameter</td>
<td>max. 800 mm</td>
</tr>
<tr>
<td>Rolling speed</td>
<td>max. 600 m/min</td>
</tr>
<tr>
<td>Rolling force</td>
<td>max. 10 MN</td>
</tr>
<tr>
<td>Strip tension</td>
<td>max. 200 kN</td>
</tr>
<tr>
<td>Capacity</td>
<td>100,000 tpy</td>
</tr>
</tbody>
</table>
Baoshan Iron & Steel Company (Baosteel), in March 2010, confirmed final acceptance of the continuous annealing line supplied by SMS Siemag. The CAL was built on reclaimed land within the Baosteel works in the Baoshan district near Shanghai.

Broad product spectrum. Baosteel uses the new line to process a wide spectrum of high-strength plates. Due to the high degrees of forming during cold rolling, the inner microstructure of the thin material has work-hardened. Through annealing, it recrystallizes, whereby the steel regains its formability and deep-drawability. Plus, further defined material properties are set. The plates are used in machine building, household-goods and electrical appliances industries and, first and foremost, in the carmaking industry.

Key equipment of the line. Almost all functions of the line are fully automated. The strip material is paid off alternately by the two uncoilers which ensures continuous strip feed to the line. A pre-leveler or flattener assists the threading process, and then a welder joins the strips. In the cleaning section, all cold-rolling oils and abraded iron particles are removed from the strip. The next station is the entry-end strip accumulator which is filled as long as a coil is being paid off. When the strip stops for a short time during welding, the accumulator feeds the downstream furnace with material. The annealing furnace is followed by an exit-end accumulator and an inline six-high skin-passing stand. A downstream small strip accumulator safeguards continuous operation while the strip is stopped at the inspection station. The strip is cut to the desired width by a side-trimming shear. Next is a DUMA oiling machine which applies an anti-corrosion oil or deep-drawing oil to the sensitive strip surface. Finally, a flying crank shear divides the annealed and skin-passed steel strip and two coilers wind it into coils.

Technical data

<table>
<thead>
<tr>
<th>Material</th>
<th>CQ, DQ, DDQ, EDDQ, SEDQ, CQHSS, DQ-HSS, BH-HSS, DP and TRIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip width</td>
<td>700 to 1,630 mm</td>
</tr>
<tr>
<td>Strip thickness</td>
<td>0.3 to 2.3 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>700,000 tpy</td>
</tr>
<tr>
<td>Processing speeds</td>
<td>- ingoing 700 m/min - process 420 m/min - outgoing 760 m/min</td>
</tr>
</tbody>
</table>
Processing of strip of most modern steel grades

Comprehensive know-how for continuous annealing lines

The spectrum that SMS Siemag offers its customers goes beyond the mere design and installation of continuous annealing lines. We also provide comprehensive know-how for the processing of cutting-edge steel grades and the achievement of superior surfaces. With the annealing of modern, high-strength steels having become increasingly demanding along with constantly growing surface-quality standards, comprehensive operating and process know-how is now indispensable for sustainable success in the market. SMS Siemag's vast knowledge and many-years' experience in the construction of plants and machines are key success factors for our customers in installation and commissioning of new plants.

A wealth of benefits

Our customers benefit in many ways from the know-how we can offer: the operator risk on the whole reduces because the plant is quickly optimized, allowing the user to offer products of the highest quality on the market. On request, our experts will be on site to render support in the processing of strip made of special steel grades such as high-strength structural steel. This makes it possible for our customers to break into markets for such products as upscale automotive grades. Earlier market launch also means earlier RoI. Plus, high-quality steel grades enable our customers to set themselves apart from the competition and to offer a wide variety of attractive products.

Inside the furnace, the strip has to be treated according to an annealing curve which is exactly defined for every steel grade.
Parameters for annealing

In addition to operational know-how, SMS Siemag’s portfolio includes the essential starting-material and production parameters for material treatment in continuous annealing lines. The treatment of a given starting material in the annealing furnace requires comprehensive knowledge about heat treatment, overaging, furnace atmosphere and strip tensions. Moreover, strip preparation and its mechanical post-treatment in a skin-passing stand or tension leveler also necessitate precise knowledge of process and material.

Comprehensive know-how transfer

Vast experiences and in-depth knowledge of the operation of annealing lines are other significant modules of the know-how we can offer. We pass this knowledge on to the customers’ operating personnel through class-room and hands-on training before and after commissioning. Hands-on training on the mills of SMS Siemag’s partners and integration tests prepare the personnel in a customer-specific way for their future operating tasks. We also offer to render technical assistance during ramp-up, operation and optimization of the mill. And the package also includes professional quality checks as well as precise mill and job descriptions.

Local staff support production.

Not only the mechanical properties, but also the strip flatness and surfaces must be flawless.

Carmakers in particular are processing more and more steels with high strength and good ductility.
At the beginning of 2010, a heavy shear line made by SMS Siemag went into production in the works of Chinese steelmaker Handan Iron & Steel Company in Hebei Province. The shear cuts high-strength steel strip into sheets up to 25 mm thick.

450,000 t of steel sheets per year
Handan, China:
Heavy shear line in service

Annually 450,000 t of steel sheets. One of the key components of the shear line is an integrated sheet leveler with individual leveler-roll adjustment which gives the material another precision-leveling treatment. In this way, the relatively small facility is able to achieve an annual production of 450,000 t of steel sheets meeting highest requirements, for instance for further processing in laser-type cutting equipment. Handan Steel Company is a member of Hebei Iron & Steel Group.

Steel sheets 5 to 25.4 mm thick. Handan uses the shear line to cut hot strip, among others from its SMS Siemag hot strip mill, into high-quality steel sheets. In operation since 2008, the hot strip mill turns out strip in thicknesses of up to 25.4 mm. The compact, about 150-m-long shear line represents an effective and economical means of producing steel sheets with superb properties in the thickness range of 5 to 25.4 mm.

Low residual stresses. Handan’s sheets are well suited for an array of applications, ranging from machine and plant building, vessel, pipeline and bridge construction to safety containers. To ensure reliable processing and high load capacity of the finished products, stringent demands are made on the mechanical properties of the sheets, for example low residual stresses over the full thickness of the material.

The process steps. First of all, hot-strip coils are delivered to the payoff reel group for unwinding. The strip then runs through the leveler or flattener, which prepares it for the downstream processing stages. The next station is the side-trimmer group where two circular-knife trimming shears trim both strip edges and cut the strip to the width desired by the customer. Then a flying cross-cut shear cuts the strip into sheets which a roller table carries to the sheet leveler for automatic leveling. The leveler operates according to exact leveling parameters provided by a mathematical model, thereby ensuring that the end product is free from any shape irregularities and flatness defects. After leveling, the sheets are piled, weighed and tied.

The new shear line cuts 450,000 tpy of hot strip into high-quality sheets.
The leveling machine. The sheet leveler is the core unit of the shear line. It features individual roll adjustment, a counterbending system and a process model to calculate the adjustment of the leveling rolls. In this way, different leveling strategies can be employed just as required for the individual sheets.

Individual roll adjustment. In the forward part of the leveler, the sheet is first subjected to severe bending to overwrite unknown stresses and deformations and to correct them to a defined state. After this, the sheet is unbent again in the rear section of the leveler. Through controlled bending and unbending, shape irregularities and flatness defects are eliminated. Thanks to very precise dynamic adjustment of the leveler in both longitudinal and transversal direction, residual stresses in the plate stock can be significantly reduced.

Counterbending system. If roll deflection under leveling force leads to machine spring, the leveling result is no longer uniform over the plate width because – like in a rolling mill – the leveling gap varies over the width. In SMS Siemag’s leveler, this problem is eliminated through wedge adjustment effected by a counterbending system whereby the deflection of the top and bottom leveler roll sets is compensated. In this way it is guaranteed that the leveler rolls are identically adjusted over the full width and the plates are uniformly leveled over their full width.

Technical data

- Capacity: 450,000 tpy
- Sheet dimensions:
  - Width: 800 to 2,130 mm
  - Thickness: 5 to 25.4 mm
  - Length: 2 to 16 m
- Process speed: 50 m/min
Yichang Three Gorges orders air-knife systems from FOEN

Six air-knife systems with minimum delivery time

Yichang Three Gorges Quantong Colored and Galvanized Company contracted Fontaine Engineering und Maschinen GmbH (FOEN) on March 27, 2010, to supply six air-knife systems including E & A. The air knives will be installed in six hot-dip galvanizing lines to ensure easy, precise and top-quality setting of the zinc layer thickness. Almost identical in design, all lines will be set up in the works located in the immediate vicinity of the metropolis of Yichang near the Three Gorges Dam. Commissioning will take place still this year.

Order handling in minimum time. Particularly worth mentioning is the short delivery time of the air knives: FOEN supplied the first system to the customer as early as the end of May, and delivery of the remaining systems will be completed by the end of August. All systems are scheduled to start up in the second half of 2010. This short delivery time is achievable thanks to the high degree of equipment standardization. All of the air-knife systems will be manufactured and assembled at FOEN’s Langenfeld location.

Air knives. In a hot-dip galvanizing line, the air knives are installed directly above the zinc pot. As the strip runs vertically upwards out of the pot, it carries with it a certain amount of liquid zinc depending on its speed and surface quality. Excessive amounts of zinc are blown off the strip by means of the air knives so that a zinc layer of exactly the desired thickness is set over the full width of the strip. Then, the strip runs vertically up into a cooling tower where the zinc coating cools down and hardens.

Equipment. Through very narrow openings on either side, the air knives blow air onto the strip at a specified pressure. The coating thickness is achieved as a function of the pressure set and the distance to the strip. The system can be shifted manually to adjust it to the strip centerline, and can also be set suitable for a slightly off-center strip travel.

To enable reproducible coating qualities, the system comes with an automatic control which sets the parameters of the air knives on the basis of product data provided by a database. FOEN’s supply package includes a basic database which the customer will extend with data from his production process.

Schematic representation of the galvanizing process: the strip runs into the zinc bath; a deflector roll guides it vertically upwards out of the pot; the air knives set the desired coating thickness.

Pascal Fontaine, Managing Director of Fontaine Engineering, and Liang Shi Chen, the owner of Yichang Three Gorges, after contract signing.
Measuring of layer thickness. To be able to control the thickness of the zinc layer and adapt the air-knife settings, each of the cooling towers has an X-ray layer-thickness measuring instrument installed on its exit side to measure the thickness of the cooled zinc coating continuously over the full width of the strip. Based on the data or information thus obtained, the position of the air-knife system and the parameters of the air knives can be constantly modified. FOEN will integrate a system of this type for the first time in a hot-dip galvanizing line in China.

System design and rating. The air-knife systems are designed for layer thicknesses between 40 and 275 g/m² in the case of pure zinc coatings. For strip to be coated with a zinc-aluminum alloy, thicknesses of 30 to 200 g/m² can be realized. The strip speed between the air knives may be up to 130 m/min. The strip widths range from 1,000 to 1,250 mm referred to strip thicknesses between 0.5 and 2 mm. Each facility is able to produce 450,000 tpy.

Yichang Three Gorges: Cold mill inaugurated

On May 18, 2010, after completion of the first of three development phases, the Chinese Yichang Three Gorges Quantong Colored & Galvanized Company officially started production on its new cold rolling mill. This special event was celebrated by Yichang Three Gorges with a huge ceremony. The Governor of Hubei Province, Li Hong Zhong, attended this ceremony along with other special guests from politics and business. SMS was represented by Markus Meier, Vice-President SMS Siemag Strip Processing Lines in China. In total, more than 5,000 guests came to the festivities.

Yichang Three Gorges had placed several orders with SMS Siemag for the setting-up of the cold strip complex. After implementation of all three development phases which is scheduled for the end of 2011, this cold strip complex will be the biggest production base for ultra-thin coated strip in China. The new complex is located in the province of Hubei near the 2,300-m-long Three Gorges Dam on the Yangtze River.

Liang Shi Chen, owner of Yichang Three Gorges, during his ceremonial speech.

Markus Meier congratulates Xu Yan Hui, President of the Yichang Three Gorges Design & Research Institute, and hands over a present.
Individual solutions focused on the customer

**SMS Siemag: Global system supplier**

**Setup of the Electrics and Automation Division**

The automation of metallurgical plants is increasingly critical for the efficiency and performance of plants and the quality of the end products. Customers worldwide required, and still do with growing frequency, all-round system competence. Complete systems with electrics and automation (E&A) – at times even turnkey solutions – must be delivered from one source. Customers no longer want to, nor can they, handle the coordination of various partners for mechanics and electrics themselves. Therefore, as the global market leader in metallurgical plants, the next move for SMS Siemag some years ago was clear: SMS Siemag had to become a system supplier covering the entire product range. This decision was the starting point for the global setup of our Electrics and Automation Division.

**Own development of technological control systems and process models.** The setup as such, however, started much earlier. The first steps involved the company’s own development of technological control systems and process models for rolling mills over 25 years ago. Our automation specialists developed complex control systems which would form the heart of the rolling mill automation. This made it possible to cover and advance the core know-how of the rolling process in our own company. This concept was extended to such other products as continuous casting plants and strip processing lines. The first technological controls for hot rolling mills, cold rolling mills and strip processing lines were taken into operation in the mid-1980s. The first references for continuous casting plants followed in the early 1990s. This competence has been continually extended and new technological requirements of the casting machine could be fulfilled with in-house solutions.
Evolving into a full system integrator. The efficiency and the performance of a metallurgical production plant are, however, not determined merely by the technological control concepts. Rather, the sequence control, operating concepts and the reliability of the electrics and automation play just as much a role. The optimal combination plus interaction of all individual controls and components of the overall automation and electrics forms the basis for maximum performance. And that’s what the customers of SMS Siemag expect. Thus, it was but a logical step to turn our Electrics and Automation Division into a full system integrator. The closeness to the mechanical side is of great advantage here. The first all-inclusive contracts were signed in the mid-90s among others for CSP® plants. Here, the market demanded very early a complete system competence comprising the mechanical/electrical equipment and the technology and for many orders we were able to prove the benefits to the customer. Over the years, we were able to add numerous other references. Today, we cover our entire product spectrum with our own electrics and automation solutions.

Focused on the customer. Customers expect their automation suppliers to be close by and be able to react quickly to faults and other requirements. This is why we are represented in all our customer regions. We maintain locations in China, India and the USA, each with their own sales and processing capacities for E&A.

While our Chinese location in Beijing initially served as an “extended workbench” for hardware and software engineering, it today focuses on the development of local business. In Delhi and Kolkata, India, the activities of the Division were initially geared to steelworks and continuous casting plants. In the past two years, rolling mills and strip processing lines were added to the range of our activities which is intensively extended. Our colleagues in Pittsburgh, USA, offer special expertise in Steckel mills and the modernization of steelworks and continuous casting plants.

Some 40 % of E&A staff based abroad. The total figure of staff of the Division that are based abroad is around 40 %, and rising. But we also set particular store by keeping the product competence and further development of solutions at our German locations in Düsseldorf and Hilchenbach.

Revamps and modernizations on the rise. In addition to new plant business, which dominated particularly the last few years, we will in future see an increase in the modernization of automation and electrics in our industry. We distinguish here between revamps – the upgrade of existing plants through revamping of mechanical components and the replacement or extension of the electrical and automation equipment – and the complete renewal of a plant’s automation system. The life cycles of today’s automation platforms roughly range between 10 and 15 years, whereas mechanical equipment has a clearly longer life. So, before the mechanical equipment is largely revamped or replaced, it is often necessary first to replace and renew the electrical components and the automation.

Expansion of modernization business. Similar to Service, pure E&A modernizations are generally local business. We are working very close to our customers here. In order to work this segment successfully, we have strengthened our base through acquisitions. Since 2009, BEA Automation – now operating under the new name of Lux Automation – is part of our Electrics and Automation Division. Lux Automation is traditionally a successful supplier of automation solutions in the metallurgy and logistics sectors and primarily focused on modernizations.

In 2007, we acquired Hellingrath as a fully-owned subsidiary of the Division. SMS Hellingrath supports us in providing special solutions and has its own switchgear systems engineering and construction facility.

Lux Automation GmbH for Europe

Both companies were recently merged to form an effective and powerful team operating under the name of Lux Automation GmbH. It primarily caters to pure E&A modernizations concentrating predominantly on Germany and the neighboring European countries.

Business expanded in China and India

The next big step for our Division is the expansion of our modernization business in India and China. We already have a formidable presence in these two major growth regions. Through our customer contacts from new plant projects, however, we are hoping to gain a greater foothold in the local modernization sector.

Brazil, a promising market

Along with India and China, Brazil is a promising market with significant growth rates. We are now beginning here to set up our own E&A sales branch and will in future position ourselves more strongly in this country as project business here increases.

Prepared for the future. Our Electrics and Automation Division will continue to prove itself as a renowned system supplier and further increase in experience. Over the past few years, we have been able to gain highly positive references. Meanwhile, our young, motivated employees have gained valuable practical experience and join our senior staff to form a competent team that helps us face the future well prepared.
LUX Automation GmbH, Germany:
Competency focus in electrotechnical modernizations

With effect from August 1, 2010, the two subsidiaries of SMS Siemag AG, “SMS Hellingrath GmbH” and “LUX Elektrik und Automation GmbH & Co. KG” (formerly BEA Elektrotechnik und Automation GmbH) have merged into one company. The new company is named LUX Automation GmbH and completes our E&A Division particularly in the service and modernization sector. Due to the merger, a company of 170 employees has been established which covers the electrics and automation technology for the steel and logistics sector.

Numerous references

While the former “SMS Hellingrath GmbH” has extensive references in the steelmaking, steelworks and continuous caster sections, “LUX Elektrik und Automation” has gained significant experience in the field of the electric modernization of rolling mills, strip processing lines and logistics.

Common benefit

The merger has considerably benefited the commercial sector, sales and marketing and also provided advantages in the implementation of the orders because the former sister companies at their Düsseldorf and Mülheim/Ruhr locations complement each other in an excellent manner. Concept preparation, design, programming and commissioning of the plants and the performance of the electrical installation on site as well as the switchgear construction are realized in the company’s workshop with their own personnel.

In-house manufacture

Besides basic automation, drive engineering, measurement and control technology (level 1), process control engineering (level 2) is also created in-house for the above areas.

Switchboards and on request also type-tested switchgear up to 4,000 amperes, local cabinets, control and monitoring systems and specially constructed gas and analysis systems are built in the company’s workshop. In addition, automation and technologically related business areas are dealt with such as foundries, logistics plants and other production facilities.

Most cost-effective solution offered

The electrical design is mainly executed with EPLAN. For the automation components as well as the drive and control systems the customer wishes can be fulfilled and the most cost-effective solution can be offered. We have extensive experience with suppliers such as Siemens, ABB, SEW, Converteam and Rockwell.

Walter Timmerbeul, Managing Director, LUX Automation GmbH.

Helmut Hölscher, Managing Director, LUX Automation GmbH.

Company building, LUX Automation GmbH, Mülheim an der Ruhr.
With our Indian locations in Delhi and Kolkata, our Electrics and Automation Division is part of our subsidiary SMS India Pvt. Ltd. (SMI) where our E&A Division has undergone a rapid development: originally, it started with 16 employees while there are presently 100 engineers who are covering all project activities from sales and marketing via handling right through to erection and commissioning. In that time, the turnover has been increased many times over.

This rapid growth required a targeted expansion of the workforce focusing on local engineering and an own creation of value. For this purpose, knowledge and competences had to be developed which not only fulfill the requirements of local business but also usefully supplement the global resources of the E&A Division. The workforce of our team was built up with competent staff members in all areas from project management via basic engineering, software and hardware planning up to assembly engineering and commissioning.

Taking into account that the main investment emphasis in India was placed on steelworks and slab casters in recent years, the priorities to further the future business of E&A were also set on the knowledge and the competences in the construction and the technical handling in this sector. Based on an increased number of projects for rolling mills and strip processing lines more recently, we specifically hired experienced staff for these types of plants and will further expand this area. At company headquarters in Kolkata, a team of ten highly qualified level-1 software engineers has already been working now in the rolling mill sector for two years. These engineers are intensively involved in our current projects at Tata Steel and Essar Steel.

**Engineering experts for all business sectors**

**SMS India Pvt. Ltd.:**
**E&A team optimally prepared**

From right to left: Keshav Kumar Gaur, Vice-President, Electrical & Automation Systems, SMS India, with his colleagues Christoph Stappenbeck and Hemant Agarwal.
Electrics and Automation

SMS Siemag Automation & Service Company
Electrics and Automation in China

Branch in the northeast of Beijing

The present branch of our Electrics and Automation Division is situated in the northeastern part of Beijing. The offices are built on four floors, and three in-house test fields enable technical handling and performance of integration tests for several orders at the same time.

E&A subsuppliers located close to our branch

Beijing, the Chinese information technology center, is also the location of many important electrics and automation subsuppliers who are located close to our branch. This provides excellent conditions for our procurement logistics.

Baide Electrical Manufacturing Co. Ltd., headquartered on the northern outskirts of Beijing, has been established in 2008. SMS Siemag Technology holds a share of 30% of Baide. At present, Baide is building switch cabinets for several major orders from SMS Siemag. Due to the proximity to the offices of SMS Siemag Technology, our engineers are able to trace the manufacturing process almost in real time and thus assure the quality expectations of SMS Siemag.

Major orders in progress

In addition to the programming and testing of our E&A supply for the plate mills of Yingkou and Hyundai, our branch presently handles our E&A part for major orders for Shougang (seven strip processing lines and one shear line), Lysteel (one shear line) and Chishang Copper (one reversing cold rolling mill).
Pittsburgh, USA:
Electrics and Automation in the USA

The Electrical and Automation Division has been active in the USA for more than 25 years. In the meantime, employees have been taken over from several companies that have become amalgamated with SMS, such as the former SMS Engineering and SMS Concast. The Electrical and Automation Division has almost doubled in size as a result of the joint venture with SMS Tippins in 2004. The former Tippins employees were able to contribute valuable experience in the field of automation of Steckel mills.

In our building at our Pittsburgh location we have a large area at our disposal for integration tests. Not long ago we tested the automation system there for the Maghreb Steel Steckel mill before sending it to Morocco.

Other major projects are at present being handled: The electric arc furnace and ladle furnace (level 1) for AK Steel in Butler, a ladle furnace (level 1) for Algoma Steel, TCS systems for the mold and oscillator table for ArcelorMittal Burns Harbor and the commissioning work for the aluminum hot plate mill for Northeast Light Alloy Co. Ltd.
System platforms as decisive modules

Powerful automation made by SMS Siemag

Plant automation using the automation systems from SMS Siemag improves the product quality, optimizes the throughput and helps save energy and personnel costs. By means of comprehensive integration tests fast plant run-up is ensured.

**Level-3 systems.** Our L3 systems control the production of the entire plant by translating customer orders into plant-specific production sequences. At the same time, the production of the individual plants is monitored so that changes in planning can be made flexibly and in good time in the event of production disturbances. In addition, the L3 distributes the primary data (PDI) to all L2 systems and receives the current production data from these systems. These production data are reworked into reports and archived. The overriding aim is to achieve the largest possible production throughput with the best possible adherence to deadlines and optimum plant utilization. Moreover, machine change parts such as rolls, knives, etc. are managed and scheduled according to requirements.

**Level-2 systems.** Our L2 systems control the production process according to the particular plant. On the basis of the primary data (PDI), sets of setpoint values for the open-loop and closed-loop control systems in the L1 are generated with the aid of mathematical-physical process models or by utilizing tables. This is performed in a manner compatible with the time and product requirements in order to achieve optimum geometrical and metallurgical properties.

The actual values received back from the L1 are used for automatic adaptation of the process models and are compiled into production logs. Furthermore, the L2 system transfers production data back to the L3. In more complex plants such as hot rolling mills, the plant-related throughput control (pacing) is additionally performed by the L2.

**Level-1 open-loop and closed-loop control systems.** Our technological control systems are designed to ensure excellent technological and functional implementation of the setting values stipulated by the L2 by means of hydraulic and electronic actuator systems. Further essential properties of the L1 systems are maximum functional availability and a high degree of process sequence automation, coupled with efficient service functions. Our L1 automation ensures the best-possible dynamics and precision in the control of the mechanical, drive-related and hydraulic equipment of our machines. For each mechanical equipment item, suitable software functional modules are developed in close cooperation with the design department. The components connected to the equipment items wholly conform to the industrial standards. Here, state-of-the-art technology such as real-time Ethernet are already in field application.

**HMI systems.** Our HMI systems are the interface between the plant and the plant owner. They allow visualization of the process in a production-oriented manner and provide all relevant information relating to material logistics and technology. The visualization facilities used for process monitoring enable target-oriented access to manual intervention possibilities for all sequences and units by means of state-of-the-art graphic-click methods. Design and layout in line with the operator’s viewpoint is achieved through intensive cooperation between our employees and the operator teams. This process is assisted most effectively by involving our customers closely in the Plug & Work tests.
Integrative engineering: Hardware design and plant engineering

The challenges faced by automation. The challenges are identical for all systems: Stability, easy maintainability, uncomplicated adaptation to new boundary conditions and high-grade technological capabilities. This necessitates a simple and yet powerful basis. All systems are based on uniform platforms that are structured in a modular manner. Consideration is given here to current hardware and software trends. Due to the extensive sub-division into various levels (basic modules, technology modules, plant-specific modules), adaptations and changes need to be performed only where this is really necessary. If the IT environment changes, e.g. as a result of a new PC type, the basic modules are adapted. If new technologies come into operation, e.g. other rolling models, the technology modules are altered. Project-specific functions and sequences are incorporated into the plant-specific modules. This structure not only enables the maturity and service life of the critical technology modules to be decisively improved but also guarantees the stability of the plant-specific modules when replacing IT components or device-driven changes.

SMS Siemag supplies professionally integrated hardware solutions for the electrical and automation requirements of all product sectors. These solutions comprise the engineering and implementation of the automation systems, drive systems and safety engineering. The engineering for the whole plant includes the planning of the switchgear rooms and operating pulpits and the erection engineering for the planning of cable routes.

Essential input information for hardware engineering is, in addition to the contract and the customer-specific requirements, the motors and components lists (list of electrical field devices and motors), the plant layout and the safety concept and risk analysis for the danger zones. Essential hardware documents are schematic circuit diagrams, cable lists and terminal diagrams, location diagrams for switchgear rooms, control cabinets and desks as well as signal lists for the software engineering. The functionally organized hardware documentation for our customers ensures that the electrical equipment is represented in a clearly structured form, allowing easy maintenance.

Integrated tools in the hardware engineering process. In the basic engineering, the engineering process is closely connected with the mechanical design by means of integrated system platforms under the uniform umbrella of SAP for the purpose of preparing and maintaining the motors and components list. With the EPLAN Engineering Center (EEC) and the EPLAN P8 object-oriented E-CAD system, SMS Siemag possesses a modern and continuous system for preparing the hardware documentation. The desk layouts are drawn up in a graphics-based desk planner and agreed upon locally with the customer. Our portfolio also includes the complete erection planning and the related cable routing for the electrical installation on the site.

Comprehensive product know-how. The recipe for success in the hardware engineering field is provided by employees with comprehensive product know-how, by the efficient utilization of powerful engineering tools and by the integrative cooperation with the neighboring mechanical and electrical engineering departments. This combination enables us to achieve a high-quality and competitive result.
Our Electrical and Automation Division also supplies the equipment for power distribution and drive engineering in respect of all products of SMS Siemag. Through the close interlinking of our mechanical and electrical-engineering departments, we are able to optimize the drive concepts of our rolling mills – from the roll gap to the design of gear units and to the dimensioning of the frequency converters and motors.

Supply range for power distribution

The range of supplies for power distribution extends from high- and medium-voltage switchgear to distribution transformers, compensation equipment, filter systems, emergency power-generating sets and UPS systems, and onwards to low-voltage main distribution boards and the pertaining Emergency Off concepts.

Supply range for drive systems

With regard to drive systems, we supply all variable drives for steel meltshops, continuous casters, hot and cold rolling mills and strip processing lines. To these can be added constant-speed drives in all performance ranges. Low investment and operating costs through reduced power dissipation, small space requirements and low maintenance are the advantages of our supply concept for power distribution and drive systems.

Remote-controlled switch operation

Above all for the switchgear of electric arc furnaces, in which currents of over 3,000 A at 36 kV are switched, we have developed a convenient solution according to the latest IEC standard in close cooperation with our suppliers: Every operation of the switch is remote-controlled, including the extending and retracting of the switch. This means that when the switches are operated in parallel, a switch can be replaced also during operation of the plant, resulting in a considerable improvement of availability.

Power distribution from one source

The power distribution concept is prepared in the form of a single-line diagram. We advise our customers as regards the strategy for linking up to the interconnected power system. In order to determine the filter and compensation equipment as required by the consumers, we conduct a network analysis in which the reactive-power demand and the proportion of harmonic waves in the network are ascertained.

Our detailed process knowledge enables us to determine the simultaneity factors and to evaluate in-house pass schedule data. This in turn allows us to dimension all components optimally, from the overhead-line power supply to the mechanical actuators.

Manufacture by international specialist firms

Following the dimensioning and specification of all power distribution components, orders are placed with internationally active specialist firms for the manufacture of the components. These firms are subjected to progress and quality controls. And it is only after the manufacturing control that authorization is issued for supply to the jobsite.

The components are to a very large extent standardized as regards functions and interfaces, thus enabling integrative engineering (interconnection of all interfaces) to be performed between the components at an early point in time. For commissioning,
selectivity calculations are carried out for the protective devices in the switchgear in order to ensure that when shutdowns take place in the plant, these are consistent with the cause.

**Reliable drive systems**

A large number of parameters play an important part in the designing of the drives, particularly for powerful capacities up to approx. 15 MW in the hot and cold rolling fields. The concepts for these medium-voltage drives have been elaborated and optimized in cooperation with renowned suppliers over the past few years. Intelligent circuits make it possible to reduce the line-side harmonic wave load to such an extent that filter equipment on this busbar is no longer necessary.

The dimensioning of these drive trains (medium-voltage breaker, rectifier transformer, converter and motor) is carried out on the basis of real process requirements that become evident from SMS Siemag’s own pass schedules. By means of optimized gear transmission of the drives, we ensure that we provide our customers with a system that offers them the highest degree of flexibility when designing their production range.

The X-Pact® electrical and automation package contains the drive-related technological functions, allowing the interface with the drives to be slim and standardized. The drive utilities system developed by us controls and monitors all utilities used by the motors and drive transformers. We can thus offer a continuous link with our plant automation, independently of the drive supplier.
For high-quality and reliable production

Successful modernization concepts

The owners of metallurgical plants have to consistently extend their production facilities in order to maintain their leading position through excellent product quality.

Such extensions of plant and equipment can today no longer be attained solely by applying newly developed mechanical solutions but must also be integrated into the automation system in order to ensure that an improved final product really is obtained. SMS offers integrated modernization solutions that maintain their focus on technological improvements in all aspects of production.

Challenges faced by the automation suppliers

The existing automation often cannot be extended as desired. The reasons for this, for example, are the lack of software specialists, the attainment of system limits and non-availability of extension assemblies.

The aim then is to find an economically optimum solution in terms of supplementing the automation or a partial replacement. For the integration, system interfaces have to be operated which may originate from several generations of automation systems. Furthermore, there must be a deep understanding of the function and technology in order to analyze existing, grown automation functions. Thanks to the longstanding experience of our employees and the focus on metallurgical plant and rolling mill technology, we are absolutely well prepared for these challenges.

Reasons for modernization projects

- Improvement of product characteristics
- Increased production and productivity
- Reduction of production costs
- Greater availability

For their implementation, the modernization concepts of SMS Siemag take account of all aspects of modern automation systems used in metallurgical plants:

- Integration of new process technologies
- Reproducible process sequences
- Improved ergonomy and safety engineering
- Replacement of obsolete systems
- Proof of quality of product characteristics by means of technological variables throughout the process

Procedure

Fact-finding: An initial project step for successful modernization is a detailed fact-finding of the actual status of automation technology. Here the installed sensor technology is recorded and checked to see if it can be used again. It is also verified as to how new sensor technology and instrumentation technology can be installed. Particularly important is that fact-finding takes into account the overall relevant electrical and automation equipment and the entire technological process sequence.

The second essential aspect is examining and determining the interfaces to the automation systems and IT infrastructure which are to remain. The results of the actual finding are basically a motors and components list, a technological process description and a documentation of the interfaces for each conversion phase.
Coordination of the operating mode: Tried and tested operating modes have developed over time for each plant. These SOPs (Standard Operational Procedures) must be carefully examined during the actual finding. The SOPs are prepared and documented locally in coordination with the operating and maintenance team. In this manner, the new operating modes are developed and coordinated with the people working on the plant every day.

Planning of the conversion phases: The phases for the major conversion steps for mechanics, utilities and electrics are planned with the customer. The conversion phases are planned in detail before the individual conversion steps take place. By ensuring a high parallelization of the necessary work operations before, during and after production stoppages, a shortest possible shutdown period is achieved. On the basis of previously defined milestones, the sequence of each shutdown is followed up by competent and well-networked site managers and revised if required.

Plant test: The results of the actual finding and the coordinated operating modes are incorporated in the hardware and software engineering. Following the Plug & Work concept of SMS Siemag, the engineering process is concluded by means of an extensive integration test. Dynamic and kinematic ratios are reproduced in a real-time simulation. The automation is tested in the functional test against the simulation under real conditions. An important factor for the modernization project is that an exact image of the interfaces to the existing remaining automation is reproduced.

Change-over concept: The simple switching-over of the signals at the interfaces is the easiest solution for changing plant operation from old to new automation. Here, the field signals are switched over from the old to the new automation system during a revamp shutdown. During maintenance shutdowns before the conversion, individual functionalities can be tested in a preparatory manner. However, the switch-over during the shutdown period is final, a return conversion to the old system is hardly possible with this method.

In particular in the case of complex interfaces and plant components which are critical for production, a change-over concept is normally used. This makes it possible to functionally test partial functions of the new automation system during several planned maintenance shutdowns already before the actual revamp shutdown at the plant.

The electronic version of the change-over concept also allows the use of the so-called shadow mode. In this mode, it is possible to record and analyze relevant data and signals of the existing automation with powerful recording systems. In particularly critical cases, the change-over technology is upgraded so extensively that the entire plant operation can be switched over between new and old automation without any major interruptions in production.

The decision in favor of the change-over concept is discussed in an open manner with the customer, taking into account all economic and technical aspects.

Re-commissioning

Thanks to the aforementioned measures, many risks of a conversion are reduced. Due to our longstanding experience in the commissioning of metallurgical plants, we succeed in making the plant ready for operation in the shortest possible time during the revamp shutdown.

The restarting of a plant after a conversion represents the peak phase of the project. This requires a careful production planning of material qualities and dimensions with the customer in advance. With the help of the data recorded in shadow mode, our process models are already pre-optimized thus ensuring immediate production start with marketable product quality.

The customer continues to receive support from us, starting with continuous assistance during start-up to technological support from our development departments. In some cases both sides recognize that there is potential for joint further developments which are elaborated within the scope of cooperation agreements.

Positive feedback from our customers after numerous successfully implemented projects confirms the effectiveness of our modernization concepts.
Far more cost-effective and safer

We believe in real-time Ethernet

High-quality production is put at risk if even a single motor on a rolling mill is not running synchronously. Automation systems and real-time capable field bus systems guarantee the required interplay of the individual mechanical and electrical components. For this reason, it can be ensured that malfunctions or plant stoppages are virtually ruled out. Our automation system X-Pact® ProBAS also supports the latest technologies in the field of real-time capable field bus systems.

With a greater degree of plant automation the number of input and output points is increasing which leads for parallel wiring to an increased expenditure for project planning, installation, commissioning and maintenance and thus increases the costs.

A field bus connects all levels. Often, the demands on the cables are high. For example, specific lines for the transmission of analog values have to be utilized. By comparison, a serial cross-linking of field system components by means of the so-called field bus systems is far more cost-effective. A field bus connects the decentrally arranged field devices such as sensing elements (sensors) and control elements (actuators) with a control device for the purpose of communication. The field bus replaces parallel line bundles by a single bus cable and connects all levels from the field up to the control level.

Secured and target-oriented data transfer in real-time by means of Ethernet. In the past, the transmission of safe and unsafe data could only be executed separately and not via the same bus system. Moreover, the application of several bus systems made a comprehensive diagnosis of the automation systems impossible. In contrast to the communication via previously established field bus systems, the Ethernet allows a secured and target-oriented data transfer in real time.

Significantly reduced expenditure for hardware engineering. Owing to real-time Ethernet field bus systems, time-critical and even large data volumes can be transmitted via the same bus system. In our plants, the use of the real-time Ethernet leads to a significantly reduced expenditure for hardware engineering, since it is now possible to collect also the signals for highly dynamic actuators resp. sensors via the decentralized periphery for the first time in a machine-oriented manner. Because of this, a considerable number of individual cables and process signal adaptations can be dispensed with.

For several orders we already use our level-1 control systems with the Ethernet-based EtherCAT system as real-time capable field bus. There are plans to further expand this technology.
Electric steelworks and converter meltshops

- Bhushan Steel, India: E&A for electric steelworks with Conarc® furnace, two twin ladle furnaces, RH degasser and single-strand slab caster
- Pervouralsky Novotrubny Works, Russia: E&A for electric steelworks with EAF, ladle furnace and RH degasser
- Dragon Steel, Taiwan: E&A for BOF meltshop
- Isdemir, Turkey: E&A for BOF BOF meltshop (converter No. 2)
- Kazzink, Kazakhstan: E&A for SAF
- Essar Steel, India: E&A for electric steelworks with Conarc® furnace

Continuous slab casters

- Magnitogorsk Iron & Steel, Russia: E&A for single-strand slab caster
- China Steel, Taiwan: E&A for two-strand slab caster
- Wuhan Iron & Steel, China: E&A for two-strand CSP® caster
- Essar Steel, India: E&A for two-strand CSP® caster
- Salzgitter Flachstahl, Germany: E&A for single-strand slab caster

Hot strip mills and heavy-plate mills

- Magnitogorsk Iron & Steel, Russia: E&A for heavy-plate mill comprising finishing stand, pre-leveler, plate cooling system, hot-plate leveler, shear line, cold-plate leveler
- Baosteel Special Steel Branch, China: Automation for hot strip mill/heavy-plate mill comprising Steckel mill, hot-plate leveler, cold-plate leveler
- ThyssenKrupp Steel Europe, Germany: E&A for new edging stand; modernization of roughing mill E&A
- Wuhan Iron & Steel, China: E&A for CSP® rolling mill
- Minmetals Yingkou Medium Plate, China: Automation for heavy-plate mill with roughing stand, finishing stand, plate cooling system, hot-plate leveler, shear line, cold-plate leveler
- Hyundai Steel, Korea: Automation for heavy-plate mill with finishing stand, plate cooling system, hot-plate leveler, shear line, cold-plate leveler
- Tata Steel, India: Modernization of automation of roughing stand and edger of hot strip mill
- Salzgitter Flachstahl, Germany: Modernization of E&A of hot strip mill to boost capacity from 3.6 to 4.5 million tpy and increase strip width from 1,880 to 2,000 mm
- Essar Steel, India: E&A for CSP® rolling mill
- Welspun, India: E&A for new roughing stand and new plate cooling system for Steckel/heavy-plate mill

Cold rolling mills and aluminum rolling mills

- Northeast Light Alloy, China: E&A for aluminum-plate hot rolling mill
- Magnitogorsk Iron & Steel, Russia: E&A for coupled pickling line/tandem cold mill
- Novolipetsk Iron & Steel, Russia: E&A for reversing cold rolling mill
- Wuhan Iron & Steel, China: E&A for reversing cold rolling mill
- Benxi Iron & Steel, China: E&A for two reversing cold rolling mills

Strip processing lines

- Handan Iron & Steel, China: E&A for cross-cut shear line
- Shougang Iron & Steel, China: E&A for cross-cut shear line
- Hyundai Hysco, Korea: E&A for vertical hot-dip galvanizing line
- Magnitogorsk Iron & Steel, Russia: E&A for combined hot-dip galvanizing and continuous annealing line, recoiling and inspection station, and packaging line
Latin temperament meets European know-how

SMS Siemag Serviços Industriais
Brazil ranks among the world’s key emerging markets with great economic and growth potential. Supported by major sporting events taking place in the country such as the World Cup in 2014 and the Olympic Games in 2016, annual growth rates of 5% and more are predicted. In this regard, the industrial development and thus also the setup and the operation of metallurgical plants and rolling mills will play a decisive role in Brazil.
SMS Siemag Serviços Industriais

Top-quality services for South American countries

In this sector, the expansion of production, the extension of the product areas as well as the maintenance resp. reduction of the (currently worldwide lowest) production costs are presently at the focus. Via our subsidiary SMS Siemag Serviços Industriais Ltda., with its head office in Belo Horizonte, we as SMS group are able to offer high-quality services covering the complete repair and maintenance of metallurgical and rolling technology in Brazil and for other countries in South America.

Cost efficiency plus flexibility

To be able to offer our customers cost-efficient and flexible services which are tailored to the respective plant and situation we make use of the infrastructure of the existing workshops. We perfectly cooperate extensively and closely with highly qualified cooperation partners. To uphold the high quality and performance standards of the SMS group we define and coordinate the entire repair, maintenance and manufacturing process. Thanks to this cooperation model, we are able to offer top-quality and first-class service features with high efficiency and flexibility to our Brazilian and other South American customers without excessive investment costs.

Very close to the customers

To make it possible that our customers are looked after and supported, SMS Siemag Serviços Industriais Ltda. has a highly specialized key account and product management team. While the customers are directly looked after by the key account managers, all technical issues are dealt with by our specialized product managers who are regularly trained at our locations in Germany or at our international locations. Consequently, they always have the required up-to-date technical know-how. In close cooperation together with the engineering staff the product managers handle the technical order processing. Owing to an optimized organizational structure, the customers of SMS Siemag Serviços Industriais Ltda. benefit from smooth order processing and direct communication. The work of the key account and product managers is accompanied by highly skilled expert staff on all company levels. In Brazil, the company maintains various competence and service centers for torpedo cars.
Working hand in hand

Since many of our customers have their own workshops we consider ourselves to be a special service provider offering additional repair capacities and in addition to this specific know-how. In this case, we work together very closely with our customers along a repair routine developed by us. Before we start our repair work we prepare a technical report with a precise description of wearing parts, dimensions, photos and with our recommendation on what needs to be done and which parts have to be replaced. This report is the basis for a detailed coordination with the customer. For the execution of an order, SMS Siemag Serviços Industriais Ltda. can rely on the worldwide experience and know-how of SMS Siemag as well as the service companies of SMS which is a great advantage for our Brazilian and South American customers.

"Extended workbench"

Repair and overhaul have become increasingly important fields of activity. It is our philosophy to be a remote workshop for our customers which makes us successful. This is demonstrated by numerous orders for which we have developed a specific handling procedure.

To convey an impression of what SMS Siemag Serviços Industriais Ltda. is providing in concrete terms we would like to present some current project and order examples.
Example of performance 1:
Replacement of supporting beam in only seven days

CSN, Volta Redonda Plant, has awarded an order to SMS Siemag Serviços Industriais Ltda. for the replacement of the supporting beams in the vertical stands of the hot rolling mill No. 2. A real challenge since the operation of the mill should only be interrupted for seven days to realize the complete replacement. To ensure that this process goes smoothly our engineering specialists cooperate on-site closely with the engineers from CSN. Besides a precise execution of all work performances, SMS Siemag Serviços Industriais Ltda. supplies the required components such as beams, tie rods as well as fastening elements, and provides the necessary tools.

Example of performance 2:
Mandrel modernization by SMS Siemag

After we had already replaced a coiler of the reversing cold rolling stand of CSN Paraná (formerly Cisa), we have now been awarded the order for the replacement of a second coiler. While the planning and development work is executed jointly by SMS Siemag Brazil and SMS Siemag Germany, SMS Siemag Serviços Industriais Ltda. will take over all assembly and reconstruction work on site. The main emphasis will be the modernization of the mandrel drive system in order to increase the reliability and efficiency of the plant. The modification work in the plant consists of removal, replacement of parts, mechanical processing, inspection, alignment and re-installation.

Example of performance 3:
Repair of Sieflex spindles

In March 2010, ArcelorMittal Tubarão, formerly CST, has commissioned us with the reconditioning of two spindles of the company’s hot strip mill. Normally, we disassemble and inspect the spindle and determine which parts have to be repaired or replaced. In this particular case, only the wear parts had to be removed. Due to the mill shutdown previously scheduled by the customer, we had to perform the repair work in three weeks. The execution of all work has been most successful.
Example of performance 4:
**Repair of the pinch roll unit and the apron of a coiler**

In mid-April, ArcelorMittal Tubarão has commissioned us to repair the pinch roll unit and the apron of the coiler of the hot rolling mill. Particularly demanding was that the repair work was planned for execution already in the second half of May within a four-week plant downtime. After the customer had delivered the removed parts to us we have first cleaned and then disassembled them. The repair measures specified on the basis of an assessment have been coordinated with the customer in detail. Thereafter, we have replaced the worn parts and have adjusted the distorted parts. Thanks to a close cooperation, the assembly and the re-assembly by the customer have been successful within a preset time.

Example of performance 5:
**Mandrel repair in a hot rolling mill**

ArcelorMittal has commissioned us to rework the coiler for the hot rolling mill in Vitória. In order to meet this challenging schedule we have defined and ordered the respective spare parts already beforehand on the basis of our experience of previous repairs. For the visual and the dimensional check we have completely disassembled the coiler so that it could be repaired according to the specifications. In February 2010, the mandrel has been tested following repair and assembly and was released for shipment to ArcelorMittal.

Example of performance 6:
**Refurbishment of roller tables**

At the end of 2008, Novelis commissioned us to completely re-vamp a roller table at the entry side of the roughing mill of the aluminum plant in Pindamonhangaba. As required by the customer, we had to reconstruct the roller table to be suitable for the assembly on the entry or the exit side. The revamping work has been successfully concluded in July last year. Last February, we were also commissioned to repair and optimize another roller table of the roughing mill.
Saudi Basic Industries Corporation (SABIC) is Saudi Arabia’s largest steel producer. Its wholly-owned subsidiary, the Saudi Iron and Steel Company (Hadeed), was established in 1979. Hadeed has been producing rebars and wire rod since 1983, sectional steel since 1993 and flat-rolled products from 1999 onwards.

SABIC, ranks among the world’s top six petrochemical companies. It has around 33,000 employees and is one of the world’s leading manufacturers of chemicals, fertilizers, plastics and metals. Hadeed is a major part of SABIC’s Metals business unit portfolio.

Customer training included

HADEED, a major service customer

Our long-standing customer Hadeed possesses several mills from SMS Siemag and places value on high-quality, highly efficient plants and on consistently high product quality. Since 2003, Hadeed has regularly asked for the service specialists of SMS Siemag. In particular, the services successfully provided over the last few years are a sign of good cooperation and mutual trust.

Our services for Hadeed include in particular inspections, servicing work, installation and commissioning of plant components, as well as training of its own employees. In addition, Hadeed regularly procures spare parts from SMS Siemag for various plant components.

Examples for technical support

For the following work, the experts of SMS Siemag have rendered technical assistance over the last eight years:

- Regular examination of the complete emulsion system of the cold rolling mill
- Overhaul of the complete emulsion system of the cold rolling mill
- Adjustment of a new coiler mandrel
- Overhaul of the cropping shear of the hot rolling mill
- Assembly and commissioning of a backup roll coupling device for the cold rolling mill with associated training
- Assembly and commissioning of a magnetic chain separator with associated training

Especially to be mentioned is the extended gear unit inspection which we perform at regular intervals during maintenance. Within the scope of this inspection in 2006, two gear experts have examined all main gearboxes of the finishing train as well as the cropping shear gearbox during a two-week service assignment in the hot strip mill.
Example customer training

The competence of the plant personnel is of crucial importance to ensure that the plants are operated expertly and to make sure that the staff is reacting quickly in case of malfunctions. Because: Well-trained expert staff is the basis for a sustainable success of any company. This know-how is based on plant-specific training offered by our experts to the customer locally or also at the locations of SMS Siemag AG in Hilchenbach and Düsseldorf.

To extend the knowledge of the plant personnel and to make the interrelated plant systems more comprehensible to the staff members, Hadeed used our training sessions several times over the last seven years. By means of hydraulic training courses, TCS training (TCS = Technological Control System) as well as PCFC training (PCFC* = Profile, Contour and Flatness Control) our service experts provided extensive knowledge on the overall system as well as on the functions, causes and consequences to the Hadeed staff.

In May 2008, a total of ten employees from Hadeed took part in a hydraulic training program over a period of seven days under the supervision of a hydraulic expert. The first part of the training program included the demonstration of theoretical basics linked to the conditions of the hot rolling mill from Hadeed. Part two of the training program contained the practical implementation of theoretical knowledge on the plant, at the same time jointly solving and eliminating an existing hydraulic problem. In addition to that, Hadeed has taken part in three TCS courses and one PCFC training course in recent years (2003, 2008 and 2009).

In February 2009, a training program on cold rolling mills took place at Hadeed for ten days. Therefore, a plant engineer from SMS Siemag traveled to Al-Jubail where he locally conveyed theoretical basics and operating specialties (e.g. as regards roughness and wear of the rolls, roll marks, strip breakage) and made recommendations for the improvement of the rolling process and the product quality to the Hadeed personnel.

Spare parts

In addition to providing technical support and customer training the supply of plantspecific spare parts is particularly important for a smooth continuous operation of a plant. Our Spare Parts area offers Hadeed the maximum possible support with regard to repairs including upgrades and the supply of spare parts. A permanent information exchange between Hadeed and SMS Siemag has contributed to a long-standing and trusting relationship.

Our Service Manager for Africa expresses the good relationship with Hadeed as follows: “Hadeed is an important strategic partner for SMS Siemag. Over the last eight years a good many service activities have been successfully performed jointly on various plant components. SMS Siemag would like to further expand this good relationship in the future and consolidate the partnership between both companies.”
Inspections at regular intervals and preventive maintenance are the key to high productivity in today’s continuous casting plants, and ladle turrets are of central importance here. They ensure that the casting ladles are permanently guided alternately to the casting and loading position. The unrestricted function of the ladle turret thus ensures a smooth operation of the entire continuous caster.

**Prevention of unscheduled downtimes**
Primarily because of high dynamic loads the ladle turrets are of course subject to a normal aging and wearing process and have to be maintained on a regularly basis. Only an appropriate and regular inspection of all components prevents the plant user from unplanned surprises which may lead in the worst case to a failure of the ladle turret. As a consequence, this would inevitably lead to an unscheduled downtime of the entire plant and to a corresponding loss of production.
Time saving due to plant-specific expert know-how

Our Technical Service offers a customer-specific inspection and maintenance package to the customer on site which is tailored to the design of the respective ladle turret from SMS Siemag. The decisive advantage for our customers: time saving due to plant-specific know-how of our experts for ladle turrets as well as safety through planning, implementation and control from a single source.

Special maintenance for large-size antifriction bearing

Our service experts particularly look at the large-size antifriction bearing, the key element of maintenance work. Regular checks of the bolt prestress as well as an optimal bearing lubrication are important prerequisites for a long service life of the bearing. Simultaneous wear measurements and lubricant analyses provide information on the bearing condition. This enables an involvement of our experts in good time for the evaluation of the situation and a professional support also when the large-size antifriction bearing is replaced during a planned maintenance shutdown.

Inspection process in detail

The inspection of a ladle turret and the replacement of the roller-bearing slewing ring comprise the following elements:

Planning
- Discussion about detail planning with our customer on site
- Adaptation of planning and preparation of assembly instructions with detailed description of single steps and expenditure of time
- Planning of manpower requirement

Implementation
- Dismantling
  - Deactivation of media and uncoupling of drive
  - Lifting of top turret by detailed, planned working steps:
    - Inspection of bearing contact faces
    - Surface treatment on site
    - Re-installation
- Re-commissioning
  - Re-connection of media facilities and drive
  - Execution of function tests
  - Start of casting

Check
- Final analysis of the complete inspection to be able to detect improvement potentials for future inspections
- Aim of the check: save valuable time and reduce future expenditure as well as costs in customers' best interests

Services rendered by SMS are characterized by the following parts ensuring an optimal inspection and maintenance of the ladle turret for the customer:

Maintenance shutdown planning
Effectiveness and efficiency are the result of a precise planning of all details. Together with our customers we provide a binding scheduling of all inspection, maintenance and assembly work including the required resources and tools.

Direct access to experts and plant documents
We are providing all plans and technical documentation as well as expert knowledge gained from design, manufacture and commissioning. The decisive advantage for our customers is the time saving obtained by an accurate analysis, planning and organization from a single source.

References
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Saarstahl, Völklingen, Germany, 2007
Tamsa, Mexico, 2008
U.S. Steel Košice, Slovakia, 2008
ArcelorMittal Ruhrort, Duisburg, Germany, 2009
Latest reference: ArcelorMittal Asturias, Gijón, Spain, 2010
Audits performed in 14 workshops
Efficiency campaign started in Russian tube mills

Dmitry Zuromski, Deputy Technical Director of the ZAO ChTPZ Group, explained the reasons for implementing the audits: "We are continuously working on enhancing the efficiency of our repair centers. To do this, we need the competence and know-how of a technology and market leader for the technical service of metallurgical plants. This is the only way we will be able to sharpen our eye for the right approaches and to make our technical maintenance and our repair center more efficient."

Audits in 14 workshops. An eight-person group of experts examined the technical maintenance of the ZAO ChTPZ Group in five workshops and of PNTZ in nine workshops. Factors like cleanliness, organization plan, management system, current plant and material stock, maintenance procedures, diagnostics systems, cooperation with spare parts and equipment suppliers and the expenditure for maintenance measures were considered. The inspectors of the SMS group identified numerous optimization potentials and formulated respective recommendations.

Optimal organization with the 5S program. Dmitry Zuromski: "The auditors recommended to introduce the proven "5S" program allowing uniform standards for cleanliness and order in the workplace to be established. Furthermore, a modern, computer-aided management system is required for the organization of technical maintenance. In addition to this, they recommended that we organize the repair shop such that specific tasks can be delegated to the operating staff as quickly as possible. This includes the cleaning work on the plants, the examination of the technical condition of the plants and the monitoring of the operation and the production. By the way, we are currently implementing these measures in the first workshops of the ZAO ChTPZ Group and at PNTZ."
Measuring the efficiency of the complete plant. The greatest optimization potentials have been identified by SMS in the stockkeeping of the individual workshops. Each production area maintains various storage facilities for spare parts, tools and materials. An integrated stockkeeping system has not yet been realized, which makes the search and registering of spare parts unnecessarily difficult. Consequently, the auditors recommended that for each production area a central store should be established.

Dmitry Zuromski points to another important aspect: “The team of auditors considers it appropriate to introduce a system for measuring the efficiency of the complete plant within the ZAO ChTPZ Group. In this case, an internationally recognized approach for the determination of the OEE coefficient (Overall Equipment Efficiency) is recommended. In Russia, plant downtimes, quality parameters and productivity analyses are traditionally considered separately. In western countries, however, these key figures are examined concurrently to be able to determine the overall efficiency of the production plants. Since the implementation of this recommendation requires no further investments the ZAO ChTPZ Group will approach this task in the short-term.”

Positive insights. The audits produced further recognitions. In some workshops the organization of maintenance and repair work is already very well positioned. Especially in the workshop No. 8 at the ZAO ChTPZ Group and in workshop No. 4 at PNTZ the experts praised the cleanliness, the quality of the executed work and the technical condition of the equipment. Dmitry Zuromski comments on the distinction pragmatically: “This is no reason for us to rest on our laurels since there’s no limit to perfection.”

Close cooperation planned with SMS. Dmitry Zuromski takes stock: “The audits have been successfully concluded and have revealed considerable potential for an increase in efficiency. Now we are considering how to implement the recommendations of the SMS group and how we can continue the cooperation. First of all, a program will be worked out to optimize the technical maintenance and the repair processes which will then be implemented in the production plants of the ZAO ChTPZ Group. The basic underlying work for this has been done and the SMS group will assist us for further steps.”

Necessary knowledge transfer. Another important recognition of the audits: More than 40 percent of the maintenance staff is facing retirement. These employees have a great deal of experience and expert knowledge. Unless something is done fast, the tube mills will be confronted with the problem of a shortage of skilled workers in the near future. In order to prevent the loss of knowledge of older employees the wealth of their experience has to be passed on to younger colleagues. The older staff must train and teach them and share their experiences with them. Moreover, additional incentive systems have to be created to motivate younger staff.

The 5S (five-step) program
1. Sorting
   Prioritization of the necessary and the superfluous
2. Visibility
   Visible orderliness allows more efficiency in the workplace
3. Cleanliness
   Prevent disorder in the first place
4. Standardization
   Common rules for order and cleanliness
5. Self-discipline
   Implement standards yourself and improve them continuously
For targeted customer support

Training as a service technician

Thanks to a continuous expansion of our “Technical Service”, we can actively support our customers on-site. For practical support of our customers on their facilities we provide training to the personnel of our workshops as a service technician.

Trained for various areas. Our service technicians are able to inspect a plant area at the customer with regard to maintenance and technical issues and to show a possible need for actions. They can also offer assistance for the installation and disassembly of the components. Currently, our service technicians are working in the areas of hot coiler, hot finishing train, drive components as well as shears and upsetting presses.

Targeted expert selection. In this way, we can offer our customers the opportunity to specifically utilize our experts who can draw up reports on the general maintenance status. It is an essential task of our service technicians to actively exchange information with the maintenance staff of the customers to optimize the maintenance concepts.

Based on the status analysis it is possible to support our customers with regard to repair work and the necessary spare parts provisioning. The aim is to make repair work more predictable so that unforeseeable failures of plant components are avoided and spare parts provisioning of critical plant components is optimized.

In brief

Latest services

- ArcelorMittal Vega, Brazil – Maintenance and repair of the trimming shear of a strip processing line
- ArcelorMittal Tubarão, Brazil – Repair of the dummy bar of a continuous casting plant and technical assistance with the overhaul of the coilbox during standstill
- JL Goslar, Germany – Status of the roll of a lead mill including crack testing
- Celsa Manufacturing Ltd., UK – Status on the electric arc furnace
- Chelyabinsk Tube Rolling Plant, Russia – Technical audit of maintenance organization of the complete plant and the sale of IMMS and TA
- Magnitogorsk Iron and Steel Works, Russia – Technical inspection of oil bearings in six workshops
- ThyssenKrupp Nirosta, Germany – Inspection of coiler No. 2 of the cold rolling mill
Long-term improvements due to cross-sectoral considerations. The assignments of our staff have proven that a functional interplay of individual components of a section for maintenance reasons can be increased by cross-sectoral considerations. For example, in the hot coiler area it is crucial that the components such as entry guide, pinch roll unit, pressure rollers, coiler mandrel and coiler mandrel gear are perfectly synchronized with each other so that an optimum finished product is achieved. Only when the maintenance or the status of these components can satisfy certain requirements is it possible to reach an excellent result in the longer term.

A close cooperation between our service technicians and the maintenance staff of our customers over extended periods of time enables us to make general statements on the condition of the SMS plants. Plus, we team up with our design departments to discover the optimization potential of the plants of our customers.

Always up-to-date on the latest developments. Our service technicians work closely together with our design departments and our workshop to ensure that they are optimally informed on the newest developments at any time. As a result, this information can be made available also to the respective maintenance staff of our customers.

MAW Mansfelder Aluminium, Germany – Inspection of the four-high reversing stand of the cold rolling mill
Outokumpu Oy, Finland – Technological training on the hot rolling mill
ThyssenKrupp VDM, Germany – Stand measurement of the CVC® rolling mill
ArcelorMittal Asturias, Spain – Replacement of the gearbox bearings on the converter
Hüttenwerke Krupp Mannesmann GmbH, Germany – Renewal of the service contract for teleservice/hotline for levels 1 and 2 for two years
Jinan Iron & Steel, China – Renewal of the service contract for teleservice/hotline for one year
Spaceframe, China – Renewal of the service contract for teleservice/hotline for one year
JSW Steel Limited, India – Supply of a coiling and uncoiling mandrel
Saudi Iron & Steel Co., Saudi Arabia – Supply of an entry guide
JSW Steel Limited, India – Supply of a coiler mandrel
Ural Steel LLC, Russia – Supply of a roller-bearing slewing ring for a continuous casting plant
Ispat Industries Ltd., India – Supply of a mill pinion gear
Hulamin Ltd., South Africa – ME-RCM analysis (Maintenance Engineering for Reliability-Oriented Servicing) of selected machines of a hot strip mill
Tata Steel, India – Technical assistance for the inspection on the coiler of the electrolytic degreasing system
Iskenderun Iron & Steel Works, Turkey – Revamp of a converter trunnion ring
ArcelorMittal Galati, Romania – Status of double side trimmer of a heavy-plate mill
Megasteel, Malaysia – Technical assistance with the commissioning of an electrode control system

Latest order
Hüttenwerke Krupp Mannesmann, Germany
Service contract for the automation systems of slab caster No. 3 renewed. A trusting relationship between SMS Siemag and HKM has been in existence for ten years. The service contract includes a 24/7 malfunction coverage including teleservice and local support.

E-mail: technical.service@SMS-Siemag.com
“Subject: Newsletter”
New order

Technical Service

New generation of crankshaft machines

Heller Automotive orders

EloCrank™ hardening machine

More than ten hardening machines for crankshafts from SMS Elotherm in FAW plants. For the selection of its vendors FAW therefore opts for partners who sustainably and successfully offer reliable machine and process technology and are thus guarantors of a smooth project handling with the result that qualitatively demanding crankshafts are produced. With this order, SMS Elotherm continues its successful cooperation with the FAW Group which is using in the meantime more than ten hardening machines for crankshafts from us in various plants.

EloCrank™: compact and flexible. Compared with the competition, the advanced hardening machine EloCrank™ of the re-engineered ModuLine™ series was convincing above all with its compact footprint and high flexibility as well as with its easy convertibility to other shaft geometries. All this is packed in a modern machine tool design and combined with a proven process competence so that the contract for this machine was awarded to SMS Elotherm by Heller.

Eco-friendly technology. A key criterion was undoubtedly the redesign without hydraulic auxiliaries. In this way, not only the electric consumption is significantly reduced and the noise level decreased, but above all the risk of contamination by hydraulic oil is ruled out. This is yet another step in the direction of a sustainable eco-friendly technology from SMS Elotherm.

Acceptance at the end of 2010. Another re-engineered machine type has thus passed from the paper to the implementation phase. In Q4 2010, the machine will be ready for acceptance in our assembly hall in Remscheid, Germany.

Walzwerke Einsal, Nachrodt

Investment in energy-efficient induction technology

In March 2010, SMS Elotherm GmbH, has been awarded an order by Walzwerke Einsal in Nachrodt, Sauerland, Germany, for the supply of an induction preheating device for sections. The company is investing EUR two million in the modernization of the production of cold-formed sectional bars. The supply includes among others also the induction heating of sections prior to the drawing procedure. During the conventional forming process the sections are heated to approx. 70 °C by means of an immersion bath before the auxiliary drawing agent is applied.
Debut success of updated EloFlex™

Shanghai GKN: Seven hardening machines ordered

China’s double-digit growth with an increasing demand for individual mobility brings Shanghai GKN Drive Shaft Company (SDS) a persistently high order intake. To expand its production capacity the Shanghai-based company recently ordered seven new hardening machines of the EloFlex™ series from SMS Elotherm. Hence, Shanghai GKN hardens the entire range of products in the field of constant velocity joints and shafts.

Advantageous EloFlex™ series. The induction hardening machines of the updated Eloflex series are characterized by the modular and advanced machine tool design and can be configured individually according to special customer requirements. Owing to the updated version, we were able to reduce also the delivery time, to improve the price-performance ratio and to increase the energy efficiency by 20 %.

Hardening true-to-contour with multi-frequency technology. This new machine generation combines our 70 years of experience in induction technology and the process know-how with today’s current customer demands for high flexibility and availability. After an effective re-engineering project, single- and multi-station machine series are available which harden different workpieces in a matter of a few seconds in manual or fully automated operating mode. In this process, one or two partly very thin-walled workpiece zones are hardened true-to-contour with multi-frequency technology.

Almost 30 machines in use at Shanghai GKN. In the meantime, the company has almost 30 machines from SMS Elotherm in service and not only appreciates the technical reliability but most of all our excellent service on site. Supported by our subsidiary in Shanghai, we fulfill the requirements of our customer for a 24/7 service availability. In addition to the mechanical maintenance possibilities our scope of services includes also a very specific inverter technology.

With this new order, we have now been awarded concrete customer orders for all updated machines.

The Shanghai GKN Drive Shaft Company (SDS) was founded in 1988 as the first joint venture for the manufacturing of components for the automotive industry in China. In the entire industrial sector, Shanghai GKN plays a model role in China for a successful joint venture. Over the past five years, Shanghai GKN has invested more than RMB 1 billion (approx. EUR 100 million) to ramp up production in China, particularly in new production plants in Wuhan and Chongqing. At the beginning of 2009, the new plant of Shanghai GKN in Wuhan with an area of 44,000 m² started production as scheduled. The plant produces more than 1,000,000 universal shafts per year. At present, GKN has a total of five Chinese manufacturing locations. In addition to the plants in Wuhan and Chongqing, it has manufacturing locations in Kangqiao, Shenjiang and Zhoupu. Every year, the company manufactures more than 600,000 longitudinal shafts, more than five million sideshafts and over 1.5 million universal shafts.

The heating is now handled by an induction plant from SMS Elotherm. With the aid of the induction plant, not only the heating of the sections can be controlled in terms of time and accuracy, but energy can also be saved considerably due to an increased efficiency compared to the immersion bath. The induction plant provides a digital transistor inverter of the latest generation and a menu-controlled PLC which optimizes the handling of different heating processes for various sections. Advanced system components from SMS Elotherm in combination with process knowledge about induction technology of many decades lead to a remarkable increase of efficiency of the complete system for the benefit of the customers.
Higher energy yield generated by increased efficiency

120-MN open-die forging plant inaugurated at Saarschmiede

Saarschmiede GmbH, Völklingen, Germany, has ceremonially commissioned a 120-MN open-die forging press supplied by SMS Meer. At the inauguration ceremony on May 8, the Prime Minister of Saarland, Peter Müller, spoke of a day for the future. Together with the management board of Saarschmiede GmbH and the parent company Saarstahl AG and in the presence of 1,500 guests the Prime Minister pressed the start button.

Dr. Klaus Harste, Chairman and CEO of Saarstahl AG, praised the new plant: "This is a great day for Saarstahl since we open a new chapter in the history of our company. The forging plant not only assures our top position on the world market but we will also be able to further increase our market share."

Nearly EUR 450 million have been invested in the production plant and 350 jobs have been created. According to the regional bank SaarLB, which co-financed the project, it is one of the largest investments in the Saarland of the past decades.
Peter Müller, the Prime Minister of Saarland (3rd from right), pressing the start button for the new open-die forging press.

The open-die forging press has a press force of 120 MN and can machine hot workpieces of up to 1,280 °C. Large shafts are primarily forged which drive turbines and generators of nuclear/coal- and gas-fired power plants. The shafts manufactured on this forging press withstand very high temperatures and pressures. As a result, the energy yield can be increased by an improved efficiency contributing also to environmental protection.

The forging press has been erected in a 15.5-m-deep pit, it is operated by 16 hydraulic pumps with 120,000 l of oil and two manipulators with a lifting capacity of 100 and 200 t move the forgings synchronously. The new production bay is 530 m long and 43 m wide.
On March 18, 2010, the 80-/100-MN open-die forging press installed by SMS Meer has been solemnly inaugurated at the Wetzlar plant of Buderus Edelstahl GmbH, Germany. Around 400 guests from the worlds of business and politics came along to the event which culminated in a fireworks display. Silke Lautenschläger, Hesse’s Minister for the Environment, Energy, Agriculture and Consumer Protection, gave the official speech.
The open-die forging press can be operated with both 8,000 t press force and in the slower upsetting cycle with 10,000 t press force. This new plant enables Buderus Edelstahl to forge large-size components with diameters of up to almost 4 m. These large heavyweight parts are used in the power engineering and special machinery sector.

A new manipulator with a lifting capacity of 250 mt is also part of the forging machine. The control stands have been designed to the same operating pattern which reduced the need for training and enables a flexible personnel assignment.

Together with the new open-die forging press Buderus Edelstahl GmbH has set up eight 250-t forging furnaces and one 300-t furnace, a trackless vehicle system for ingots up to 160 t as well as an oil-hydraulic system with an oil volume of 70,000 l.
Relocation of two forging presses

Wuxi Turbine Blade, China: Substantial modernization order

The Chinese Wuxi Turbine Blade Company in Wuxi, Jiangsu Province, has commissioned SMS Meer to relocate and upgrade two forging presses. The relocation of production to a neighboring industrial area has become necessary since a new residential district is planned at the company’s current location.

The two presses are a hydraulic screw press, type HSPRZ 630, with 80-MN die-to-die blow force, and a clutch-type forging press, type SPKA 11200, with 180-MN die-to-die blow force. These machines had already been delivered to China at the end of the 70s and in the mid-90s respectively. The relocation time of the clutch-type forging press will be used to modernize the electric and the hydraulic equipment as well as parts of the mechanical equipment.

Wuxi Turbine Blade Company, a subsidiary of Shanghai Electric Group, is the largest manufacturer of turbine blades in China and mainly serves the power plant industry.
Kolkata, India: April 28 thru 29, 2010

"Minimill“ – The highlight at the Wire-Rod Symposium in Kolkata

Mills for the production of wire rod hold huge growth potential for SMS Meer, especially in countries with constantly growing economies. To take advantage of this potential, we launched our own series of symposiums on this issue earlier this year. After the successful launch in Mönchengladbach, the next event took place in Kolkata, India, from April 28 to 29.

Huge interest. 250 representatives from 68 Indian firms attended the lectures presented at the Hyatt Conference Center in Kolkata during the two-day symposium. The presentations focused on new products and technical innovations contributing to higher productivity in wire-rod rolling.

Minimill for small production volumes. In his introductory talk, Bimal Sarkar, Managing Director and CEO of SMS Meer India, presented a detailed overview of the Indian steel market. The technical papers that followed focused on the rolling of wire rod, bars and sections. A topic lively discussed was the "Minimill“ concept for small production volumes which combines an EAF steelworks from SMS Concast with a rolling mill from SMS Meer. “Owing to the relatively low investment costs, plant owners in countries such as India are seeing great future potential for this concept,” is how Bimal Sarkar explains the importance of this concept.

Further topics. Further papers dealt with the development of a high-speed looper, coil compactors for wire rod, and the new wire-roll mill in Duisburg-Hamborn built and supplied by SMS Meer.

In addition, SMS Meer’s subsidiary SMS Schumag presented its machines for the processing of cold-finished steel and copper. The state of the art in inductive heating was presented by SMS Elotherm. And the services and products of SMS Meer’s “Service Division” also aroused lively interest.

The SMS Meer staff used the breaks between the papers for in-depth discussions with our visitors. According to Sarkar “it is obvious that our symposium comes at the right time and tackles the right issues”.

Another wire-rod symposium took place in São Paulo, Brazil, where SMS Meer recently founded a new subsidiary.
SMS Meer and SMS Concast

Siam Yamato, Thailand: Minimill for maximum benefits

Highly praised by the customer

Piya Chairat, Plant Manager of Siam Yamato, is full of praise:

“SMS enjoys worldwide a distinguished reputation and we benefit from this every day especially when our customers visit us. They see the company signs from SMS on the plant and are positive right away: German and Swiss technologies sell extremely well also in Thailand.”
Piya Chairat, Plant Manager of Siam Yamato and his colleagues, remain convinced of the decision in favor of SMS: “With the minimill for medium sections from SMS at the Map Tha Put location we have bought the right equipment,” said the manager of the Thai/Japanese steel enterprise. “My customers believe in technology from SMS and we had to invest significantly less money than for a conventional plant. In this way, we are able to produce at lower cost and even the ecological values are excellent.” Since several months, this perfectly producing mill has been in operation.

40-year-old idea more relevant than ever

“Minimill” – this 40-year-old idea is today more relevant than ever. Germany’s Willy Korff had designed the mill in the sixties. In 1968, he inaugurated his steel plant in Kehl, Baden, Germany, the first of its kind with electric arc furnaces and an associated rolling mill for the production of rebars from SMS, at that time worldwide an absolute novelty.

The idea was revolutionary. From then on, steel could no longer be only produced where the coal was located but at any location. The Kehl port area with easy access to waterway, rail and highway was ideal to deliver scrap as starting material.

Just one year later, nearly 149,000 t of steel were produced in Kehl. Meanwhile, annual production is more than 2.2 million t which corresponds to 23,500 charges per year. In the early years, the smelting staff required a few hours for a charge but today the time required for loading scrap up to liquid steel takes just 38 minutes.

Good for ecology and “green” steel

In the age of ecology and “green” steel, Korff’s idea which was realized by applying SMS technology has considerably regained attraction. Steel production and further processing in an integrated factory saves energy. At the same time, the customers benefit from highly flexible SMS plants which can be revamped within very short periods of time and thus the demand is correspondingly high.

Successful minimill team

SMS has reacted to the market demands with a comprehensive team. Under the direction of Paolo Cancian from SMS Meer, Italy, colleagues from all over the world closely cooperate with each other, whether they are from the Business Area SMS Meer or from SMS Concast.

The success justifies the concept: large and significant reference plants such as those at Siam Yamato (medium sections), Tung Ho in Thailand (bar mill) or a combined plant from SSM in Košice are already running at full speed just like a mill in the USA. With a planned works for heavy beams in Sulb, Bahrain, another milestone will be added soon and also in Saudi Arabia a mill is under construction.
Minimills

Cost-efficient solution for growth regions

Especially when a project needs to be completed ‘on a greenfield site’ the customers often choose a cost-efficient minimill solution. This type of plant pays off particularly for steel producers in the growth regions of Asia, the Middle East or South America, but also in the established markets of Europe and the USA the minimills are becoming more and more important.

Next to the sector of tourism, the heavy industry in Thailand has developed in recent years to the most important source of income for the Thai population. Economies such as the USA, Australia and Japan use the favorable conditions in the country of orchids to invest in new production facilities.

Two steel plants already realized

Such is the case also for the Japanese Siam Yamato Group, a joint venture between the Thai family-owned Siam Group and the Japanese Yamato Group. Two large steel plants have been built in the Map Tha Put Industrial Zone, 100 km south of Bangkok. Plant No. 2 has been planned and constructed together with SMS as general contractor. 400,000 t per year of medium sections will be produced. The minimill technology from SMS ensures favorable production costs, high productivity and necessary flexibility for the production of different sizes and products.

Most modern plant of its kind in South East Asia

In close cooperation between Swiss and German experts from SMS the most modern plant of its kind was built in South East Asia. SMS Concast realized a steel plant with state-of-the-art technology. The associated section mill from SMS Meer features different levels and has a capacity of 400,000 t. Sections with edge lengths between 100 x 50 and 350 mm x 175 mm are predominantly produced.
The minimill for medium sections of Siam Yamato

Steel plant. The steel plant from SMS Concast has been designed for a capacity of 700,000 tpy and it comprises an 80 t electric arc furnace, a ladle furnace as well as a combined continuous caster. Various auxiliary plants such as scrap transport, dedusting system and material feed are also included in the supply package.

Continuous casting plant. The continuous bloom caster features five casting strands and allows for a production of a wide format range from 150 x 150 mm up to 230 x 450 mm. Simultaneous casting of various formats is possible.

Medium section mill. The semi-continuous medium section mill from SMS Meer produces beams from 100 x 50 up to 350 x 175 as well as channels and angles. The annual capacity of finished products is approx. 400,000 t. A future expansion of the mill to rounds and flats and an increase in production at the same time is possible in a further expansion stage. The mill comprises a walking beam furnace with a capacity of 130 t/h, a two-high reversing stand as well as a continuous finishing train with nine stands, of which six stands are equipped as universal/two-high stands.

The mill stands. The mill stands are modular compact stands of the CS type. The stands are interchangeable and can be used alternatively as horizontal/vertical or universal stand. A quick stand change can be executed without the need for a crane.

The finishing line. It consists of a rake-type cooling bed, a nine-roller straightening machine with adjustable pitch, a sawing line with three cold saws, five stacking machines, binding and loading devices.

Most modern mill in Asia. The mini steel mill is the most modern plant in Asia for the production of medium sections and it takes the latest technologies into account.
The South Korean steel producer Daehan Steel has commissioned SMS Meer to supply a rebar mill with a VCC® installation (Vertical Compact Coiler) for compact coils. The mill with an annual capacity of 450,000 t will be the first rolling mill worldwide which concentrates exclusively on the production of compact coils. The plant is scheduled to go on stream in April 2011.

SMS Meer supplies the key equipment for the rebar mill which includes six housingless mill stands each in H/V arrangement for the roughing and intermediate trains, a finishing block with eight rolling units in V arrangement, facilities for the heat treatment, the VCC® installation as well as the electrics and the automation. In addition to this, SMS Meer is responsible for the coordination of erection and commissioning.

The production line processes square billets with an edge length of 130 mm. It is planned to expand the mill for the processing of billets 150 mm x 150 mm in size. The rebar dimensions comply with D10 to D16 (according to Korean standard) and the production of the corresponding round bars is also possible.

For hot coiling, the VCC® installation is presently regarded as state-of-the-art procedure. The VCC® technology is also ideally suited for older mills with wire rod blocks and loop laying heads since it is possible to produce compact and stable coils.

The Vertical Compact Coiler (VCC®) from SMS Meer is able to coil the bars directly in vertical position. Owing to this technology, the customers can do without turning manipulators in the future. The throughput time is considerably reduced by the VCC® system since the coils are already formed in their natural final position.

The International Company for Steel Rolling (ICSR) in Hassia, Syria, has successfully taken the bar mill supplied by SMS Meer into operation. On this plant, surface heat-treated reinforcing bars are produced with speeds of up to 36 m/s in the exit section. The mill is designed for reinforcing steel with low and medium carbon content. The annual capacity is 300,000 t of round bars with diameters from 8 to 40 mm.

Structure of rolling line. The pusher-type furnace for the heating of square billets supplies a one-strand continuous rolling line comprising roughing, intermediate and finishing trains. The roughing train consists of six stands and the intermediate train operates with multiple-pass mill stands in HL design and H/V arrangement. The finishing block in V arrangement is equipped with eight rolling units and two more units can be retrofitted. In this way, the customer has the option to reconstruct the plant into a combined bar and wire rod mill at a later date.

Cooling bed with HSD® system. On the entry side of the cooling bed a high-speed delivery system HSD® (High-Speed Delivery) has been installed. The system is equipped with a double rotating launder transporting the straight bars to the cooling bed with speeds of up to 36 m/s.

The scope of supply. SMS Meer supplied the complete rolling mill including electrics and automation. The supply package included also the supervision of erection and commissioning. In addition to this, the scope of supply comprised a fully automated bundling plant and a tying station.
SMS Meer (UK) Ltd.: Service & advice for wire-rod producers

OEM know-how, short reaction times and communication in the local language – all this is part of the services offered by our service company SMS Meer (UK) Ltd. which was founded in England at the beginning of 2009. These services are not only gladly accepted by the users of wire rod mills in Great Britain but also by the plant operators in Central Europe. Company headquarters are in Chesterfield near Sheffield. With 10 employees in the meantime, this location has grown steadily and it offers extensive technical services and advice for all plant users in Europe.

E-mail: serviceinfo@sms-meer.co.uk

Robust and reliable at lower costs
New roller guides

SMS Meer has further developed its standard and high-speed roller guides for the wire rod and bar mills area. Complete systems are now available to our customers for the first time which are characterized by robustness and reliability. In this way, the roller guides have a longer useful life resulting in reduced costs for the plant users.

By the use of identical parts with various dimensions significantly fewer spare parts are required by the customers. Moreover, the roller guides consist of only a few single components so that the assembly or the replacement of wearing parts is considerably easier.

Owing to a central adjustment, all guides can be aligned in a quick and simple way. With high-speed guides, sections up to a diameter of 40 mm can be safely guided.

The novel systems have been particularly developed for the high-speed finishing blocks from SMS Meer. However, they can also be used in older plants and are compatible with the wire rod blocks of other manufacturers, provided that corresponding guide holders are available.
High-speed guides and innovative guide holders

South Steel, Saudi Arabia: New guide series ordered

The South Steel Company, an enterprise based in Jizan Economic City, Saudi Arabia, has commissioned SMS Meer to equip the bar mill of its new minimill with our newly developed guide series. The order comprises the design, construction and supply of standard and high-speed guides.

Scope of supply

In detail, we supply three complete sets of guides as well as the equipment for the assembly and the adjustment of the guides. The roughing and the intermediate trains are provided with our newly developed entry and exit guides as well as with Mono-Block and two-roller guides. The finishing block is equipped with the latest series of high-speed guides and with our innovative guide holders.

Steelworks of SMS Concast

Bar mill of SMS Meer

The order is part of a minimill project which is currently handled by SMS Meer and SMS Concast. The new minimill is yet another example for a successful cooperation between the individual companies within the SMS group. SMS Concast supplies the steel plant and the continuous caster, SMS Meer is building the 22-stand bar mill with an annual capacity of nearly 500,000 t. The mill processes square billets with an edge length of 150 mm to round bars with diameters between 8 and 32 mm. The rolling mill is scheduled to be put into operation soon.
SMS Meer has modernized a finishing mill for Nucor Steel Darlington, South Carolina, USA, in just five weeks. The new continuous finishing mill allows much shorter stand changing times and also much reduced setup and adjustment times. This consequent modernization has yielded a real competitive edge.

The new intermediate/finishing mill consists of four horizontal, one vertical and three convertible type HL stands. The convertible stands are of dual-drive arrangement, with motors and gears keeping their position regardless of the stand configuration (either H or V), with benefits for maintenance and plant usability, easier access to these facilities while minimizing depth and amount of required foundation work.

A flying shear, inter-stand equipment, quick change devices and tools, hydraulic and lubrication units as well as twelve additionally provided exchangeable cassettes are also part of the new setup.

This modernization in such a short time was only possible by close cooperation between SMS Meer and Nucor Steel. The modular pre-assembly of equipment and extensive pretests by SMS Meer’s production team reduced the number of operations on site, thereby allowing this record revamping time to be accomplished.

Nucor Steel Darlington, a company of the Nucor Bar Mill Group, is a well-known producer of steel bars in the USA.
Operators brought up to the latest technical standard

Tube rolling mills: Highest efficiency by individual training

We are passing on our know-how to the plant operators in individual training programs. It includes extensive knowledge about the complete tube plant, its functions, causes and consequences of operating errors. This knowledge gives the customer’s staff the chance to utilize the full potential of the machine with regard to productivity, flexibility and quality. Equally important as to bring the machines and the plants up to the latest technical standard is also to provide the staff members with the respective know-how. Individual training will support our customers so that an optimum efficiency of the machines can be achieved over an entire life cycle. The integration of latest technologies also requires individual training programs.
To deliver a quality plant is important. Nevertheless, it is not easy for the customer to make optimum use of the full potential of the machines without qualified staff. For this reason, SMS Meer offers qualified training for future plant operators as an important element of the overall offer.

Staff members of the world’s largest seamless tube maker Tenaris were recently present in Mönchengladbach when key components of the new 7-inch PQF® tube rolling mill were pre-assembled for the Tamsa plant in Veracruz, Mexico. Andreas Makowski, Project Manager, said: “A precise installation of the stands of the stretch-reducing mill is very important. During the final forming step high precision is crucial. The operating staff from Tenaris learned all technical moves required to be able to optimally adjust and align the stands. Based on this, technical interactions can be learned more vividly and the functioning can be better understood.”

SMS Meer supplies the complete production line of a new 7-inch tube rolling mill with PQF® technology to the world’s largest tube maker Tenaris for the Tamsa plant in Veracruz, Mexico. Our supply package includes also the training of the operator personnel. Thus, we have developed a tailor-made training program for the customer which already started in March 2010 while assembly work was still underway in the plant. Since Tenaris is already operating a seamless tube plant from SMS Meer at the same location, the Mexican staff was particularly eager to examine the technical advancements during pre-assembly of the new SMS plant.

The training for the Tenaris staff will be continued. The next training units are focused on all modern further developments.

PQF® symposium as a bonus

During their training courses the staff members from Tenaris could additionally participate in an event focusing on PQF®. That is to say, at the same time the second PQF® seamless tube symposium took place at SMS Meer in Mönchengladbach with numerous experts coming from all over the world. They learned more about the latest PQF® technology and were particularly interested in a demonstration of “Mill stands with floating axle”. After the successful completion of the training courses the staff from Tenaris could demonstrate the operating mode of the stands for themselves.

We would certainly be pleased to develop an individual PQF® training program also for other customers and look forward to hearing from you.
Seamless tube plants: Replacement/overhaul of hydraulic capsules

New services offered for PQF® and MPM plants

For seamless tube plants, the companies belonging to the SMS group provide the customers from now on with a worldwide service for the replacement and the overhaul of hydraulic capsules. In PQF® and MPM plants (Multi-stand Pipe Mill) these capsules play an important role. The offer can be accepted within the scope of a preventive equipment check or else individually. Within the SMS group, SMS Meer and SMS Innse form the competence center for seamless tube plants.

Hydraulic capsules play key roles. For each single roll in a PQF® or MPM plant there are independent hydraulic capsules with position sensors and pressure transmitters, position controllers and servo valves. In the complete plant the capsules play a key role. If they fail or are defective the quality of the production process is at risk or it will even lead to a machine downtime. Since the hydraulic capsules wear off, it is useful and necessary that they are overhauled at regular intervals.

Services also around hydraulic adjustments. In addition to this, the experts from SMS provide a full service around the hydraulic adjustment of work rolls. The inspection is performed with a modern remote control system. Preventive maintenance measures can be introduced immediately. Software updates can be installed via remote access to make sure that the plant is always kept up-to-date.

“For our customers it is very important to concentrate on the core business: troublefree production of tubes in top quality,” said Marco Ghisolfi from SMS Innse. “Our services for the core components such as the hydraulic capsules help them since only a well maintained plant with smoothly functioning components runs permanently reliable.”
Completion before the end of the year

**PQF® goes west: Tube rolling mills in Brazil and Mexico**

The PQF® process (Premium Quality Finishing) continues to conquer the world of seamless tubes. 18 plants have been sold and delivered so far to Asia and the adjacent regions. Now, South and North America are also “infected” by the advanced technology made by SMS Meer: two plants are close to being commissioned at the same time.

16" plant in Brazil and 7" plant in Mexico. Vallourec & Sumitomo Tubos do Brasil, a joint venture consisting of the tube makers Vallourec and Sumitomo, is building a 16" PQF® plant with a nominal capacity of 600,000 tpy in Jeceaba, Brazil. TenarisTamsa launches a 7" PQF® plant with a nominal capacity of 450,000 tpy in Veracruz, Mexico. Both plants have almost been completed and will come on stream before the end of the year.

The beginning was 2003. The new seamless tube technology has been used in industrial applications in 2003 for the first time. This tube technology developed by SMS Meer in cooperation with SMS Innse was first used by the Chinese tube maker TPCO, namely in the Tianjin plant. The size was 7". Two years later, the SMS Meer customer realized an 18" plant and just one year later a plant with a dimensional spectrum of up to 9 5/8".

Already 20 plants ordered. The PQF® plants became rapidly established as a new standard for the production of seamless tubes. Meanwhile, 20 plants of this recent technology have already been ordered worldwide. Norbert Theelen, Head of Seamless Tube Plants Product Division at SMS Meer: “Together with the previous technology MPM (Multi-stand Pipe Mill) these innovations represent about 50 % of the seamless tube production worldwide.”
Cape Town, South Africa: March 14 thru 18, 2010
16th International Wheelset Congress 2010

“Faster, shorter, further”

Mobility today is one of the key topics around the globe. People want to travel “faster, shorter and further”, yet consume less and less energy doing it. With its Product Area “Wagner Banning Ring Rolling”, SMS Meer plays an important role in achieving these goals. That was once again underlined at the 16th International Wheelset Congress recently held in Cape Town.

Presentation of the world’s most modern wheel rolling machine. Martin Gellhaus, our Chief Sales Officer, presented our latest process for the production of rolled wheels. A short time before, SMS Meer had supplied a facility of this type for the new wheel rolling plant of Lucchini RS in northern Italy. Being the world’s most modern wheel rolling machine, it enables fully automatic pressing and rolling. On stream since spring 2010, the machine attains an annual production of 280,000 railway wheels.
Accompanying trade exhibition. The Product Area was represented at the accompanying trade exhibition with its own stand which was the ideal opportunity to give a concise overview of Wagner Banning’s expertise in erecting all-inclusive wheel rolling machines for railways and track-bound vehicles.

Congress held every three years. The Wheelset Congress has been held every three years since 1963. It is a meeting place for railway operators and equipment suppliers, but also for administrations and international authorities that come here to learn all about the most important innovations in the area of rail and wheel technology for railways.

This year’s host was the South African company Ringrollers Pty. Ltd. The venue chosen by the organizers was the Cape Town Convention Center, a modern events center in the heart of Cape Town. For three days, some 200 participants from around the globe were guests in the country of the FIFA World Cup.

The next International Wheelset Congress will take place in the Ukraine in 2013.
Düsseldorf, Germany: April 12 thru 16, 2010

“Tube & Wire” a huge success

SMS Meer, SMS Elotherm and PWS presented their portfolios

The companies of the wire, cable and tube & pipe industries showcased their latest technologies at “Wire 2010, International Trade Fair for Wire and Cable” and “Tube 2010, International Trade Fair for Tube and Pipe” which ran in Düsseldorf from April 12 to 16, 2010.

SMS Meer joined forces with its subsidiaries SMS Elotherm and PWS to present their latest developments and products in the sector of tube & pipe production.

Our 600-m² stand turned out to be one of the highlights of the trade fair thanks to an eye-catching design feature: a light-diode banner that displayed the names “SMS Meer” and “SMS group” as well as the key areas and product names in a loop going round the stand. Also in every other respect, the stand reflected the key characteristics that we stand for: quality, service, and customer orientation.

Mission accomplished. “We are totally satisfied with the result,” says Dr. Peter Heimerzheim, Head of Corporate Communication at SMS Meer. “We had as many visitors as in the boom year 2008, and we met all our key targets. The organization team did a great job.”

For the first time, we had asked our sales teams before the event what their aims were, then on the last day of the trade fair
we asked everybody on the stand how far these goals had been achieved. The result: Top grades for the stand itself as well as the organization. Also in “sales promotion” we did better than expected. Only the grades for “acquisition of new customers” were not that good. Obviously, as a result of the economic downturn, customers in some countries have cut back on traveling.

**Numerous new projects.** Besides making new contacts, this time there was a focus on “new projects with existing customers”. Talks with each third customer were about potential new business, and we sent 85 concrete proposals to our customers after the trade fair. This was the first year the two SMS Meer subsidiaries SMS Elotherm and PWS were represented on our company’s joint stand.

**Get-together on the trade fair stand.** Traditionally at this fair, we invite customers to an evening get-together, and attendance was especially high. In 2008, we had invited our guests to celebrate with us the inauguration of our new heavy-load hall in Mönchengladbach. This time, the party took place on our trade fair stand. There were mixed reactions: on the one hand, there was a lot of approval of this concept which reflects the current economic situation. On the other hand, some of our sales employees would have preferred a little more “glamor”.

**Positive resumé.** Confirming the positive overall impression of the SMS Meer team, the trade fair organizers were also upbeat. “Last year’s economic crisis has definitely bottomed out, things are looking up,” said Joachim Schäfer, CEO in charge of the Tube & Wire 2010. “The trade fair came at exactly the right time. Companies are beginning to invest again to sharpen their competitive edge or to improve their market position.”

**70,000 professional visitors from over 100 countries.** The number of exhibitors at the Tube & Wire in Düsseldorf totaled 2,400. Their stands covered an area of 100,000 m². Some 70,000 professional visitors from more than 100 countries came to the Tube & Wire which is a combination of the two leading fairs “wire, International Trade Fair for Wire and Cable”, and “Tube, International Trade Fair for Tube and Pipe”.

Most of the attendants came to Düsseldorf from traditional customer countries like Great Britain, the USA, Italy, Austria, Poland, Brazil and India. Visitors mostly came from various industries (81 %), trade (8 %) and craft (3 %). Visitors from abroad accounted for 63 %.

**The next Tube & Wire will once again take place in Düsseldorf from March 26 to 30, 2012.**
Shanghai, China: May 11 thru 13, 2010

6th Shanghai Tube Expo & China Pipe Fittings Expo

Shift of focus from quantity to premium-quality tubes

Shanghai Tube Expo & China Pipe Fittings Expo is one of the largest trade fairs in the tube making and processing sector, not only in China but in the entire Asia-Pacific region. Since its successful introduction in 2005, it has evolved into a major event and today is a key platform for the exchange of know-how and cooperation projects between the domestic and international steel tube industries. This year’s Expo attracted more than 10,000 visitors and over 300 exhibitors from around 80 countries. SMS Meer, the leading supplier of tube rolling mills, also participated in this event. The photo shows Mr. Salomon, an expert for the Chinese market in the Seamless Tubes Product Area of SMS Meer, during his talk on our latest tube rolling technologies. He was the only international guest invited by the organizers to give a talk.

SMS Meer expert reports on current industry trends

Frank Salomon, an expert for the Chinese market in SMS Meer’s Seamless Tubes Product Area, at times knows more than local market participants. This is why he was the only international guest invited by the organizers of the 6th Shanghai Tube Expo to give a talk. The most notable companies and experts of China’s steel tube industry were represented at the event. And Frank Salomon did not disappoint them.

In his presentation, he summed up the history of the seamless-tube rolling processes developed by SMS Meer – from cone-type piercers via PQF® plants, Flexible Precision Sizing (FPS), Computer Aided Rolling Technology Application (CARTA®), Lasus® Multi-Scan diagnosis technology and TPE™ technology to the hot pilger process.

In the ensuing discussion, SMS Meer’s expert explained the current challenges of the market. China today produces as much as 37% of the 35 million t of seamless tubes put out worldwide. “The market is defined by largely outdated equipment,” he said. “At the same time, however, the demand for niche products, including heat-treated, high-alloy steel grades, is increasing rapidly. These are challenges that can only be met using modern plants.”

As the global leader in seamless tube plants, SMS Meer is able to provide all its customers with advanced rolling processes and technologies. The equipment sets high standards here in terms of precision, quality and price/performance ratio.

The increasing construction of power plants saw the demand particularly for tubes of high-alloy steels in China soar. Mr. Salomon reported how SMS Meer cooperated with Hengyang Steel Pipe in China to build a hot pilger mill that can produce tubes made of high-alloy materials with an outer diameter of up to 28” – a novelty in the sector.

The tube rolling mills built with Tianjin Pipe are good examples of the innovative strength of SMS Meer.

Hu Mingyang, General Secretary of the China Special Steel Enterprises Association, shared Mr. Salomon’s views in every detail: “For years, our market was characterized by rapid growth. We expect to see a fundamental shift here from quantity to premium-quality products. This is possible only with high-quality technologies.”
From March 7 thru 10, 2010, the Arab Steel Summit, the annual conference and exhibition of the Arab Iron and Steel Union (AISU), took place in Marrakech, Morocco. Besides the Middle East Iron and Steel Conference, it is one of the pivotal events of the industry in the MENA region (Middle East & North Africa). In a paper Christian Geerkens, Executive Vice-President of Steelmaking Plants/Continuous Casting Technology Division of SMS Siemag, presented the new Maghreb steel complex, and handed over a model of the works to the management of Maghreb Steel. The model was the big attraction at SMS Siemag’s exhibition stand. Paolo Cancian of SMS Concast held a paper about “State-of-the-art solutions for long product minimills”.

Christian Geerkens talking about the Maghreb order at the conference.
Shanghai, China: June 9 thru 11, 2010

Aluminium China 2010

The trade fair held at Shanghai’s new exhibition center was well-frequented. The organizers officially reported a visitor count of 9,000, and 320 exhibitors. The stand of the SMS group was located in the German section and showcased in particular the latest technologies and developments of SMS Meer’s Extrusion Presses Product Area. Hertwich Engineering and SMS Siemag had also delegated representatives to the event. All of our Chinese key customers for extrusion presses visited our stand. The next Aluminium China will take place in Shanghai from July 13 to 15, 2011.

Beijing, China: May 11 thru 14, 2010

Metal + Metallurgy China

The trade fair was preceded by the Congress of the China Iron & Steel Association (CISA) which was attended by high-caliber representatives, among them Stephan Krämer, Executive Vice-President Hot/Cold Rolling Mills Division of SMS Siemag, who held a talk on “Plant builders’ products for the steel industry – today and tomorrow”. The companies of the SMS group took part with a joint stand where we welcomed numerous representatives of institutions and renowned steelmakers to in-depth discussions with our experts.

Ho Chi Minh City, Vietnam: May 17 thru 20, 2010

SEAISI 2010

The SEAISI Conference & Exhibition is organized by the South East Asia Iron and Steel Institute and takes place every year at a different location. This year’s event was hosted by Vietnam. According to the organizer, the SEAISI attracted more than 400 participants from 25 countries. The SMS group was represented at both the conference and the exhibition. Besides focusing on “Economic Challenges” and “Market Trends”, the event of course offered numerous technical sessions. Topics included steelmaking and possibilities for process improvements, the production of flat products, and new developments. Rüdiger Holz, Executive Vice-President of SMS Siemag’s Cold Rolling Mills Division, presented a paper on “Reversing Cold Mill – Flexible plant concept for emerging markets”.

Mrs. Ho Thi Kim Thoa, Vietnam’s Vice-Minister for Industry and Trade, and Dinh Huy Tam, President Vietnam Steel Association (center) are welcomed by Jens Haupt, Vice-President, Marketing/Central Sales, SMS Siemag.
Held every three years, the Aachen Steel Colloquium (ASK) is a conference devoted to shaping technology and attracts specialists from the worlds of industry and science. The ASK is organized by the Institut für Bildsame Formgebung (IBF) (Institute of Metal Forming) and the Institut für Eisenhüttenkunde (IEHK) (Institute for Ferrous Metallurgy) of RWTH Aachen university.

The lectures presented at this year’s event at Eurogress Aachen revolved around “Global Challenges: New markets for forming technology”, with a special focus on energy technology and lightweight construction. The event offered decision-makers and specialists in forming technology and its applications in machine and plant construction, energy technology and traffic or transport engineering a great platform to swap information.

SMS Siemag participated with a paper entitled “Process technologies and plant designs for the production of new steel grades”.

In addition to the papers, the 25th ASK offered technical exhibitions, a poster show, as well as tours of the IEHK and IBF with presentations of all key R&D areas. The SMS group participated in the technical exhibitions with a 21-m² stand where the representatives of SMS Siemag, SMS Meer and SMS Elotherm welcomed visitors to informative meetings.
6,600 attendants and 390 papers

This time, the annual conference of the U.S. Association for Iron & Steel Technology (AIST) took place at the David L. Lawrence Convention Center in Pittsburgh, Pennsylvania. Running from May 3 to 6, 2010, the Conference & Exposition attracted some 6,600 participants who could choose from a total of 390 papers. The companies of the SMS group contributed 15 presentations.

On a total of 430 stands, the accompanying exposition provided a wealth of information. SMS Siemag, SMS Millcraft, SMS Meer, SMS Concast, SMS Elotherm, Fontaine Engineering and Drever International joined forces on a 50-m² stand which was the ideal platform for our specialists to inform visitors at first hand about latest technologies, future trends and our latest orders.

Shanghai, China: November 16 thru 18, 2010

Baosteel Biennial Academic Conference

From November 16 to 18, 2010, Shanghai will host, for the fourth time, the Baosteel Biennial Academic Conference (BAC) under the motto “Green Steel, Green World”. Stephan Krämer, Executive Vice-President of our Hot Rolling Mills/Cold Rolling Mills Division has been invited by Baosteel to present the keynote lecture in the Metallurgical Equipment session. He will talk about “Efficient solutions for hot rolling mill modernizations and upgrades.”
Two conferences in Latin America

In fall 2010, SMS Siemag will present its latest technologies at two conferences in Latin America.

Monterrey, Mexico: October 3 thru 5, 2010

We will hold the following talks at CONAC in Monterrey:

- Conarc® – Metallurgy with future-oriented flexibility
- CSP® plants – the success story of an outstanding technology
- The UNI plus coiler
- Tools for the reduction of life-cycle costs and maintenance expenditure in metallurgical plants and rolling mills

Belo Horizonte, Brazil: October 26 thru 29, 2010

The 47th Rolling Seminar of the Brazilian Steel Association ABM will take place in Belo Horizonte from October 26 to 29, 2010. SMS Siemag will participate with the following talks:

- Flexible plant concepts and technologies for hot strip and plate production
- A new development for coiling high-strength strip in large thicknesses: the UNI plus coiler
- Cold rolling technology for economical production of high-strength steel

Beijing, China: September 14 thru 18, 2010

International Conference on Steel Rolling (ICSR)

The International Conference on Steel Rolling (ICSR) is held every four years. The 10th ICSR taking place in Beijing from September 14 to 18, 2010, will be organized by the Chinese Society of Metals. SMS Siemag and SMS Meer will participate in the exhibition and present the following topics at the conference:

- Latest developments in hot rolling technology
- The UNI plus coiler for highest requirements
- Advanced online-measuring systems for efficient cold strip production
- The new heavy-plate mill for MMK
- Hydrothermal acid regeneration
- Strategies to reduce spare parts inventory
- New developments for wire rod and bar mills
- Leading-edge technologies for beams, structurals and billets
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