FROM A SINGLE SOURCE

Planning, maintenance or repairs – service provided by the SMS group convinces plant operators throughout the world.
In Focus – Service solutions by the SMS group

This issue of the Newsletter reports about current projects of the SMS group, with a focus on the versatile service provided.

In Focus – Service

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Paul Wurth offers solutions for everything to do with the blast furnace

Premiere in Jakarta

Experts of the SMS group presented machinery and services of the company at the Indometal trade fair which took place in Jakarta for the first time. At the exhibition stand, Frank Solomon, SMS Meer (center), and his colleagues demonstrated to Mustafa Abubakar, Indonesia’s Minister of State Enterprises (on the right in the picture), which machinery and equipment of the company is of interest for Indonesian customers. In the future, Indometal is planned to take place every two years. “We were able to establish many new contacts,” says Solomon.
Several plants, including two BOFs, were commissioned at Tata Steel.

To avoid a hold-up of maintenance activities, SMS uses radio-based measurements at the EAF.
High honor

Dr. Heinrich Weiss receives Award of Honor

The government of the Russian Federation led by President Putin has awarded Dr. Heinrich Weiss, Chairman of the Supervisory Board of SMS Holding GmbH, the “Award of Honor” in recognition of decades of outstanding services to Russian-German relations.

This honor is only rarely bestowed on foreigners. It was presented in Berlin on May 2, 2013 by the Russian Ambassador, Mr. Grinin.

The SMS group built up by Weiss has erected numerous metallurgical plants and rolling mills for the Russian steel and aluminum industry over the past 45 years. As early as 1969, when Weiss served as Managing Director of an SMS subsidiary, he negotiated his first major contract for a mining plant in Moscow. In the past ten years alone, the SMS group attracted orders from Russia totaling more than USD 3.5 billion. Furthermore, Weiss dedicates himself to fostering economic-political relations.

SMS Elotherm

I.A.S. acquired

SMS Elotherm has acquired the heating technology specialist I.A.S. Induktions-Anlagen + Service GmbH. With about 120 employees in Germany and China, the company is a world leader in the field of industrial electric heating technology.

SMS Siemag AG

Change on the Supervisory Board

While assuming the Chairmanship of the Supervisory Board of SMS Holding GmbH, Dr. Heinrich Weiss resigned as Chairman of the Supervisory Board of SMS Siemag AG effective September 5, 2013. In future, he will attend to the development of the company as member of the SMS Siemag Supervisory Board. With effect from September 6, 2013, the Supervisory Board of SMS Siemag AG appointed as his successor Dr. Joachim Schönbeck.

Dr. Heinrich Weiss

Dr. Joachim Schönbeck

SMS Siemag AG

Cottin head of SP lines

On May 1, Michael Cottin was appointed Executive Vice President Strip Processing Lines and is responsible for sales. The mechanical engineer has held various positions within the SMS group since 1985. His experience in the field of sales and his product knowledge will contribute to further expanding the global sale of strip processing lines.
Since July 1, 2013, Andrew van Niekerk (in the photo, on the left) has been the new Managing Director of Metix (Pty) Ltd. He succeeds Reinier Meyjes, who had been the Managing Director of the company for ten years. Since 2011, Metix has been a company of SMS Siemag. The South African company based in Johannesburg is active as a plant engineering specialist and equipment supplier for the ferroalloys industry.

The Supervisory Board appointed Harald Rackel as a Member of the Board with effect from April 16, 2013. Active in the company for more than 25 years, he will in the future be responsible for the Strip Processing Lines, Furnace Technology, and Electrics and Automation Divisions.

Dmitrij Medvedev, Prime Minister of the Russian Federation, recently visited the universal rolling mill of OAO Novokuznetsk Iron & Steel. He made very positive comments on the good plant technology of one of the “most modern rolling mills in the world.” The mill has an annual capacity of 1.3 million tons. It has been upgraded by SMS Meer and was taken into operation at the beginning of 2013. OAO Novokuznetsk Iron & Steel is the largest producer of rails in Russia. For the hot rolling section, SMS Meer supplied the rolling technology and the complete mechanical and electrical equipment.

Since May 1, 2013, Bernward Reif has been Deputy Executive Vice President of the Electronics and Automation Division. His main area of responsibility is order processing for hot and cold rolling mills. He has been with SMS Siemag since 2006. Prior to this, he held managerial positions in various plant and mechanical engineering companies. During the past one-and-a-half years prior to his most recent assignment, he was responsible for the E&A Division of SMS Siemag Technology in Beijing as Senior Vice President.
At the press conference on annual results held by the SMS group in Düsseldorf on June 4, 2013, two key events dominated the agenda. First, the announcement that Dr. Heinrich Weiss was going to resign as Chairman and CEO of the SMS Holding GmbH and assume the Chairmanship of the Supervisory Board. Effective from July 1, 2013, Dr. Joachim Schönbeck is Spokesman of the Managing Board of SMS Holding GmbH. The second central topic was the takeover of the majority share in the Luxembourg-based company Paul Wurth. With more than 1,500 employees and 25 subsidiaries, Paul Wurth ranks among the leading suppliers of blast furnaces, coking plants and green technology for metallurgical plants.

SMS group and Paul Wurth complement each other perfectly, as Weiss explained to the representatives of the economic and trade media present at the conference. “Together, we are the only plant supplier in the world covering the complete process chain of steelmaking,” stated Weiss. While Paul Wurth is a leader in the construction of blast furnaces and upstream equipment, SMS Siemag and SMS Meer are leading manufacturers of steelmaking plants, continuous casters, rolling mills and strip processing lines. A second mainstay of the newly acquired company is engineering. Paul Wurth offers consulting, planning, designing and project management services for infrastructure projects, among others in areas such as transport, healthcare and education. An example of these activities is the construction of a railway and streetcar network in Qatar: during the 2022 FIFA World Cup hosted by Qatar, the fans will mostly be traveling to the matches by rail. Paul Wurth continues to operate as a self-standing corporation within the SMS group. Within the group structure, it belongs to the Business Area SMS Siemag.

Customers reluctant to place orders

SMS group: order intake below previous year’s level – sales up.

Dr. Heinrich Weiss assumed the Chairmanship of the Supervisory Board of SMS Holding GmbH, effective July 1, 2013.

WEISS ASSUMES CHAIRMANSHIP OF SUPERVISORY BOARD

After 45 years of development and leadership of the group, Heinrich Weiss decided to step down from the operational business. He assumed the Chairmanship of the Supervisory Board, effective July 1, 2013, retaining the ultimate responsibility for the further development of the SMS group. For the customers, this guarantees continuity in their business relations, which in many cases go back several decades. SMS remains a reliable
partner retaining the structure of a grown family business. The management team, consisting of Burkhard Dahmen, President and CEO of SMS Siemag AG, Dr. Joachim Schönbeck, President and CEO of the Business Area SMS Meer, and CFO Eckhard Schulte, stands for this continuity. Within this circle, Dr. Joachim Schönbeck acts as Spokesman of the Managing Board.

In business year 2012, the SMS group generated an order intake of EUR 3.343 billion, including Paul Wurth. The elexis group, which specializes in automation technology, contributed an order intake of EUR 180 million to the group. Sales generated by the SMS group in 2012 increased by five percent to EUR 3.237 billion. Still unchanged, the main sales markets are the developing and emerging economies. Business with Asia accounted for 43 percent, with Europe (including Russia) for 32 percent, with the Americas for 23 percent and with Africa for two percent. Through the acquisition of the majority share in Paul Wurth, the number of employees in the SMS group, including apprentices, increased to a total of 13,588 at the end of 2012.

COMMITMENT TO GERMANY AS MANUFACTURING LOCATION

Despite a persistent reluctance of our customers to invest, we expect a slight recovery on the market by the end of the year,” stated Weiss. From this, he derived the following forecast for 2013: “Based on the continued high level of orders in hand, and taking into account the effects of the first full year of consolidation of the Paul Wurth group this year, we anticipate a modest increase in sales compared to 2012, but a decline in profit.” To maintain its high quality level, SMS remains committed to producing the most complex components of its machinery and plants in Germany. That is why the company invested heavily over recent years in expanding and upgrading its German facilities in Hilchenbach and Mönchengladbach. Yet, parallel to these measures, it expanded its production capacity in China. Here it is mainly about better customer service locally as well as special products designed for the Chinese market. These can be produced at lower prices locally. According to Weiss, the availability of highly qualified personnel in Germany is a competitive advantage that outweighs the disadvantages of Germany as an industry location. “In addition to its focus on technological development, SMS will increase its investments in the field of vocational and on-the-job training,” explained Weiss. “The budget allocated to these activities has been raised.” Heinrich Weiss sees the strong commitment to HR development as a contribution to the competitiveness of the group. “Through this, SMS continues to adhere to its principle of supplying best-quality innovative products made by a highly skilled staff,” he adds.

»TOGETHER, WE ARE THE ONLY PLANT SUPPLIER IN THE WORLD COVERING THE COMPLETE PROCESS CHAIN OF STEELMAKING.«

Dr. Heinrich Weiss, Chairman of the Supervisory Board of SMS Holding GmbH
42,000

The outer shell of the Olympic Stadium in Beijing consists of 42,000 tons of steel. China currently generates much more CO₂ per tons of steel than Europe. There’s plenty of scope for savings here. That was revealed by an Ecoplants conference held by the SMS group in Beijing.
Addressing more than 200 representatives from the worlds of industry and politics, experts from the SMS group presented the ecological and economic advantages of Ecoplants solutions for the operation of metallurgical plants. What makes Ecoplants so attractive is the combination of reduced operating costs with lower emissions.

The SMS speakers presented solutions from the entire metallurgical process chain – from pig iron to finished plate, strip, and tubes.

The Vice President of the Chinese Chamber of Commerce, Yao Wenping, underlined the importance of sustainable development for the People’s Republic of China. “The level of environmental pollution is a serious problem! That’s why China is looking for ways to build a green society. We must save resources and reduce emissions in the metal processing industry. Through this seminar we will benefit from the experience of the SMS group so we can make our production plants cleaner.”

In his opening speech, Dr. Joachim Schönbeck, Spokesman of the Managing Board of SMS Holding GmbH, explained the necessity of linking economic and ecological aspects in both the global and the Chinese steel industry. For each tons of steel produced in China, 3.4 tons of CO₂ are generated, while the figure in Europe is just 2.0 tons. “These figures show how large the potential is for avoiding emissions using the technology already available,” said Schönbeck.

Ecoplants systems from the SMS group offer significant benefits for customers all over the world. To decide whether a plant deserves the Ecoplants name, SMS examines the entire manufacturing process. From the input of raw materials to the consumption of energy and operating materials, from the reduction of emissions to improvement of the recycling rate, all stages of metallurgical production are analyzed and improved. Schönbeck said: “This holistic assessment of processes improves our customers’ plants, efficiency, and productivity and also makes a considerable contribution to environment protection.”

**INNOVATIVE GAS CLEANING**
Participants interested in the topics “Steel and Iron” or “Flat Products” subsequently attended the individual presentations given by Dr. Christian Fröhling of SMS Siemag. Mr. Fröhling reported on innovative gas purification procedures for BOF (basic oxygen furnace) processes in converter steelworks. He focused on a newly developed, patented method: the Hydro Hybrid Filter System, which is suitable above all for revamps of BOF plants. It meets even the strictest environmental regulations – at a very low investment cost.

The Chinese visitors were especially interested to hear that the clean gas dust content of older BOF plants is usually significantly above 30 mg per cubic meter of exhaust gas. The innovations from SMS Siemag ensure compliance with even the much tougher limits anticipated in the future.
“None of our competitors in China can match our results,” said Fröhling. “An EU directive already limits the clean gas dust content to 20 mg. With our new systems, we guarantee 10 mg. That means Chinese steel producers can be sure they remain below statutory limit values with our new plants, even in the future.”

**COST-SAVING SMELTING IN THE EAF**
In another talk, Fröhling explained ways of recovering energy from waste heat in the EAF smelting process. The major innovation from SMS Siemag here is our Compact Boiler.

The newly developed, two-stage system recovers energy in two stages. In the first stage, the exhaust gas is directed into an afterburning chamber with a rapidly expanding cross-section, followed by a cooling section. The gas is cooled there to approx. 600 °C. In the second stage, the waste gas cools down in a vertical boiler to 200 °C. During this process, the heat is transformed into steam which the plant operator can then use for various purposes. A further development is the combination of the two stages to form a Compact Boiler. On the one hand, this reduces the footprint, and on the other hand it increases the effectiveness of the boiler.

Positive side effects are the avoidance of acid corrosion because the wall temperatures are significantly higher than the sulfuric acid dew point, plus drastically reduced abrasion because the rapid cross-section enlargement quickly and dramatically reduces the speed of the gas flow. To maximize cost savings and environment protection, the SMS group also supplies the ideal energy management system: the X-Pact® Energy Advisor. For example, it shows the operating personnel the energy efficiency figures for the plant in real time. According to the principle “observe, control, optimize,” plant operators can act to cut costs and reduce emissions.

Mauro Milocco of SMS Concast Italia presented the CONCHARGE® scrap pre-heating process. This process combines a number of specially developed transport units that mix the scrap progressively while it is simultaneously pre-heated using exhaust gas from the electric-arc furnace. The more efficient heat transfer raises the scrap temperature.

Milocco also presented the patented Condoor® system from SMS Concast. This is a fully automated slag door that ensures energy savings of up to three percent and reduces both the amount of carbon injected and the electrode consumption. It simultaneously improves process reliability in the furnace.

Dr. Horst Kappes of Paul Wurth also showcased Eco-plants solutions for steelmaking. Apart from energy-efficient and green innovations such as the SOPRECO® pressure regulation system, Kappes explained to the audience a genuine SMS group highlight: the EFA™ process.

“EFA from Paul Wurth is a milestone for environment protection in the steel industry,” said Kappes. “Our exhaust gas cleaning solutions for sintering plants help prevent...
emissions with optimal utilization of reagents.” Furthermore, EFA™ technology gives plant operators the option of choosing cheaper raw materials with a higher sulfur content. That saves a great deal of money.

**ECOPLANTS SOLUTIONS IN FLAT STEEL PRODUCTION**

During hot rolling, re-heating the slabs accounts for 80 percent of the energy costs, explained Dr. Karl Hoen of SMS Siemag. To save a major part of this energy, customers can use SMS solutions that have been available on the market for many years. These allow the processing of hot slabs as well as efficient rolling mill operation. Included here is our slab sizing press. In addition to hot charging, economizing on expensive alloying elements by utilizing innovative strip cooling systems from SMS Siemag is the strongest means of leverage for making hot strip production more efficient.

“The CSP® (Compact Strip Production) method from SMS Siemag is an ideal way to combine economic and ecological production with high productivity and excellent strip quality,” said Stephan Krämer of SMS Siemag in his talk on CSP® thin-slab technology.

The recipe for success of CSP® is the direct linking of casting and rolling. Compared to conventional hot strip mills, plant operators reduce the operating costs up to 40 percent. Because there are fewer process stages, the investment costs for CSP® plants are lower.

In cold rolling and strip processing, which together account for approx. Ten percent of total energy consumption in steelmaking, thermal treatment in the form of soft annealing uses up the largest share of energy.

Yet, as Hoen explained, there is also potential for savings in the cold rolling process. For instance, modern emulsions make it possible to considerably reduce friction in the roll gap. Depending on the product, that offers energy savings of up to 30 percent.

Another highlight presented by Hoen was the ECOLub wet skin-pass roll system. It doubles the service life of the rolls, prevents pressure marks on the strip, and cuts energy consumption. The economic benefit: cost savings of up to EUR 200,000 per year compared to conventional wet skin-passing mills, even before accounting for the fact that a much greater share of products can be wet skin-passed more cheaply.

The SMS group also supplies green solutions for aluminum and long products. In his talk, Dr. Karl Hoen underlined the fact that the key to efficient aluminum production based on CSP® is an ideal way to combine economic and ecological production with high productivity and excellent strip quality.”

Yao Wenping, Vice President of the Chinese Chamber of Commerce.

150

This hot process, e.g. in a slab sizing press, saves up to 150 kWh/tons, or EUR 5 per tons.
ingots is increasing the yield. Currently, this rate is barely more than 60 percent. SMS Siemag supplies efficient solutions such as specially designed sizing presses, edge heating systems, and intelligent shear control systems to improve this result. Furthermore, Dr. Hoen explained the benefits of the Airwash™ exhaust gas cleaning system. It offers operators of aluminum cold rolling mills a double advantage: They meet even the strictest environment protection regulations and reduce overheads, because Airwash™ filters evaporated rolling oil out of the exhaust air and cleans it so that it can be recycled.

Another expert from SMS Siemag, Joachim Kuhlmann, gave details of solutions for strip processing that enable significant savings in resources. Kuhlmann presented the Ultra-Fast Cooling System for cold strip processing. Due to direct injection of pure hydrogen into the cooling chamber, the system consumes up to 40 percent less electricity. Further positive side effects: Hydrogen consumption is slashed and the high cooling rates mean it is no longer necessary to add alloying elements to certain steel grades.

The presentation by Günther Wimroither of Hertwich Engineering tackled the issue of economic and ecological advantages in the melting of aluminum scrap. This is where the highly efficient Ecomelt furnaces from Hertwich Engineering make all the difference. That is because they consume much less gas than conventional smelting furnaces. That not only saves energy, but also cuts CO₂ emissions. Furthermore, the immersion melting process reduces metal losses to significantly below three percent, which increases the yield even more.

EFFICIENT MINIMILLS
Paolo Cancian from the SMS minimill team explained how these integrated mini steel mills can be made even more sustainable. “Our business partners continuously challenge us to develop new technologies,” said Paolo Cancian. “The tough, dynamic competition on the global steel market...”

The ECOLub system achieves cost reductions of up to EUR 200,000 per year compared to conventional wet skin-passing mills.
demands ever more effective cost reductions combined with better quality and higher operating flexibility. And environment protection is also an increasingly important factor. That’s why we’ve expanded our range to include CMT™ (Continuous Mill Technology). SMS Meer, SMS Concast, and SMS Eltherm have systematically improved the basic minimill concept. The result: lower energy consumption due to direct connection of the rolling mill to the steelmaking plant. The key technology here is INVEX®, a new mold system developed by SMS Concast. It makes high casting speeds and direct transfer of the billets to the rolling mill possible. This makes reheating furnaces superfluous. Instead of oil or gas-fired furnaces, the system uses an inductive heating plant or alternatively a gas-permeable burner to equalize the temperatures in the cast billet, ensuring perfect rolling conditions. Because the entire heating stage is no longer necessary, this results in a significant reduction of both energy costs and environmental pollution. Specifically, a plant from the SMS minimill team saves EUR 11 per meter-ton of rolled steel, generating 72,000 tons less CO₂ per year.

MEERdrive®: CLEAN DRIVE DESIGN
Ulrich Svejkovsky of SMS Meer presented the MEERdrive® drive principle. This development sets new global standards for rolled wire production, opening up scope for vastly reduced investment and operating costs. The basic idea behind MEERdrive® is to replace the high-consumption, high-maintenance group drive of a wire rolling block with individual drives for each stand. That cuts energy consumption by more than 30 percent. MEERdrive® also allows for more flexible calibration and pass schedule design. Furthermore, it is not necessary for all rolls in the block to be machined to the same diameter. The result: a significant reduction in roll pair consumption by up to 60 percent.

The development of our PSM® 3-roll technology is a milestone in SBQ steel and wire production. Svejkovsky explained the technology and its advantages. PSM® enables narrow tolerances and increased flexibility – with reliable, simple, and fully automated control. What makes the low tolerances possible is the hydraulic adjustment with diameter measuring instruments and monitor control. “This is how we achieve better material yields and lower peeling losses,” said Svejkovsky.

SOFT STARTER: FOR COST-SAVING EXTRUSION PRESSES
How can we optimize the energy consumption of extrusion presses? This was the question Hans-Uwe Rode of SMS
Meer answered in his talk about state-of-the-art extrusion press technology. The solution he presented was our Soft Starter technology for main drives. “We can save most energy by switching off all the pumps not currently needed,” said Rode. That’s exactly what the technology from SMS Meer does. During extrusion pressing, the Soft Starter drive automatically switches off all pumps not in operation. Added to this are electric servo drives for all auxiliary functions of the extrusion press. All this reduces the energy consumption by some 20 percent, or around 10 kWh per tons. “As a result, 225,000 kWh of electricity can be saved per year. That’s enough to supply about 160 three-person Chinese households for a whole year,” said Rode.

Now SMS Meer has improved this Ecoplants solution even more with its HybrEx technology. “Our Hybrid Extrusion Press technology goes one step further. Here, the main components of the extrusion press for the rapid movements are also fitted with servo drives, meaning we save up to 35 percent of the energy,” said Rode. In combination with the Soft Starter, this cuts energy consumption by 46 kWh per tons – enough for 400 three-person Chinese households for one year.

**ECOPLANTS FOR COPPER, FORGINGS, AND TUBES**

Three areas, one topic: economic and ecological advantages from optimal utilization of raw materials. Dr. Michael Schwarze and Thomas Winterfeldt of SMS Meer reported on two of the most important technologies for copper processing: CONTIROD® and directube®.

More than 90 percent of the energy consumption of CONTIROD® lines is accounted for by the furnaces for melting the copper cathodes. This was where we identified the greatest potential for optimization. The remodeled furnace is a few meters taller, so the heat is transferred more efficiently from the combustion gas to the raw material. There is also a new drive concept for the combustion air fan with frequency-controlled motors and automated burner control. The result: the oxidation of the liquid copper is minimized and the gas consumption is lower – by more than a quarter, depending on the plant height. Looking at larger CONTIROD® lines, that means more than 10,000 tons of CO₂ per year. “Even more impressive is the reduction in electricity consumption in the rolling mill,” according to Schwarze. “Using frequency-controlled three-phase drives opens up a savings potential of up to 67 percent.”

The high raw materials price is forcing copper tube manufacturers to continually improve their production processes and to respond to market demand for thinner-wall...
tubes. "Low-Ratio Extrusion and directube® from SMS Meer are the only processes that can meet these high demands," emphasized Thomas Winterfeldt in his talk about directube®, the SMS Meer Ecoplants solution for copper tube production. The process directly shapes copper cathodes into tubes. Compared to normal extrusion processes followed by cold pilger mills, directube® saves several work-intensive process stages: pressing, preheating, and one of two intermediate annealing processes are eliminated. Production is more cost-efficient, and the investment costs are much lower than those for alternative processes.

TECHNOLOGICAL PARTNERSHIP TURNS TUBE AND PIPE PLANTS INTO ECOPLANTS

Norbert Theelen of SMS Meer presented the technology partner strategy for seamless tube production. Apart from working on cutting-edge plant construction, SMS Meer has in recent years developed special tools and technologies and has teamed up with customers to adapt these solutions to the specific requirements of their operations.

With innovations such as PQSC® [Premium Quality Surface Coating], LASUS® [LaserUltrasonic], and INCOAT® [In-line Coating], SMS Meer offers operators of both new and already existing tube plants solutions for more cost-effective, greener production. This enhances the tube produc-

Cost-effective: LASUS® measures the individual tube wall thickness without any nuclear radiation source.

46

SMS Meer has installed 46 CONTILOD® lines worldwide (see graphic).

INNOVATIVE FORGING TECHNOLOGY

Efficiency in Forging Technology – this was the topic tackled by the SMS Meer experts Dr. Andreas Lieb and Dr. Serdar Tuncel at the Ecoplants Seminar. Dr. Andreas Lieb presented Ecoplants solutions that save energy, time, and money. "The most efficient way to save energy during the forming process," said Lieb, "is to save material." The key to this is ensuring that tolerances and additions are as small as possible. Lieb presented the Ring Monitoring System from SMS Meer. It monitors the ring rolling process and detects defects during rolling. The scrap rate is much lower than normal, which leads to raw materials savings of 30 percent.
ers’ competitiveness, and is expressed in the SMS Meer principle “Quality Unites.” Take, for instance, PQSC® mandrels. Installed in cross-rolling mills, they drastically cut tool costs because of their hardwearing coating.

LASUS® measures the individual tube wall thickness and does not require a nuclear radiation source. The process combines top efficiency due to improved wall thickness tolerances with safe laser ultrasonic measuring. With LASUS® MultiScan it is even possible to control every roll position in the PQF® plant in real time. That enables operators to further improve wall thickness eccentricity.

INCOAT® revolutionizes the deoxidization method normally used today. It eliminates the entire station and removes the cause of scaling with inline coating during piercing directly in the cross-rolling process. That means there is no need for deoxidization powder, which requires special work safety gear. Added to these advantages are an improved energy balance and a further reduction in production costs.

Michael Stark of PWS wrapped up the third subject block with his talk on efficient welding technologies for the large pipe industry. He presented Perfect Arc®, a welding system that achieves a good CO2 result, low energy consumption, and a constant grid load.

The bottom line: the solutions from the SMS group are cost-effective as well as green – for the benefit of customers and people all over the globe.

www.sms-ecoplants.com
FAST, COMPETENT AND RELIABLE

The service of the SMS group convinces by its high quality which is due to more than 100 years of experience. A worldwide network proves its local presence. The staff is familiar with the plant details and sets technological benchmarks.
Service from one source
The SMS group offers more than spares 20

At a glance
Service worldwide 30

Maximum customer benefit
The TECademy imparts knowledge for the daily routine 38

Service for everything to do with the blast furnace
Paul Wurth assists customers throughout the life of their plants 46
SERVICE FROM ONE SOURCE

Experience, knowledge, local presence: These characteristics distinguish the service of the SMS group companies. The activities are comprehensive and not restricted to supplying spare parts. Via a worldwide network, the SMS group offers solutions to its customers that safeguard reliable and economic operation of their plants throughout the entire life cycle.
When thinking of service activities, many people picture a technician who drives up to a customer with his toolbox, repairs a defective part or system, and after he has finished his work will not be seen by the clients for a long time. This image is outdated and does not at all apply to the customer service of the SMS group. “Our service solutions comprise distinctly more. We accompany our customers throughout the whole life cycle of their plants. Even in times the plant is operating smoothly, we consult our customers on how they can make their facilities run more efficiently,” says Pino Tesè, member of the management Technical Service Division at SMS Siemag. Based on the knowledge of an Original Equipment Manufacturer (OEM), SMS makes sure its customers will remain competitive in the long run.

Whether submerged arc furnaces in Indian steelworks, aluminum rolling mills in China or PQF® tube plants in Brazil are concerned, the service solutions of the SMS group are tailored to the specific customer needs. The range extends from the supply of spare parts over maintenance measures and staff training to complex modernizations. The experts of the SMS group have always one goal in mind: achieving high plant availability at low maintenance costs.

TRUSTING PARTNERSHIP
A target that has convinced a large number of customers, some for many years now. At annual intervals since 1997, the engineers of SMS Siemag have inspected the mill-pinion gear units of a six-stand hot wide-strip mill and replaced defective drive parts at NLMK in La Louvière, Belgium. “We appreciate the know-how of SMS Siemag’s engineers and technicians. And in the course of the years, we have developed a trusting partnership,” comments Jacques Sulmon, Maintenance Engineer at NLMK. On this mill, NLMK produces wide strip which is used in the automotive industry and in the field of building construction. The strip is mainly delivered to NLMK’s subsidiaries in the north of France.

In the stainless steel sector, too, the experts of SMS Siemag provide the customers with advice and support, as for example in the case of a stainless steel Steckel mill at Outokumpu Stainless Oy in Tornio, Finland, which had been expanded by a finishing mill in 2004. SMS Siemag has been responsible for the annual hydraulic inspection of the plant since 2007. “If the hydraulic system fails, the complete plant will come to a standstill,” says Teemu Lomu, General Manager Maintenance at Outokumpu. “We rely on the expertise of SMS Siemag as its specialists know the system best.” Every year now, a service expert travels to the customer’s site and checks the hydraulic system together with Outokumpu to find potential weak points as early as possible.

EARLY is the keyword for an optimum service. And this is exactly
Top: Plant-specific maintenance schedules include checks at regular intervals, here at a horizontal leveler.

Bottom: Imparting knowledge is one of the measures by which SMS employees like Recai Erdem, SMS Siemag, help increase the productivity of their customers’ plants.
where the equipment check of SMS Meer steps in. “We examine the performance and the condition of a plant in detail,” says Friedhelm Bitter, Commercial Head of Business Unit Service at SMS Meer. “Repeated analyses rapidly reveal alterations so that we can submit our customer-specific suggestions for improvement.” For instance, the service experts of SMS Meer analyzed the condition of an eccentric press, type VERK 1600, at Sona BLW Präzisionsschmiede GmbH in Remscheid, Germany. They overhauled the slide, pressure rod and slide guide and modernized the slide adjustment system. “We are very satisfied with the result. Despite the fact that further damaged parts were detected after assembly work had started, the team of SMS Meer managed to adhere to the stringent schedule,” says Stefan Schäfer-Kuhl, Maintenance Manager Mechanical Equipment at Sona.

CONSULTING AND TRAINING
At SMS Meer the service products are divided into the categories MEERcare®, MEERcoach® and MEERconsult®. “The decisive factor is the right mix,” says service expert Bitter. The specialists of SMS Meer prepare maintenance concepts, among others, consult the customers in terms of plant optimization (MEERconsult®), take over warehousing as well as repairs in the case of an emergency (MEERcare®). “The right service concept is essential, but the most important success factors are certainly the staff members and their know-how. Investing therein always pays off. The more knowledge the operating team of a plant has gained and the more details they understand of the processes and machine sequences, the more efficient will the customer produce”, Bitter points out. “Our experts from MEERcoach® provide
The know-how of its staff distinguishes the customer service of SMS.
SmS group newsletter 02/2013

"WE DO NOT ONLY SUPPORT OUR CUSTOMERS WITH OUR KNOW-HOW AND OUR EXPERIENCE, BUT ALSO WITH PRODUCT ADVANCEMENTS AND INNOVATIONS."

Friedhelm Bitter, Commercial Head of Business Unit Service at SMS Meer

many valuable tips gained in practical experience for practical application. The recently conducted training course on rolling modules for the staff of ArcelorMittal Hamburg is a good example."

Training courses are also included in the scope of services offered by SMS Siemag. "In 2010, we established our own customer academy, called TECademy," says service manager Tesè. "Here we conduct trainings on all issues concerning plant operation, including maintenance and technology."

Upon request, courses may be individually arranged with the customer. In 2012, for instance, SMS Siemag trained personnel from the Saudi Arabian steelmaker Hadeed in its Hilchenbach location.

LOCAL PRESENCE DUE TO WORLDWIDE NETWORK

"Our experts will also conduct training courses directly at the customer’s site," continues Tesè. This is ensured by the worldwide SMS network. The locations are distributed over the entire globe – 35 run by SMS Siemag and 25 by SMS Meer. "This network stands for fast delivery of components. In the case of an emergency our service experts will be on the spot shortly," says Tesè. All locations have uniform standards to guarantee high quality. There is a continuous exchange between the development, design and service departments, as this is the only way for SMS to achieve the target of low-maintenance plants – to the benefit of the customers.

"This means that every innovation is checked for its contribution to cutting maintenance costs, for instance," explains Tesè. "It is important that our staff continuously search for further improvements of our products." To be mentioned here are the new procedures in coating technology which, among others, increase the life cycle of mold copper plates. "Our customers have to face ever-growing competition worldwide and therefore strive to lower costs and save resources," adds Friedhelm Bitter, the Commercial Head of Business Unit Service at SMS Meer.
Replacing wear parts at regular intervals belongs to the typical maintenance measures performed by the customer service of the SMS group.
SMS Meer. “And this is exactly what our innovations are aiming at.”

The most recent example by SMS Meer is the variable-speed pump control, VSPr for short, which is used in gap closing presses. Its special feature: The oil pressure is generated exclusively upon system demand, i.e. when it is actually required. Hydraulic systems with VSPr do not need a cooling system or a central hydraulic station with large tank. Expenses for housings or casings and hydraulic cellar plus long pipelines are omitted. All hydraulic components are installed directly at or on the machine in a maintenance-friendly way.

At SMS Siemag as well, innovations are not exclusively aimed at better quality, but also at reduced costs for the customers. The new Sieflex® HT spindle for hot strip mills, for example, is able to reliably transmit more than 50 percent higher drive torques and hence needs less maintenance (also refer to page 124).

CUSTOMER PARTNERSHIP

The companies of the SMS group closely cooperate in all service activities. Hence, the customer will be presented the optimum solution from one source. “We understand the relation to our customers as a partnership. This includes on the one hand the provision of high-quality services and products, at short notice and favorable prices. On the other hand, we do not only stand by our customers with our know-how and our experience, but also with product advancements and innovations,” Bitter sums up the service solutions of SMS.

Knowledge, experience, local presence – throughout the useful life of a plant. More than just a toolbox.
Interview

Customer Partnership

Pino Tesè, Service SMS Siemag, and Friedhelm Bitter, Service SMS Meer, on individually tailored service solutions.

What does service-oriented mean to you?

**Bitter** Service-oriented means that all solutions must be tailored to the needs of our customers. Particular flexibility is required. Nowadays, service does not only mean to be there for the customer, but to jointly develop individual solutions.

**Tesè** The customer comes first. We do not only offer standard solutions from our product range, but respond directly to the customer’s requests. If he wants a service that we have not rendered so far, we will try to find approaches in a common effort.

Service at SMS – what does it stand for?

**Tesè** Service at SMS implies continuity. We accompany our customers throughout the useful life of their plants. This ensures high product quality and productivity in the long run.

**Bitter** We understand the relation to our customers as a partnership. This includes on the one hand the provision of high-quality services and products, at short notice and favorable prices. On the other hand, we do not only stand by our customers with our know-how and our experience, but also with product advancements and innovations.

What are the advantages for customers purchasing a service from the SMS group?

**Bitter** We supply everything from one source. The service is the hub where all threads converge – from the machine via the technology to the service activities. On the basis of such information we strive to find the best solution for our customers.

What are the demands customers have nowadays in terms of service?

**Tesè** They expect high quality, fast response times and all that close to their site. Service must be available around the clock. This is a demand of growing importance, and our teleservice is one of our answers. Via hotline we can be contacted around the clock.

**Bitter** This means that we design a machine, commission it in cooperation with the customer, train his staff, provide him with spare parts, carry out repairs and modernizations when the machine is showing its age and give advice for process optimization. A crucial factor is the advancement of core equipment, our value-added components. The best example is the PQSC® mandrels (also see page 36).

**Tesè** The keyword is process optimization. An essential factor in this connection is our advanced high-performance components which are also suited to increase the efficiency of existing plants.

What objectives do you have for the future?

**Tesè** We will expand our global network to be even closer to our customers. Jointly we will develop new individual solutions and products to strengthen their competitiveness with the aid of our services.
SERVICE WORLDWIDE

SMS Siemag and SMS Meer with their experts offer service in OEM quality. Customers benefit from manifold advantages – worldwide. Some examples from different countries reflect the range of services and the competent service support.

China

Dismantled and generally overhauled

For Dongbei Special Steel, China, SMS Meer Service has given three peeling machines built in 1988 a general overhaul, dismantled them in the Dalian plant in the Liaoning Province, and reinstalled them in the new plant outside the city center. The machines now achieve an improved surface quality and closer diameter tolerances. Falk Rößler, Project Manager at SMS Meer, stated: “Thanks to the modernization of the peeling machines Dongbei Special Steel will be able to meet the increased requirements of its customers in the future.”

China

Exchange of blocks

Where heavy plates are processed, systems like the profile, contour, and flatness control (PCFC) operate with extreme accuracy. Even for more than five-meter-wide hot-rolled plates, the purchasers demand tolerances in the micrometer range. Here, the CVC® shifting system plays a key role. Reason enough for Anshan Steel to decide in favor of original spare parts from SMS Siemag. In its new heavy-plate rolling mill in Bayquan, the customer replaced the existing blocks which will be overhauled in the service workshop in Zhangjiagang.
Nickel ensures gradual cooling, also for the beam blank mold of Jindal Steel and Power in Raigarh. A team of experts from the Bhubaneswar workshop protected the copper plates against high wear by subsequently coating the initial chromium faces of the copper plates with nickel. The layer thickness need not exceed 0.5 to 1.0 mm. Other service specialists were engaged in activities at a more than 20-year-old coil box at Tata Steel Ltd. in Jamshedpur. The lasting heavy loads had detached the anchoring which was replaced by a team of SMS and Tata staff within one week only.

For the purpose of improving product quality, ArcelorMittal Dofasco, U.S.A, entrusted SMS Millcraft with the modernization of two continuous casters manufactured by other suppliers in the years 1987 and 1996. The copper plates were provided with the ceramic-metallic mold coating UniGuard®. “Since that time, we did not only observe less mold wear, but also noticed an essentially reduced number of inadequately filled corners,” says Dan Rudle, responsible for the facilities in ArcelorMittal Dofasco’s Works No. 1.

High availability and efficiency of plants are the basic requirements for competitiveness. To discover potential defects as early as possible, SMS Meer developed machine-specific equipment checks. One of the companies relying on this procedure is Uralskaja Kuznitsa OAO in Tchebarkul, Russia. At regular intervals, the machine technology is individually analyzed with regard to its condition and critical points. SMS Meer describes improvement potentials, prepares detailed service reports and, in the case of need, recommends spare parts or modernization measures.
Fresh power from the substitutes’ bench

The targeted use of maintenance budgets reduces operating and maintenance expenses. SMS Siemag and SMS Meer accompany their customers throughout the entire lifetime of all production lines. “Being a system supplier we are able to provide all required parts from one source,” says Viola Frenyo, Member of the Management Service Division at SMS Siemag. In addition to standard and catalog parts, SMS supplies major spare parts such as gear units and coiler mandrels. Customers benefit from premium quality and short delivery periods. “The delivery time for electrical spares may be less than four hours,” says Jan Heimann, General Manager Spare Parts at SMS Siemag.

INDIVIDUAL WAREHOUSE MANAGEMENT
In coordination with the customer, SMS experts prepare individual stock-keeping concepts. “If so desired by the customer, we will invest in the spare parts inventories and operate the store. Such solutions have been implemented for several customers worldwide,” says Heimann. In Bahrain, too, SMS Meer took responsibility for the spare parts management and warehousing for the minimill of United Steel Company. “This concept of safeguarding spare parts supply offers an all-round carefree package. The customer concentrates on his core business and SMS Meer takes care of the rest,” explains Dr. Dirk Oedekoven, Head of Product Management Service. Frenyo points out another advantage of the SMS spare parts service: “We closely cooperate with the design and development departments. Advancements directly benefit our customers.” To give an example: the new flat-neck spindle with oil-air lubrication system to extend the spindle life. It has been operating successfully at Ilsenburger Grobblech GmbH for some time. “Our advancements and adaptations of spares to suit new market requirements undergo stringent quality controls,” says Frank Jansen, Head of Spare Parts Service at SMS Meer.

A further point is the overaging of spare parts. SMS Siemag and SMS Meer both supervise the availability of units and systems on the market on behalf of the customer. This service is particularly important for electrical components with a short product life cycle. If such a product is no longer available, SMS will search for alternatives and place them at the customer’s disposal. “If the components can no longer be procured we will accumulate spare parts inventories to safeguard operation of the customers’ plants,” says Heimann.

The spare parts service is not limited to delivery. SMS experts render support on site for installation and removal of the parts as they know the plant best. The advantages are short downtimes and a reliable restart of the facility. “And in addition, we give valuable advice for maintenance,” adds Heimann, “that help plant operators continue to focus on their core business.”
MORE RELIABILITY FOR REPAIRS

To improve all relevant processes involved in service repairs, SMS Siemag established a separate assembly area in Germany.

In its German workshop, SMS Siemag had carried out repair work parallel to the assembly of new equipment until quite recently. The opening of a special repair center paves the way for a best possible repair service. Frank Benfer, Head Spare Parts Department Technical Service, says: “We are in a much better position now to tackle the challenging repair work immediately and to its full extent.”

FIXED CONTACT PERSONS
A team of skilled and experienced service experts and technicians represents the core competence of the workshop. Fixed contact persons support the customers. Repair coordinators continuously check the state of projects and orders which are readily available. Since these specialists have exact knowledge of the customer wishes they are able to flexibly respond to special requirements or processes. The project manager prepares a repair history for the core components giving quick information on the reconditioning work already performed. SMS Siemag repairs the complete range of core components. The experts are in close contact with the development and design departments. SMS considers new approaches in their planning phase and offers its customers innovative solutions. Viola Frenyo, Member of the Management Technical Service Division, comments: “With us the customers will be able to maintain their plants on a sophisticated technical level. Our repair team can draw on the high degree of expertise available throughout the whole group. Technical innovations will be integrated if so requested by the customer.” These items are not considered by other companies. SMS offers more than just a one-to-one repair, which is particularly important nowadays since many companies are continuously reducing their maintenance staff. Very often, this is combined with a loss in professional competence.

Tailor-made frame contracts offer the customers further advantages: Stock-keeping of critical spare parts prevents long times of delivery and allows precise deadlines to be set. These special parts are readily available in the repair center. Thus, SMS can quickly carry out even unplanned repair work.  

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Core components
By core components SMS means all parts that contribute to factors like quality or reliability in the plant and/or the repair of which requires a high degree of technical know-how.

- Coiler mandrels
- Hydraulic adjustment cylinders
- Drive spindles and gear units
- Roll chocks
- Rolls
- Drum-type shears
- CVC® bending and shifting blocks
- Eccentric shaft units
Coatings

Special coatings prolong the longevity of components. Important applications include the coating of copper plates (continuous casting molds), chromium-plating of work rolls (cold rolling) and the coating of sink and furnace rollers in strip processing lines.
Special coatings for longer service lives

Coatings applied to rollers and molds help reduce operating costs and increase the product quality.

There is fierce competition between the operators of steel-making and rolling plants. Only those operators who continuously maintain, refurbish and optimize their plants by servicing key equipment on a regular basis can stand up to this competitive squeeze. The coating of plant components such as rollers or molds prolongs their service lives and helps to assure the product quality. For this, the SMS group with its worldwide service centers is the ideal partner.

SMS Millcraft, which is part of the service network, has many years of experience in the coating of plant components. Thanks to this know-how, which is available at all service centers of SMS Siemag, it is possible to give equipment parts crucial to product quality a finish that makes them more resistant to wear.

For example, in order to extend the life cycle of a mold plate, the plate surface must be given a wear-resistant surface. By electroplating, nickel or a nickel-cobalt alloy is applied to the surface in an electrochemical process. The resulting wear-resistant coating gives the material a high surface quality and superior antifriction properties. A mold with such a coating attains an up to 30 percent longer life.

A breakthrough development in this area is the UniGard® process, which achieves hardness values higher than 1,000 HV. The surface coating applied by a computer-controlled high-velocity oxygen fuel (HVOF) process is mainly made up of tungsten carbide (WC). The result is an extremely hard, heat- and wear-resistant plate surface, doubling the longevity of an uncoated mold. The maintenance effort decreases, while the production capacity is markedly raised.

FOR EACH COMPONENT THE RIGHT METHOD
SMS Siemag also offers modern processes for applying coatings to the surfaces of rollers and rolls. From build-up welding of segment rollers through to the coating of work rolls for cold and hot rolling mills and rollers in strip processing lines, SMS Siemag offers the optimum method for each component. For segment rollers, different submerged-arc welding techniques, particularly suitable for long rollers, are used. Also here, the objective is to prolong the service life and reduce maintenance costs in the process through a harder material surface. This cuts operating costs, minimizes downtimes and improves the strip quality. The same applies to rollers in downstream strip processing lines.

For work rolls, chromium plating is the surface coating of choice. The hardness, corrosion-resistance and the resulting low abrasive wear of chromium-plated surfaces extend the service life four times over.

NEW SPECIFICATION FOR FURNACE ROLLERS
Sink rolls in the zinc bath of continuous galvanizing lines should always have a smooth surface to avoid marks on the strip. Also for this application, SMS uses HVOF-applied tungsten-carbide coatings. The benefits are higher hardness values, low wear and high resistance to corrosion.

For the constantly growing demand for AHS (Advanced High Strength) steels, SMS Siemag offers a newly developed specification for furnace roller coating. The excellent properties of this coating avoid the occurrence of adhering manganese and silicon. The McrAlY coating, which is sprayed on in a thermal process, leads to an obvious minimization of this phenomenon. Additionally, it reduces roughness and hardness losses on the rollers and improves the strip guiding properties. All these advantages result in an increase in production capacity. No matter which coating process offered by SMS Siemag is used, it will always translate into direct value added for the customer. The increase in productive times and fewer downtimes resulting in direct cost savings and a higher product quality safeguard competitive advantages.
PQSC® plugs in use
Tenaris Mexico

In practice PQSC® piercing plugs are already being used by customers around the world, for example at Tenaris. Tenaris, leading supplier of tubes and related services for the world’s energy industry, is already using PQSC® piercing plugs in its PQF® (Premium Quality Finishing) plant in Mexico. “We are achieving great results. With this technology, we are able to produce in a cost-effective and environment-conscious manner. At the same time we can ensure high tube quality over the long term,” says Miguel Ladron de Guevara, Operations Director from Tenaris.
Premium technology for premium tubes and pipes

With PQSC® piercing plugs from SMS Meer, tube manufacturers produce high-quality, resource-efficient products.

PQSC® stands for Premium Quality Surface Coating – and it does what it says: PQSC® piercing plugs have a special ceramic coating that increases their service life and results in improved inside tube surfaces.

The first stage in the production of seamless tubes is cross rolling. Here, the billets are rolled over a piercing plug, turning solid steel billets into tube shells. The piercing plugs are subjected to extreme thermal and mechanical loads: during piercing they are surrounded by red-hot steel and need to be able to withstand high frictional forces. PQSC® plugs from SMS Meer are designed such that they can endure stresses for a particularly long period of time. As a result, tube producers save on tooling costs and can increase the productivity of their entire plant. Product quality is improved, too: PQSC® piercing plugs are able to meet the exacting requirements to ensure outstanding tube quality. “In a direct comparison with conventional piercing plugs, the PQSC® plug used to date has attained a service life that is approximately ten times longer, for example when piercing materials containing 13 percent chromium. Customers save both time and money using our plugs,” says Product Manager Manfred Topüth from SMS Meer.

Customers can see for themselves how it performs: “We offer our customers a comprehensive advisory service and sample plugs for test rolling. Our experts are also on hand during the test rolling if need be,” explains Mr. Topüth. “We optimize the entire system jointly with the customer. Depending on their requirements, we are able to manufacture PQSC® plugs of various sizes, contours, and coatings.”

Tube producers can produce perfect results when the PQSC® plugs are used in conjunction with the appropriate PQSC® cooling system. The cooling unit is adjusted to the temperature curve in the plug and can achieve a maximum cooling capacity with a minimal cooling period. The service life is again increased considerably as a result, meaning greater cost benefits.

LONGER SERVICE LIFE

The high-quality ceramic coating on the PQSC® plugs provides a stable, compact protective layer tailored by SMS Meer to meet individual customer needs. Consequently, the plug can meet the exacting requirements to ensure outstanding tube quality. “In a direct comparison with conventional piercing plugs, the PQSC® plug used to date has attained a service life that is approximately ten times longer, for example when piercing materials containing 13 percent chromium. Customers save both time and money using our plugs,” says Product Manager Manfred Topüth from SMS Meer.

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A mere two years after the foundation of the Tecademy as seminar and training academy for the worldwide metallurgical and rolling-mill industry, the list of satisfied customers is long. The underlying idea of combining the process know-how of SMS Siemag, customer relations and plant familiarity of the company’s own instructors to a practice-oriented training concept seems to be working. Within the fields of technology, maintenance/repair and plant engineering, customers may choose from numerous standard training modules.

However, the strength and the future focus of this training facility will lie on individual training units tailored to the customer’s specific requirements as in the case of Bilstein, this fact was proven when scheduling the modules that extended over three months and by the didactic implementation of the contents. In addition to courses in Hilchenbach, some seminars were conducted at the customer’s site. “The training measures have excellently prepared us for operating the plant and included test components for simulation purposes,” Karvan sums up.

ACQUIRED SKILLS ALREADY APPLIED
For both participants the benefit of the Tecademy training was the detailed plant knowledge of the instructors from the respective SMS Siemag Divisions. “We had the opportunity to talk to the persons who had once commissioned the plant. This was ideal and very useful to me for my later everyday work,” said Karvan.

“Especially the practical relevance did us a lot of good. We were given useful tips and learned how to react in the case of an emergency, and what we should avoid when we make changes to the plant. All this could already be applied during a failure that happened in the meantime,” says Stachowicz who would participate again in such a method of knowledge transfer.

Ali Saeed Al-Qahtani feels the same. His employer, Saudi Iron and Steel Company, delegated him to a seminar in Hilchenbach to be trained on the topic “Rolling Technology: Product Quality and measuring methods.” “That was one of the best trainings I have ever enjoyed,” he says, still delighted.

As it combines theoretical and practical training, the dual vocational education system in Germany ranks
Interview

Combining theory and practice

ThyssenKrupp Rasselstein in Andernach, Germany, produces high-quality packaging steel on plants established by SMS Siemag. Dipl.-Ing. Andreas Brauer is responsible for the five-stand cold rolling mill and attended the seminar “Expertentraining für Kaltband” (Cold Strip Expert Training) at the SMS Siemag TECademy.

Herr Brauer, what is it that makes the SMS Siemag TECademy so interesting to your company?

In 2008, SMS Siemag carried out a comprehensive modernization of the five-stand cold rolling mill at ThyssenKrupp Rasselstein. This means that the TECademy instructors have a lot of detail knowledge meeting our technical requirements. That convinced us.

Looking back, what impressed you in particular?

Both the organization of the seminar at the Hilchenbach premises as well as the communication of the contents were well coordinated.

Have you already been able to take advantage from the instructors’ tips and your learning success in daily business?

The way of teaching fundamentals, theoretical knowledge and process modeling as well as application in practice revealed that one is dealing with experts in the field. The participants have the opportunity to delve into many aspects needed for their work, to ask questions and discuss potential daily challenges at the plant. This newly gained knowledge is also helpful in day-to-day routine.

Considering the development and innovations in the plant engineering sector and also the demands on you as a staff member, what do you think are the future topics on the training market?

In plant engineering, technical advancement will be a significant step towards success also in the future. Other important components of training programs should include framework conditions such as occupational safety and environmental protection, legal provisions or energy management.
Customer-oriented with eService

With eService SMS Meer now offers customers the possibility to order spare parts online around the clock in an easy and comfortable way.

A cooperative and trusting relationship with customers was of prime importance already in the concept phase of eService. In dialog with the customers, a program was created satisfying the expectations of modern management. “We expect from our business partners that they are up-to-date, offering us quick access to information about the renewed procurement of spare parts or possible services. Here, modern Web tools are a must. We are very pleased to see that SMS Meer is undertaking necessary steps to continue to be ahead of time.” These were the first reactions from customers in the American market, encouraging SMS Meer in its intentions.

Apart from the considerations with regard to a user-friendly system, SMS Meer has also integrated the various function areas within the organization of the customer. Specific functions were planned and implemented offering added value to individuals with different responsibilities. This includes for example the areas maintenance, purchasing, and also general management. Via a personalized display, the customer may look at service reports of previous maintenance and servicing measures. Future inspection and maintenance measures as well as a machine-specific demand for spare parts can be effectively planned for the long term. Purchasing will also benefit from this. Machine drawings and parts are interlinked enabling the customer to find the required parts quickly. He can see information on parts availability and dispatch status at a glance. “The decisive factor for us was to develop relevant competence-specific functions to help our customers to work more efficiently,” stated Gary Olden, Vice President Spare Parts Service. The consistently positive feedback of the initial users shows that Olden and his R&D team are right.

@ ONLINE
Customers interested in SMS Meer eService can register under the following link: http://eservice.sms-meer.com

SERVICES
The online program is shown in the table below:

- User-friendly system/interface building on experience with B2C eCommerce systems
- Practically oriented solution to quickly identify and order required parts from SMS Meer and other renowned vendors
- Access to key information such as assembly drawings, bills of materials and recommended spare parts
MEERcoach® training on mill moduli

Within the framework of a MEERcoach® training, four employees from ArcelorMittal Hamburg, Germany, participated in a two-day training course in the workshop of SMS Meer.

Proper handling of mill moduli of the CL 200 type was the focus of this hands-on training. SMS Meer’s trainer Ayan Ascioğlu shared the plant manufacturer’s know-how with the experts from Hamburg. Installing plain bearings, assembling roll shafts, completing mill modulus housings with roll shafts, measuring bearing clearances — these were just some of the issues clearly communicated by him. The issues also included fundamental principles because mill moduli not only determine the diameter of the rolled stock but are also essential for the quality of the end product. Without proper maintenance and servicing of the components not only quality problems may arise — but in the worst case, a total failure of the plant may happen.

With proper know-how gained during a MEERcoach® training course, interested members of customer’s staff — in this case from ArcelorMittal — are able to effectively prevent these undesirable surprises. Dipl.-Ing. (FH) Sören Hische, Plant Manager at ArcelorMittal, was impressed: “A top training conveying in-depth knowledge. In our Hamburg plant, mill moduli from SMS Meer have been in use for decades.” Friedrich Kauz, a participant from ArcelorMittal, said: “Personally, I really enjoyed getting to know different methods of work.”

A very positive feedback from the participants was the main reason that also ArcelorMittal Ruhrort has already requested a mill modulus training course.
Even at a pump pressure of 680 bars the wedged vessel did not move.

Removing a 4,500 mm-wide trunnion ring segment was inevitable.
CHALLENGING CONVERTER REPAIR

An impending converter failure in the works of Tata Steel Europe in Port Talbot, Great Britain, required fast and comprehensive repair activities.

The service staff of SMS Siemag successfully repaired a converter in the Port Talbot works of Tata Steel Europe. In January this year, Tata started operating the converter again after works engineer Stephen Dawson had first contacted the technical service of SMS Siemag because of bearing problems on the suspension in March 2012.

Due to the imminent commissioning of the new blast furnace, the supply of a completely new system was out of the question to Tata. The company considered several methods of avoiding that step, either by correcting the distortion of the bearing through mechanical machining, by using bearings with greater tolerances, or by turning the ring.

HARD BUT RIGHT DECISION
The management of Tata asked SMS Siemag for a local inspection, which was carried out in May 2012. “Although in the beginning we found it difficult to accept this proposal, since the bearing supplier had been on site several times, it turned out to be the right decision.”

The records of the SMS experts illuminated the dimensions: “The long-lasting use of the converter has left clear marks. High temperatures were transferred from the vessel to the trunnion ring and its suspension. There is a high risk of a vessel crash.” The report of our experts showed that Tata would have to adjust and newly fasten the trunnion ring without delay. We responded immediately,” explains Dr. Thomas Germershausen, Member of the Management Metallurgical Plants Division.

Tata decided in favor of the lamella suspension system usual in converter systems today. Due to the fact that SMS had immediate access to raw material it was possible to design, engineer, manufacture, and supply the new suspension within a mere ten weeks. In the course of the disassembly work it became clear that the vessel, too, had strong deformations. Trunnion ring and vessel were in contact, partly over a width of 1.5 meters. Even a pump pressure of 680 bars could not move the wedged vessel. SMS recommended adapting the segments. The experts discovered damage at the fillet welds of the bulkhead plates and a long crack in an important web plate. Some wall thicknesses were severely washed out.

Shift teams consisting of welders from Rowecors and an SMS welding specialist provided the comprehensive repair work. In November, after approval by SMS, Tata continued correcting the neck position and placing the lamella suspensions. Deformations made the installation of the lamellas very complicated. After all measures had been completed and all welds checked, Tata heated the vessel in January this year, and the converter resumed operation.

PLEASED ABOUT THE SUPPORT
“The last few weeks and months have cost us lots of energy. We are so glad to have been supported by SMS Siemag in this emergency situation which demanded a good deal of organization, power of endurance and patience, but finally it is done. The converter is ready to go on stream again. Jointly we have gained valuable experience that will be implemented when repairing the second converter,” tells Dawson.

Christoph Häusler, General Manager Technical Customer Support at SMS Siemag: “A converter repair is always a challenging and exciting experience. Many of our customers are facing similar problems. We recommend reacting at an early stage and are gladly prepared to provide advice.”
24/7

The service team of SMS Meer is available for SULB 24 hours a day, seven days a week.

Top: Quick reaction of the service team ensures minimal outages.

Bottom: Availability of spare and wear parts is ensured by three-shift operation.
The newly established service company of SMS Meer in Bahrain has started operations. The personnel headed by Siegfried Gruber look after the complete spare parts management of the new section mill of United Steel Company (SULB) in the Kingdom of Bahrain. From the outset, SULB has opted for this type of warehousing.

Advantage for the customer: no own warehouse, no administrative costs, no payroll costs – and yet everything you need right on hand. SMS Meer is responsible for spare parts availability of all companies involved. This means: warehouse and inventory management of initial reserve of SMS Meer and SMS Concast for all parts supplied as well as warehouse and inventory management for spare parts of partner companies. This ensures high quality of spare parts supply and minimizes the costs for storage.

UNWANTED DOWNTIMES ARE HISTORY
This forward-looking development and implementation of an advanced spare parts supply concept reduces the servicing times and prevents unwanted downtimes. All previously specified articles and parts are available in tested OEM quality (Original Equipment Manufacturer). The availability of spare and wear parts is ensured by three-shift operation of the warehouse. Gruber and his team are available on a 24/7 basis.

The entire warehouse concept was originated in close coordination with SULB. The customer has access to the whole storage system at any time and thus has complete cost transparency. The stock is retrievable online around the clock. SULB is just one of several examples in which the SMS group has assumed warehouse management.

The new service company of SMS Meer in Bahrain takes over spare parts management for the new plant of United Steel Company.
Service range

Paul Wurth offers services for a wide spectrum of areas, which includes raw material handling, cokemaking plants, sinter plants, charging systems, hot blast stoves, pulverized coal injection (PCI) plants, blast furnace plants, blast furnace charging systems, slag granulation as well as all ancillary facilities, for example for water treatment or gas cleaning.

Top: At Paul Wurth, customers are partners.
Bottom: Experienced experts inspect the plant components, here a sealing flap.
Service for everything to do with the blast furnace

Plant building company Paul Wurth assists customers throughout the life of their plants.

Up to 80 meters high, more than 2.5 million tons of hot metal per year and a hazardous CO-containing atmosphere – in the more than 220 plants supplied by Paul Wurth worldwide, working conditions are definitely not easy.

For more than 60 years, Paul Wurth has been building complete blast furnace plants all over the world, playing a decisive role in the development and implementation of both newly built plants and modernization projects. Within the framework of a wide range of services, Paul Wurth has accompanied its customers as a life cycle partner during the entire blast furnace campaign.

For Paul Wurth, service means assisting the customer in tackling technical challenges as a partner by providing solutions and support. The task is to understand andcope with unforeseeable situations, unexpected challenges and customer-specific requirements in cooperation with the customer. This can be done by timely delivery of spare parts, repair of critical equipment on site or in Paul Wurth’s workshops, by refurbishing and modernizing plant and equipment or providing services such as staff training, support during standstills, feasibility studies, process advice or maintenance services.

Within the area of spare parts services, Paul Wurth offers warehouse management concepts, spare part supplies as well as spare part optimization strategies. With its assistance, Paul Wurth helps plant operators to reduce warehousing costs and optimize the spare part management system. In addition to assisting in reconditioning complete gearboxes, the service team can also assist the customer during on-site rebuilds and repairs, for example when exchanging the chute at the blast furnace top, which often may turn out to be rather complicated as the chute must be mounted and dismounted through the gear. The modernization of existing equipment may range from retrofitting a greasing system to the planetary gearbox through to replacing a gearbox with latest-generation equipment.

TAILOR-MADE SERVICE
Condition monitoring systems developed by blast furnace specialist Paul Wurth help the operator to have a clear view of the condition of the plant and equipment and develop preventive maintenance concepts, which have the purpose not only of keeping the equipment running but also of analyzing and deriving knowledge from the collected data. “Our focus is always on the customer. We appreciate our customers’ views and expertise and closely cooperate with them in implementing their ideas and suggestions for improvement,” comments Jochen Burg, Vice-President Corporate Service Paul Wurth.

Paul Wurth is not merely a supplier of equipment and components but contributes solid process understanding and plant operation know-how. This wealth of expertise has been accumulated since the beginnings of the steel industry and as a result of long-standing customer dialogs. The permanent dialog with and experience from a broad customer base form the solid foundations for new challenges. Being an OEM, Paul Wurth is in a position to deliver perfectly fitting parts and solutions on time and to the satisfaction of its customers. All core components and plants are supplied from a single source.

All Paul Wurth’s worldwide staff go through many years of instruction and training. The quality of the plants and machines is checked by functional tests on test rigs.

CUSTOMER INTIMACY
More than 120 employees in 22 countries provide local and direct support to customers. The service teams can rely on a group-wide expert and knowledge network. With development, engineering, manufacture and commissioning competence all under one roof, the Paul Wurth experts can respond quickly and individually to customer requests. Thanks to this global set-up, Paul Wurth is ready to help customers in emergency situations. For example, if a replacement gearbox is urgently needed, Paul Wurth can check the availability of appropriate alternatives and propose solutions.

Paul Wurth operates service workshops in Europe, the U.S.A., Brazil, China and, in future, also in India, ensuring the quality of products, repairs and refurbishments.
Paul Wurth customers wishing to extend, in a cost-efficient way, the availability of their existing plants may take advantage of the Paul Wurth Equipment Exchange Program. This program provides additional operational safety at low cost because reconditioned equipment can be delivered quickly or just-in-time as a preliminary service prior to the delivery of the replacement part.

Since the late 1990s, Paul Wurth has been offering its customers a program for exchanging worn equipment with replacement units. Customers participating in the program may receive, for example, a reconditioned gearbox prior to returning their own gearbox to Paul Wurth for reconditioning.

**THUS THE CUSTOMER WILL NEVER ENCOUNTER AN OUT-OF-STOCK SITUATION**

This provides the customer the flexibility to keep the old gearbox as a back-up for emergencies until the new one has arrived and increases planning security, as there is always a back-up in case of equipment failure. The difference compared to a usual reconditioning service is that the customer is never without a spare part. In other words, he can reduce its spare part inventory as he no longer needs to keep extra parts to bridge the time until the new equipment is delivered.

Last but not least, this will decrease equipment in stock and operating capital. At the same time, the Equipment Exchange Program saves costs compared to the purchase of new equipment.

While, in many cases, the parts to be replaced are no longer of the latest standard, the equipment delivered by Paul Wurth is of the latest applicable state of the art and design. This will result in an increase in output and a longer service life.

Paul Wurth assures the quality by extending the same warranty on that equipment as for comparable new equipment.

NEW FOR OLD

The Equipment Exchange Program offered by Paul Wurth provides customers the benefit of extending the availability of their existing plant and equipment in a cost-efficient way.

**In practice**

Many customers have made use of the Equipment Exchange Program. For instance, at Tata in the United Kingdom and at BlueScope Steel in Australia drive gears of chutes were exchanged, at ArcelorMittal Tubarão, Brazil, and US Steel Fairfield, U.S.A., planetary gearboxes and at ArcelorMittal Vanderbijlpark, South Africa, tilting gears.
When a blast furnace needs to be relined or a longer outage is required for other reasons, it is necessary to evacuate the residual liquid material from the blast furnace immediately after blow-down. Removal of hot metal accumulated in the blast furnace sump below the taphole, called salamander, requires special know-how and must meet the most exacting safety requirements. Paul Wurth has gained this know-how during the execution of numerous blast furnace projects worldwide. This allows the company to offer its customers an unparalleled service package which guarantees timely and safe tapping of the salamander.

A controlled blow-down of the blast furnace and safe tapping of the salamander necessitate careful and thorough preparation. Detailed process and risk analyses are used to guard against the occurrence of any abnormal incidents while the process activities are going on. By means of mathematical models specifically developed by Paul Wurth for this purpose, it is possible to calculate the erosion profile of the hearth lining, precisely determine the position and drilling angle for the additional tapping hole in the blast furnace hearth and check the temperature profiles during drilling.

CONTINUOUS MONITORING PREVENTS EXPLOSIONS
The preparatory phase is followed by the installation of provisional devices at the blast furnace proper. These may include equipment for nitrogen or steam injection into the blast furnace shaft and for efficient water spraying, in order to safely manage the process of bringing the burden material level down to the tuyere stock and maintain safe internal furnace conditions. This process is carefully controlled through continuous stockline probe measurements. Also the gas composition is continuously measured and monitored throughout this process to ensure there is no risk of explosion due to high hydrogen content.

Finally, the additional taphole is drilled. For safety reasons, the taphole is opened by means of oxygen lancing. The residual liquid hot metal is tapped into torpedo ladles.

Tapping of the blast furnace salamander is a challenging task. To deal with this challenge successfully, Paul Wurth offers innovative solutions.

Tapping of the salamander.

Overcoming the salamander

300 tons of residual material were tapped by Paul Wurth in 2012 from blast furnace No. 1 at Ilva’s steelworks in Taranto, Italy. Blowing down the blast furnace and tapping the salamander for an environmental upgrade of the steelworks took just one month.

www.paulwurth.com
Top: Hot repairs in the combustion chamber save time and money.

Bottom: By isolating the area to be repaired, large plants can continue operating.
SAVE TIME AND MONEY

Hot repairs in hot blast stoves cut downtimes of blast furnaces and related costs. Prior to any hot repair, the service team of Paul Wurth prepares for each individual situation.

Hot blast stoves in blast furnace plants achieve very long service lives. Throughout their lives, they are continuously in operation, virtually without any maintenance. However, towards the end of the service life, it may happen that the brickwork of the lining has suffered damage due to wear and/or there may be some problems with the ceramic burners. In order to prolong the lifetime for several more years, repairs may become necessary. Repairs can be carried out under hot or cold conditions.

For repairs under cold conditions, the hot blast stoves must be stopped for a rather long period because, before the repairs, they have to cool down and afterwards heated up again. Consequently, minor repairs are disproportionately expensive and time-consuming. When the refractory lining in the lower part of the combustion chamber, at the hot blast outlet or at the ceramic burner is to be repaired in the hot state, a heat shield is installed via the hot blast connecting pipe. This helps to significantly reduce the time the blast furnace must be kept out of operation and the costs associated with such outage.

An endoscopic inspection provides information as to the extent of the damage and whether a hot repair is possible or not.

Before starting the hot repair, the hot blast stoves are isolated from the rest of the plant and all other openings which are not required for the repair are mechanically or electrically locked. In general, a blast furnace stop of a single day is sufficient. Depending on the extent of the repair and the design concept of the hot blast stove, the heat shield may be installed via the hot blast outlet or the opening of the metallic burner. The heat shield separates the repair area from the remaining part of the combustion chamber, which may remain hot.

READY TO START WORKING IN JUST A FEW DAYS

The collapsible heat shield is moved into the combustion chamber and unfolded from outside of the stove using cooled support beams. As soon as the heat shield is in the correct position, cooling fans lower the temperature in the working area. Due to the small volume of refractory lining in the area to be repaired, it takes just a few days to cool the working area down to an appropriate temperature and start with the repair work.

Depending on the duration of the repair, it may be necessary to run some heating cycles in order to prevent the refractory materials from cooling down below the admissible temperature range. During these heating cycles, the refractory repair is temporarily interrupted and burners are mounted to the heat shield. This procedure is used to prolong the repair time, for example for major repairs such as the replacement of complete ceramic burners. After completion of the repair work, one last furnace stop is required to facilitate reconnection of the hot blast stove to the plant network.

The most critical issues during hot repairs are health and safety. It is crucial that the workers have a good deal of experience in hot repairs and receive dedicated training. Specialized training programs prepare the technicians for the specific project, since each hot repair is unique. For example, they train on a full-scale model of the combustion chamber as to how to install and remove the heat shield. The experienced specialists from Paul Wurth devise specific safety concepts together with the plant operator and the contractor.

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**Stabilized System**

The practice-proven Condition monitoring system Genius CM will in the future work even more reliably and faster. SMS Siemag has perfected its proven product and recently launched a new release of the system.

Genius CM is an instrument for condition-oriented maintenance. Sensors permanently monitor the condition of critical plant components. To prevent failure of these components and the severe consequences resulting from this, the number of customers relying on this type of maintenance strategy is constantly growing.

The upgraded system convinces through features such as easier use, the possibility of mapping highly informative long-term trends and its increased data-processing capacity. Christoph Häusler, Manager Technical Customer Service, describes the development process: “During the last few years, we have been happy to receive proposals for improvement from our customers. We used that time to achieve the best possible results in the long run. Today, we can reap the rewards.”

In cooperation with suppliers and customers, a team of technologists, mechatronics engineers, and software and maintenance experts created the new software and hardware architecture. They made the overall system more stable through the application of new installation methods and modifications in the hardware design.

**Further Developments**

The use of higher-performance units allows data to be recorded along the complete production process. The software processes incoming signals even more efficiently, reducing the overall requirement of data processing capacity. This sets free resources for further analyses while reducing hardware requirements.

The data management accelerates the retrieval and display of analysis results. The visualization features now also include a web-based, dynamic graphical display system. With the cursor, the user may select individual data points. The measured values relative to these points pop up immediately. The system also has a feature to illustrate long-term trends.

SMS also increased the number of selectable default reporting modules. At the same time, reports are freely configurable. The data are instantly processed. Administrator access for adjusting the measuring configuration – for example, by changing the limit values stored in the system – is web-based.

---

Wolfgang Scheffel
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Training for the future

Technicians from Mexico visiting SMS Meer.

Two plant operators of the Mexican company Conticon took part in a MEERcoach® training organized by SMS Meer in Aachen, Germany. To allow the producer of copper wire rod to optimize his CONTIROD® plant, the operators deepened their product knowledge and learned technical details from SMS Meer. An equipment check in Mexico with MEERcare® has shown that: the 28-year-old plant offers more potential and could be more productive.

“The training course was an important experience. To learn about and understand the process fundamentals is a great advantage for us. We are now well prepared for the future,” said Raul Valadez Revilla from Conticon. Lothar Lückhof, Trainer and Designer at SMS Meer: “It is not only important for us to convey knowledge. We also place great weight on the fact that the participants are provided with lasting support.”

Kick-off in India

Further Service Entry Point in New Delhi.

After one year of intensive construction activities at the New Delhi site in Gurgaon, SMS Siemag has opened a further Service Entry Point for automation systems. Here, local service engineers are available to respond to queries from customers based in India. They will place special emphasis on aspects of safety, maintenance and development of electrical equipment.

Via a remote access communication interface provided for in the network, all SMS service experts have instant and secure access to the respective automation systems. Thus, support can be provided on a 24/7 basis. This saves the operator time, especially in an emergency situation. The experts solve problems by combining worldwide tele-service and individual on-site support to best suit the requirements of the customer.

Conference in Houston

Tube and pipe industry in dialog.

More than 250 experts traveled to the Steel Tube & Pipe Conference in Houston, U.S.A. – among them representatives of international tube producers such as TMK IPSCO, JSW Steel and JMC Steel Group. Key subjects included the growing market for OCTG tubes (Oil Country Tubular Goods) in North America, gas exploration from shale (fracking) and an increase of quality requirements in the tube sector. SMS Meer presented the latest technological developments for the manufacture of seamless tubes – for example PQSC® piercing plugs, the LASUS® measuring system and the CARTA® technology system allowing customers to improve the quality of seamless tubes. Moreover, production becomes more efficient and eco-friendly. With more than 20 reference plants worldwide, SMS Meer is one of the leading manufacturers of equipment for the production of seamless tubes.

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@ automation-hotline@in.sms-siemag.com
@ serviceline24@sms-meer.com
CONVINCING PLANTS

Technology from SMS convinces. This is proved by numerous projects around the globe – be it steelmaking plants for Venezuela, tube welding plants for the U.S.A. or filter systems for a three-stand tandem cold rolling mill in China.
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**Hydrostatic pipetester**

Vallourec in Germany has awarded SMS Innse with the supply of a hydrostatic pipe tester for seamless tubes. The new pipe tester will go into operation in Mülheim, Germany, and will also include a pipe drifter unit. The complete assembly of the equipment is also part of the supply package of SMS Innse. Commissioning is scheduled for April 2014.

**Electrode columns**

As strong as a lion

Metix supplied and installed the complete sets of electrode columns for the new "Lion 2" plant currently being built at Xstrata (Limpopo Province, South Africa). The plant, featuring two 75-MVA FeCr furnaces, will be based on Xstrata’s Premus pre-reduction technology. The first furnace, which uses electrode columns for 1,600-mm-diameter electrodes, is planned to go on stream by the end of 2013. Previous projects for "Lion 1" included the replacement of the electrode columns for the two 63-MVA FeCr furnaces along with associated secondary power factor correction.

**New dividing shear**

Only 31 days downtime

After a downtime of 31 days, the new dividing shear at Salzgitter Mannesmann Grobblech GmbH in Mülheim, Germany, commenced operation according to schedule. SMS Siemag supplied and installed the shear including all ancillary and media systems as well as electrics and automation.

**Hot strip mill**

New spindles

SMS Siemag will equip roughing stand R1 of the hot strip mill at Tata Steel UK in Port Talbot, Great Britain, with new flat-neck spindles. With a maximum spindle torque of 7,400 kNm they are designed to match extremely high requirements. The sliding plates of the new spindles will be lubricated by an efficient and eco-friendly oil-air system.

**Order for SMS Innse**

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On May 30, 2013, Northeast Light Alloy Co., Ltd. (NELA) rolled the first strip on its new six-high CVC® plus cold rolling mill. At its production site in Harbin in the Chinese province of Heilongjiang, NELA can now avail of an annual production capacity of 85,000 tons of aluminum cold strip. The technical equipment of the mill is in line with the latest state of the art for premium strip grades and includes CVC® plus, HES and DS (Hot Edge Spray and Dry Strip) systems. The strips have a maximum width of 1,900 millimeters. They are rolled to a final thickness of minimum 0.1 millimeter and used, inter alia, as starting stock for foils.

SMS Siemag

Foundation for new workshop

Close to the city of Bhubaneswar in India, SMS Siemag is erecting a new workshop. In spring 2013, the foundation was laid by Dr. Guido Kleinschmidt, Member of the Managing Board of SMS Siemag (photo: second from right) and Marcel Fasswald, CEO & Managing Director SMS India (photo: right). The new workshop mainly serves to provide the Indian steel market with an even better quality, especially in the steelmaking sector. The opening of the new workshop is scheduled for mid-2014.

SMS Mevac

Premiere in India

Bhushan Steel’s No. 2 steel melt shop at Meramandali, Odisha, India, is the site of the first use of a CAS-OB unit in India. The first hot trial of the unit took place on May 11, 2013. The plant was designed by SMS Mevac UK and SMS India in joint partnership. More secondary-metallurgy topics on page 77 ff.

www.sms-mevac.com

Secondary metallurgy

Order from Metal Ravne

Metal Ravne, which is part of the Slovenian Steel Group (SIJ), has placed an order with SMS Innse and SMS Mevac for the planning, delivery and erection of a secondary-metallurgy center to be integrated into the existing Metal Ravne plant at Ravne na Koroškem in Slovenia. The new facilities will comprise a ladle furnace and a X-eed® 45-ton/60-ton tank degassing unit (VOD/VD). “We decided to choose as suppliers a group of the most distinguished and best global producers of metallurgical equipment, the German SMS group and its subsidiaries SMS Innse and SMS Mevac,” says Tibor Šimonka, President of the Board of Directors of the SIJ Group. Both SMS companies will handle the Metal Ravne order as consortium partners.
Bidut Gosh, Paul Wurth, checking hot blast supply.
SUPPLY FROM A SINGLE SOURCE

In Jamshedpur, India, Tata Steel operates an integrated iron and steelworks with a total annual capacity of more than ten million tons of high-grade flat and long steel products. For the construction and commissioning of its latest production line, Tata Steel relied on SMS Siemag and Paul Wurth as strong partners.

Blast furnace “I”

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful volume</td>
<td>3,814 cubic meters</td>
</tr>
<tr>
<td>Annual production</td>
<td>3 million tons</td>
</tr>
<tr>
<td>Same design</td>
<td>blast furnace “H”</td>
</tr>
</tbody>
</table>

It is basically of the same design as blast furnace “H”, which was commissioned shortly before, in 2008. It is the fourth Paul Wurth reference in Jamshedpur, as also blast furnaces “F” and “G” had been supplied by the company. Blast furnaces “H” and “I”, which come with the latest technological features, rank among the biggest blast furnaces in India.
Top: Twin 170-ton hot metal desulphurization plant supplied by SMS Mevac. Desulphurization is carried out by deep injection of calcium carbide and magnesium powders.

Bottom: The remotely operated deslagging machine allows the operator to safely and efficiently remove the sulfur-rich slag, without leaving the control room.

X-Melt® steel plant

- Two converters for 170 tons of steel each
- Annual production – 2.8 million tons, improved slab quality
- Gears with pneumatic emergency drive, lancing equipment and lining devices for the converters, maintenance-free lamella suspension technology
- Primary off-gas cleaning systems for both converters: Demag wet-type cleaning system Baumco and subsequent off-gas recirculation
- Suction capacity – 270,000 m³ / h
- Secondary dedusting with two electrostatic precipitator units
- Twin-ladle furnace – 170 tons each
Top: Twin-ladle furnace. Here, the chemical analysis is adjusted, guaranteeing attainment of the proper steel grade.

Bottom: SMS Siemag commissioned two BOFs with a maximum tapping weight of 170 tons each, the tilting drives with pneumatic emergency drive, the lancing equipment and the gunning machine. The converters are equipped with the maintenance-free SMS Siemag-developed lamella suspension system.
Tata Steel makes high-grade products on the two-strand CSP® plant. The product mix includes – in addition to carbon steels – non-grain-oriented electric strip, tube grades and dual-phase steels.
Top: SMS Siemag supplied continuous casting plants of the vertical bending type. The process technology provides for a stable production process and a high thin-slab quality.

Bottom: All rolling mill stands feature hydraulic screwdown, work-roll bending systems and CVC® plus technology.
Top: Satisfied with the production: Narinder Singh Malhan, SMS Siemag India, and Hitesh Shah, Head TSC (operation), Tata Steel.

Bottom: The CSP® plant is designed for an annual capacity of 2.4 million tons of hot strip produced in widths from 900 to 1,680 millimeters and thicknesses from 1.0 to 20.0 millimeters.
Top: In the six-stand CSP® rolling mill, the thin slabs are rolled down to final thicknesses ranging from 1.0 to 20.0 millimeters.

Bottom: SMS Siemag supplied all process models and technological controls for all the equipment of the CSP® plant.

**Facts and details of the CSP® plant**

<table>
<thead>
<tr>
<th>Strip width</th>
<th>(900) 950–1,680 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip thickness</td>
<td>1.0–20.0 mm</td>
</tr>
<tr>
<td>Product range</td>
<td>carbon steels, Si steel, tube steels, dual-phase steels</td>
</tr>
</tbody>
</table>
das Werk von SN liegt in der Stadt Ciudad Piar, im Bezirk Bolivar, Venezuela.

Top: Construction team of SN and SMS Siemag.

Bottom: The SN works is located close to the city of Ciudad Piar, Bolivar District, Venezuela.
GREENFIELD PROJECT IN VENEZUELA

SMS Siemag received the order to supply a new steelmaking and processing complex for Siderúrgica Nacional (SN) in Venezuela.

In phase 1, SMS Siemag will supply and erect an electric steel plant with an annual capacity of 1.55 million tons liquid steel, a continuous casting plant and a heavy-plate rolling mill. In phase 2, these facilities will be completed by a ladle degasser (VD) and a Steckel mill for strip production. The scope of supply includes the complete technological equipment, commissioning and comprehensive training for the customer’s personnel.

SN intends to process HBI produced in Venezuela along the complete process chain to plates (356,000 tons per year) and strips (844,000 tons per year). While the major part of the products is planned to be sold on the local market, the steelmaking and continuous casting capacities are also to be used for the production of commercial slabs for the export market.

Together with the customer, SMS Siemag developed the complete plant concept – from the scrap yard all the way to the plate and coil stores. As technology provider, SMS Siemag was contracted to provide the entire basic engineering for all units. This includes the design of all process facilities and logistical systems as well as the specifications for the media supply systems.

Already in 2012, SMS Siemag prepared the complete project planning for the technological foundations, the buildings, the technical infrastructure of the buildings and the higher-level media management in the bays. The work on the foundations started in the middle of 2012. Commissioning is planned for 2015.

The steelmaking plant consists of a 200-ton ARCCCESS® electric arc furnace and a ladle furnace, which ensures that the chemical analysis and the temperature of the liquid steel are always correctly adjusted. The VD ladle-degassing plant features a steam ejector vacuum pump with a suction capacity of 600 kilograms, temperature and sample taking equipment, wire feeding machine and optional oxygen blowing equipment.

The plant is rated for the production of high-quality ULC grades. The VD plant, designed as a twin unit, will in a first stage be implemented as a single VD unit with one tank and one cover car. Provision has been made for everything needed to convert the plant into a twin-unit with an additional over car and a further tank. The EAF will have an input power of 220 MVA and be equipped with an SIS oxygen injection system.

The electric arc furnaces of the ARCCCESS® series operate at high energy efficiency and are equipped with trendsetting burner/oxygen injection technology. This concept ensures high productivity at low production costs.

CONTINUOUS SLAB CASTER

The single-strand continuous slab caster will be made for the production of 180- and 250-millimeter-thick and between 800- and 2,100-millimeter-wide steel slabs.

It will be designed as a vertical bending machine with a radius of 9.5 meters and a metallurgical length of 31.5 meters. The plant will be
equipped with various ISC® modules (Intelligent Slab Casting), which have decisive impact on quality and production. These modules include the hydraulically actuated resonance oscillation system, remote-adjustable narrow mold faces for changing the slab width during casting and position-controlled Cyberlink segments for Dynamic Soft Reduction.

**Steelmaking plant**
- 01 Alloying elements management
- 02 Electric arc furnace
- 03 Ladle furnace
- 04 Vacuum degassing plant
- 05 Liquid steel management
- 06 Repair area for refractory lining
- 07 Gas cleaning plant
- 08 Lab area

Combination with the width-dependent air-mist secondary cooling system and the technological process model Dynamic Solidification Control guarantees that slabs of high internal quality are produced.

**ROLLING MILL**
The 3.8-meter heavy-plate mill will comprise a reheating furnace, supplied by SMS Meer, a descaler, a roll stand with edger, plate cooling equipment, a hot-plate leveler, a walking-beam cooling bed, a double trimming shear and a cross-cutting shear as well as a cold-plate leveler. Designed for an annual production of 356,000 tons, the heavy-plate mill will make plates 3,400 millimeters wide and between 8 and 100 millimeters thick.

The heavy-plate mill will feature a rolling force of 75 MN. It will be equipped with a hydraulic screwdown system, work-roll bending and Morgoil® bearings of the KLX® type. The 24-meter-long plate cooling line will be designed with laminar cooling equipment. Downstream of the hot-plate leveler, the plates will cool down on the walking-beam cooling bed. Before entering the shearing line, the plates will
undergo ultrasonic inspection. The trimming and cross-cutting shears for cutting the plates to size will operate to the rolling-cut principle.

In the second phase, a twin Steckel mill will be added. This will expand the hot rolling mill’s annual production by 844,000 tons of hot strip. For hot strip production, the heavy-plate mill will roll the slabs down to transfer bar gage. Then the two-stand Steckel mill will take over and perform the remaining passes. In the final construction stage, the works will have an annual production capacity of 1.2 million tons.

ELECTRICS AND AUTOMATION
All electrical equipment for the technological units of the steelmaking plant, continuous casting plant and rolling mill will come from SMS Siemag. The X-Pact® automation package will include the process automation (level 1) and the technological process models (level 2). Integration of the production planning system (level 3) at a later stage will provide the capacity to highly reliably plan and control the production processes in the future. Prior to installation at the customer’s site, the automation systems will be tested with the Plug & Work procedure.

The order also covers the provision of extensive training. Some 160 new SN employees will be given training lessons to prepare them for their future jobs. The operating and maintenance teams will, among others, participate in the Plug & Work tests in the SMS Siemag test center where important scenarios will be simulated using the automation equipment that will be installed at SN. The program will be complemented by theoretical lectures and hands-on training in running production plants.
FOUR WEEKS AHEAD OF SCHEDULE

The new submerged arc furnaces at POSCO will produce a total of 20,000 tons of ferro-silicon per year. The first furnace was recently brought on stream.

Electrode types

Pre-fired electrodes are available in different grades and sizes and useable for all applications.

Self-baking electrodes lower the operating costs and are typically used in higher-capacity furnaces for the production of ferro-alloys, pig iron, non-ferrous metals or CaC₂.

Since April 2013, the first of two submerged arc furnaces for the production of ferro-silicon (FeSi) has been successfully in operation at POSCO in South Korea. The plant was handed over to the customer four weeks ahead of schedule. Meanwhile, the customer already issued the FAC for the plant.

With an installed power of 31.5 MVA each, the furnaces will produce approximately 20,000 tons of FeSi per year. In order to provide for the option of producing Si metal at a later stage, the furnaces come with a rotating device for the furnace vessel. The electrode system can be operated with pre-fired carbon electrodes or with self-baking Soederberg electrodes.

The ferro-silicon grades produced in submerged arc furnaces have Si contents ranging between 15 and 96 percent. Grades with higher contents are called silicon metal. The furnaces feature hydraulically controlled electrode columns and high-current lines installed in a low-reactance manner. The water-cooled gas hood is equipped with eight hydraulically actuated furnace doors for poking the furnace charge.

20,000

Tons of ferro-silicon will be the annual production capacity of the 31.5-MVA submerged arc furnaces at POSCO.

@ Rolf Degel
rolf.degel@sms-siemag.com
Copper cleaning

Order for high-capacity slag cleaning facilities.

From Zambia, Metix received an order for the supply of a slag cleaning furnace. Designed for an annual capacity of 200 tons of matte and slag, the Isasmelt furnace, ordered by Kansanshi Mining Plc, a company of First Quantum Minerals, requires high-capacity cleaning facilities. These will come from Metix, which is building a six-inline rectangular slag-cleaning furnace with a transformer rating of 24 MVA for the project. The supply scope additionally includes the charging system, the electrode columns with hydraulic unit, electrics and automation system, the tapping system and the transformer. This project is a technological milestone in copper slag cleaning. The new furnace is scheduled to treat the first slag in 2014.

Full capacity

600,000 tons of Cr-ore pellets per year.

At Xstrata-Merafe’s Rustenburg facilities in South Africa, a chromium-ore sintering plant was commissioned at the end of 2012. The plant was supplied by RB Met, a joint venture of Metix and Royal Bafokeng Holdings. It has an annual capacity of 600,000 tons of chromium-ore sintered pellets. The project included a complete pelletizing and sintering plant, executed by Metix on the basis of an EPC contract. Outotec, as owner of the process, supplied the core equipment and was responsible for the basic engineering. The plant passed the contractual performance tests during the first two months from its start of operation. During the last few years, Metix has supplied a total of six sintering plants to customers in South Africa in cooperation with Outotec. This project underlines again the good and successful cooperation.

Record column

Metix takes part in project in South Africa.

Metix supplied to BHP Billiton the biggest electrode column ever installed in South Africa. It has a diameter of 1,900 millimeters. The FeMn furnace of the Metalloys M14 project in Meyerton, for which Metix supplied the electrode column, is also the biggest furnace of its kind in South Africa. Designed for an annual production of 120,000 tons of ferromanganese, it operates with a transformer rating of 81 MVA. Successful start-up of the furnace was at the end of 2012. Metix is proud of this association with South Africa’s largest FeMn producer and has meanwhile received the handover certificate. Since 2011, Metix has been an company of SMS Siemag. As its core activities, Metix makes facilities for the production of ferro-chrome and ferromanganese.
600 million tons of steel per year can now be produced at DSC.

230-ton converter.

RH-TOP plant in reliable operation.

Thanks to the good cooperation, commissioning went fast and smoothly.
In 2010, converters No. 1 and 2 and the first RH-TOP plant were successfully commissioned at Dragon Steel.

The Taichung works recently saw the commissioning of the third 230-ton converter supplied by SMS Siemag and the second RH-TOP plant supplied by SMS Mevac. The latter will be primarily used for the treatment of special steels for the automotive industry and for the production of transformer steels.

The SMS Siemag scope of supply includes the converter with lamella suspension system, 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, vehicles, ladles and slag pots.

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

SIX MILLION TONS PER YEAR
The steel plant consisting of three converters has been designed for an annual production of six million tons of steel. Dragon Steel Corporation is a company of the CSC Group, Kaohsiung, Taiwan, which is one of Asia’s most important steel producers.
Hebei Puyang Iron and Steel Co., Ltd. (Puyang Steel) has awarded SMS Siemag Technology (Beijing) Co., Ltd., China, the order to supply a medium-slab continuous casting plant for the Wuan City works in the province of Hebei.

The steelmaker is expanding its slab production to include pipe grades, pressure vessel steel, plates for shipbuilding and high-quality carbon steels.

The single-strand slab casting plant is rated for an annual production of 1.2 million tons of slabs in thicknesses from 150 to 180 millimeters and widths from 1,000 to 2,300 millimeters. In the caster design, provision will be made for a future expansion to twin-casting.

SMS Siemag Technology (Beijing) Co., Ltd. is handling the order for the Chinese customer completely in China. The supply package for the continuous casting plant includes the complete plant and process equipment as well as the X-Pact® electrical and automation systems complete with the technological process models (level 2). The plant will be equipped with various ISC® modules (Intelligent Slab Casting), which have a decisive impact on the product quality and the production process. Features such as dynamic soft reduction and the technological process model "Mold Monitoring System" ensure that slabs with high internal quality are produced. Puyang Steel is a leading private steel producer in China.

Hebei Puyang expands its slab production. The photo shows a similar plant.

Slabs between 150 and 180 millimeters thick will be able to be produced.

### Project management in China

SMS Siemag Technology provides customer intimacy by supplying a medium-slab continuous caster to Hebei Puyang Iron and Steel.

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### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
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<td>Annual production</td>
<td>1.2 million tons of slabs</td>
</tr>
<tr>
<td>Slab thickness</td>
<td>150 – 180 millimeters</td>
</tr>
<tr>
<td>Slab width</td>
<td>1,000 – 2,300 millimeters</td>
</tr>
<tr>
<td>Steel grades</td>
<td>tube grades, pressure vessel grades, shipbuilding plate, high-quality carbon steel slabs</td>
</tr>
<tr>
<td>Commissioning</td>
<td>2014</td>
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</table>
Efficient technology

Dry-type electrostatic precipitator for BOF shop.

Jindal Steel and Power Ltd. (JSPL), India, placed an order with SMS Siemag for the supply of an X-Melt® converter shop including a secondary-metallurgy center and comprehensive environmental technology. The plants will be installed at the Angul site in the district of Odisha. Annual production in phase I, which will be based on operation with two basic oxygen furnaces (BOF), is to amount to 3.8 million tons of high-quality steel. The scope of supply will include two 250-ton BOF – each one complete with a gas cleaning and recovery plant – and three ladle furnaces. SMS Siemag provides the system for primary gas cleaning, which SMS ELEX will equip with a gas conditioning tower and a dry-type electrostatic precipitator. SMS Mevac UK Ltd. will deliver a twin-tank hot-metal desulfurization plant and a vacuum degassing plant.

www.sms-elex.com

Powerful components

Modernization after 45 years.

ArcelorMittal Ruhrort, Duisburg, has contracted SMS Mevac to modernize the steam ejector pump system for the existing RH facility (Ruhrstahl-Heraeus process). Now that the facility has been in operation for 45 years, the wall thicknesses of the ejector system have diminished to critical values. SMS Mevac will be replacing the existing steam ejectors and condensers by new, more powerful components. With the new control system for the pump system, it will be possible to reduce steam requirements and thus energy consumption, control steel splashes and increase the pump-down speed. SMS Mevac’s supply scope comprises the mechanical components of the pump system (including engineering and control system) and supervision services during installation and commissioning. Commissioning is scheduled for the 4th quarter of 2013.

www.sms-mevac.com

Order for SMS Mevac

Fujian Fuxin orders VOD plant.

SMS Mevac will supply an X-eed® Duplex VOD facility to Fujian Fuxin Special Steel [part of Formosa Plastics Corporation], based in Zhangzhou, China. The aim of the project is to enable the production of austenitic and ferritic stainless steels. Fujian Fuxin plans to commence production with the new facility in the Zhangzhou works at the end of 2014. The VOD facility will be equipped with two tanks and two vacuum covers, a joint four-stage vacuum pump system with automatic vacuum pressure control (VOD-SC) and a common alloy storage and addition system. To protect the environment, the VOD unit’s vacuum pump system will include a gas cooler and an integrated bag filter system. The scope of supply covers the entire mechanical process equipment as well as the complete electrical and automation systems.

www.sms-mevac.com
SMS Mevac supplied the secondary-metallurgy center to OMZ.
THE DREAM OF SECONDARY METALLURGY

The Russian steel producer OMZ relies on technology from SMS Mevac for the expansion of its secondary metallurgy facilities and the production of anti-corrosion steels with low and ultra-low carbon contents.

Since the beginning of 2012, a ladle-metallurgy center has been integrated into the Kolpino facilities of Russian steel producer OMZ. The equipment was supplied by SMS Mevac. In the interview, Professor Yuri Utochkin, Deputy General Director OMZ, and Vitaly Lotokhin, CEO Forpost Management, explain which objectives OMZ is pursuing with the new facility.

OMZ is a leading metals producer. To which sectors does OMZ supply steel?

Utochkin First of all, OMZ is active in the field of heavy machinery engineering. But also steelmaking has a long tradition at OMZ. The steelmaking capacities were established primarily to satisfy the needs of our own mechanical engineering activities. Our metallurgical production facilities are designed to produce individual, usually heavy forgings and castings, for example for the mining machinery and nuclear power plants as well as the petrochemical industries. All these industries need our special steels.

Our metallurgical production is characterized by a wide range of special steel grades. We produce several hundred different steel grades. The products weigh between 400 and 420 tons. In the future, we will even be able to make ingots weighing 500 tons. Currently, we can make forging ingots of up to 265 tons and castings of up to 150 tons.

Where do you see future markets for OMZ?

Utochkin One of our supply markets is the nuclear power industry. We are currently tendering for the completion of two blocks of a nuclear power plant in Temelín in the Czech Republic. We are continuing our successful collaboration with Rosatom within the framework of a power plant construction in China. We also have projects in India. Further plans concern projects in Vietnam, Turkey, Belarus and other countries.

Another segment of our portfolio is the manufacture of petrochemical containers. For the time being, our activities in this field are limited to the domestic Russian market. But we plan to also participate in the international market with these products.

As far as steel products are concerned, we are active in various regions, including China and Europe. We basically supply all kinds of rolls – the complete range up to 250 tons, from large work rolls through to heavy backup rolls for the rolling mills 5000. We also supply turbine rotors and hydraulic shafts, including latest-generation high-chromium rotors. It would be very interesting for us to supply rings, especially the large ones as used in the manufacture of nuclear reactors and containers for the petrochemical industry. So far we have only made these products for our own companies. For some time, we have been in negotiations with SMS Meer about the supply of a ring rolling plant.

By the way, when we speak about new equipment today, a key issue is how to continue the development of...
»THE NEW LADLE-METALLURGY CENTER FROM SMS MEVAC IS DEFINITELY A KEY PRODUCTION UNIT FOR US. IT BRINGS DOWN THE PRODUCTION COSTS AND INCREASES THE PRODUCTIVITY.«

Yuri Utochkin, Deputy General Director OMZ
the VD/VOD plant. We plan to add a second ladle furnace position in order to be able to produce ingots that weigh 500 tons or more.

**The secondary metallurgy plant is already up and running. How important is this plant for OMZ and how satisfied are you with it?**

**Utochkin** Actually, when I joined OMZ twelve years ago, I had two visions. The first one was to build a modern electric steelmaking complex on the site of the Izhora works. We commissioned the 120-ton electric arc furnace supplied by SMS Siemag – “Demag” at that time – in June 2009, with the help and direct support of Forpost. My second vision was the construction of good and efficiently operating secondary metallurgy facilities. As to my second vision, we produce a great number of alloyed steel grades. Therefore, our goal was to build a plant which provides us with the possibility, firstly, of an efficient secondary-metallurgy treatment process and, secondly, of making corrosion-resistant steels with low and ultra-low carbon contents. The new ladle-metallurgy center from SMS Mevac is definitely a key production unit for us. It brings down the production costs, increases the productivity and guarantees that the required steel grades – primarily anti-corrosion grades – can be produced.

**Lotokhin** Even though we had intensive discussions during the project implementation, we always worked towards a common goal and solution. I highly appreciate the effort demonstrated by project managers like Mr. Teworte. All in all, collaboration with the SMS group was very good, and we have two more high-tech plants now.

**Are there any further plans for the future?**

**Utochkin** I’m convinced that the cooperation between all three partners will continue as effectively in the future. We are very pleased to be operating the largest plants of this type in Russia.

**ONLINE**

Click on this QR code to watch a short video on the OMZ plant: www.sms-siemag.com/qr/omz
35,000

Much of the 35,000 tons of special steel for the hull and the inner struts of the Queen Mary II was produced on plants erected by SMS Siemag.
ONE MATERIAL, COUNTLESS APPLICATIONS

What do pylons and tower blocks have in common? What is the connection between a car and an offshore pipeline? How is it possible that the same material can have so many different properties?

The high-tech material steel is used in a large range of applications. And development is continuing: New steel grades are opening up unimagined opportunities. Low-cost lightweight steels for automotive construction or pipe grades for pipelines that withstand extreme conditions in the Arctic or at the bottom of the ocean – these have been part of the mix for some time. SMS Siemag supplies the necessary continuous casting plants, as shown by numerous references.

One example is Salzgitter. Salzgitter Flachstahl GmbH produces a wide range of high-quality steel materials, mainly for the automotive industry and for pipe manufacturing. With its Continuous Caster No. 4, Salzgitter Flachstahl has expanded its product range once again. In particular the 350 mm gage enables the company to supply slabs for heavy plate production in dimensions that meet future demands and that were not possible before.

Plant No. 4 produces sophisticated micro-alloyed steels, heavy plate qualities, and acid-gas-resistant pipe grades that comply with the standards A PI-5L and H IC. 70 percent of the quality slabs produced are processed hot, i.e. rolled without any preceding quality checking. The circular arc plant has a constant curve radius of 11.5 meters. This design minimizes stress in the strand shell and enables very high surface qualities.

Plant No. 3 at Salzgitter expanded the range of special grades for top degrees of purity and surface requirements, especially for automotive plates. The plant produces high-quality steel grades at extremely close tolerances in terms of dimensions and mechanical properties. It has increased the company’s range to include phospho-rized and special high-strength types, including acid-gas and IF steels.

The first continuous slab caster in Morocco was supplied by SMS Siemag. At Maghreb Steel, Morocco, SMS Siemag has commissioned an electric steelmaking plant and a single-strand continuous slab caster in 2011. The facilities are designed for an annual production of one million tons of steel and will supply the Steckel rolling mill with input stock. The production comprises the manufacture of low and medium-carbon steels and high-strength, low alloy steels for the country’s own requirements and for export. With the new works complex, the customer can cover the entire product range.

SMS Siemag is the expert for continuous casting plants.

Continuous casting history

128 continuous casting plants with a total of 164 casting strands:
That is how many orders SMS Siemag has attracted just since the year 2000. They range from turnkey plants to extensive alterations and revamps. The experience we have gained here goes into every new plant.
»IT IS THE VERY FIRST SLAB TO BE CAST IN MOROCCO. AND WE HAVE SUCCEEDED IN PRODUCING PERFECT SLABS STRAIGHT AWAY. IT COULDN’T HAVE BEEN BETTER. SMS SIEMAG HAS DONE AN EXCELLENT JOB HERE.«

Othman Benmlih, General Manager of Maghreb Steel

from liquid steel to the final product and will thus considerably enhance his capacities and the value-added chain.

The slab plant at Anyang Iron & Steel in China casts an extensive and sophisticated program of steel grades – from high-strength construction steels to pipe grades. Ninety percent of the steel grades are processed hot, guaranteeing cost-effective production of quality hot strip and heavy plates. Here the world’s widest slabs – at 3,250 mm – are cast.

At Peiner Träger GmbH (Salzgitter AG), SMS Siemag installed a continuous caster that can cast either slabs or beam blanks as required. That significantly increases the capacity utilization of the production plants. Peiner can react very flexibly to the market, achieving higher sales. Production on the two-strand combined plant can be switched within 48 hours from the world’s widest beam blanks to high-quality slabs.

INCREASING PRODUCTION WITH CSP®

The CSP® (Compact Strip Production) process developed by SMS Siemag directly links up continuous casting with rolling. Essentially, CSP® plants cast liquid steel into thin slabs that pass through a tunnel furnace for temperature equalization, then go immediately to the rolling mill for processing without roughing.

CSP® is capable of producing all steel grades demanded by the market today. Included here are in particular low-carbon IF and soft steel grades, HSLA steels, pipe grades, dual and multi-phase steels, and silicon grades. Today, the annual production of a CSP® caster is up to 2 million tons per strand. With cast thicknesses of 100 mm and more, these machines can also manufacture high-strength pipe grades.

SMS Siemag is constantly improving its continuous casting technology. The latest example is the BCT® belt
casting plant that SMS developed together with Salzgitter Flachstahl GmbH. The first plant of this type is in the phase of commissioning in workshop at Peiner Träger GmbH. It produces high-alloyed steels such as the HS® (high strength and ductility) grade developed by Salzgitter Flachstahl. These steels offer a perfect combination of good formability and high strength.

They are ideal for automotive manufacturers because their increased strength means they can be used in thinner gauges. They provide more crash safety and individual components are up to 25 percent lighter, which can reduce the total weight of the body by four percent. The rule of thumb is: 100 kg less weight reduces fuel consumption by 0.35 liters per 100 km. That means better fleet consumption and lower CO₂ emissions.

The portfolio is the result of the experiences and successes of SMS customers. Apart from project management, financing, technology, electrics and automation, service, green technology, and resource saving, there is even more: genuine cooperation and mutual trust.

Christian Geerkens
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FACTS AND FIGURES

RANGE OF PLANT TYPES

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Width (mm)</th>
</tr>
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<tbody>
<tr>
<td>Ultra-thick slabs</td>
<td>&gt;340 – 500</td>
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<tr>
<td>Thick slabs</td>
<td>&gt;180 – 340</td>
</tr>
<tr>
<td>Medium slabs</td>
<td>&gt;120 – 180</td>
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<tr>
<td>Ultra-wide slabs</td>
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<td>Combination plants &amp; twin dividers</td>
<td>Slabs / long products</td>
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<tr>
<td>Thin slabs CSP® &amp; CSP® flex</td>
<td>&gt;50 – 120</td>
</tr>
<tr>
<td>BCT® belt casting plant</td>
<td>8 – 20</td>
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</tbody>
</table>

VLB: Vertical Liquid Bending (Vertical bending plant with liquid corh),
VSB: Vertical Solid Bending (Vertical bending plant with solid corn),
VC: Vertical Caster (Vertical plant),
C: Curved Mold (Bow-type plant),
BCT: Belt Casting Technology (Horizontal belt caster)
In vehicles, medical technology, or IT – assistance systems are playing an ever more important role. They warn of accident risks, help overcome physical impairments, or guide users through software installation procedures. They support users and ensure more safety, control, and comfort. Assistant systems in industrial production contribute to higher product quality, productivity, and ultimately to cost savings.

Mr. Geerkens, SMS Siemag has been designing and building continuous casters for more than fifty years. Has the technology become so wide-ranging and complex that operating personnel – in other words your customers – need support?

Yes, that’s true. In recent years we’ve developed many technologies that can influence the process sequence and therefore other parameters that ensure high product quality. And during casting, more data is collected than ever before. All this comes together in the control station, and decisions have to be taken fast: do I continue the process as it is, or should I change something? That really is very challenging. I should also mention that our customers are producing ever higher-quality products on their plants, and that they will continue to expand their ranges in the future. These high-quality products have different requirements, and we have to take these into account. Equally, we have to remember that our customers also want lower operating costs. This is where our Plant Assistants can provide vital support.

How exactly do the Assistants help?
Most of our Assistants help during the production process. Because they are interactive, they can follow the instructions of the user and take over some of the work, while the user is of course always in control. They instantly provide the data on the plant’s operating status that operators need to be able to run the plant optimally. Of course, it’s equally important to us that our Plant Assistants provide direct customer benefits. For example, using them can reduce the risk of downtimes or cut maintenance work.

That really is a wide scope of support. Would you describe an Assistant to us?
The HD (high definition) mold is our Casting Assistant. More reliably than all known measuring procedures, the HD mold helps control the casting process. The heart of the system is the newly developed temperature measuring solution using fiber optics technology. Break-outs and longitudinal surface cracks are detected earlier and more reliably because the operating personnel can observe the casting process down to the last detail. Also available are the X-Cast®LASr, our Aligning Assistant, and ECO-Mode, our Powersave Assistant, along with other assistants we will present and supply to our customers.

Christian Geerkens
Member of the management of the Continuous Casters Division.

Christian Geerkens
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**HD mold –
the Casting Assistant**

The HD mold makes it possible to regulate and control the casting process. The heart of the system is our newly developed temperature measuring solution using fiber-optics technology. Break-outs and longitudinal surface cracks are detected earlier and more reliably because the operating personnel can observe the casting process down to the last detail.

- Innovative fiber-optics technology: faster temperature measurement, significantly higher signal resolution.
- Improved process quality, better slab quality.
- Early recognition of operating problems, more time for operating personnel to react.
- Cost savings due to fewer downtimes, fewer product faults, and less maintenance.

**X-Cast®LASr –
the Aligning Assistant**

With X-Cast®LASr, the Aligning Assistant from SMS Siemag, it is easy to reliably measure and align the strand path. The new X-Cast®LASr Aligning Assistant guides operating personnel through measurements. The measured values are fed directly into the newly developed, user-friendly software, eliminating the risk of transfer errors.

- Innovative laser technology with 3D measurement, processing, and display.
- Seamlessly computer-aided work process for a reproducible, high alignment accuracy ensuring excellent slab quality.
- Time savings during installation and servicing/maintenance.
- 3D design models are used as reference data.
- Capable of mobile use in all continuous casting plants.

**ECO-Mode –
the Powersave Assistant**

ECO-Mode, the Powersave Assistant from SMS Siemag, offers a reduced-energy mode by automatically switching off electricity consumers or cutting back their power to a minimum. Various operating tests have proven that ECO-Mode saves ten percent of the average energy consumption of the selected units.

- Possible cost saving by the energy consumers up to ten percent per year.
- Contribution to energy efficiency and resource-saving plant operation.
- Can be used and expanded at any time.
- Operating philosophy, visualization, and automation developed in close cooperation with the customer.
- Integration into the existing plant automation system is also possible.
The mill housings arriving on site.

### TECHNICAL DATA

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<tr>
<td>Commissioning</td>
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<tr>
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<td>Plate thickness</td>
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A MILESTONE FOR SUSTAINABLE GROWTH

The modernization of the heavy-plate rolling mill of NLMK DanSteel A/S was one of the major projects in this field in Europe.

NLMK DanSteel A/S and SMS Siemag jointly modernized the rolling mill of the Russian-Danish heavy-plate producer in Frederiksværk, Denmark. With a new 4.2-m heavy-plate mill stand, a new hot-plate leveler, and the associated X-Pact® electrics and automation, NLMK DanSteel is now able to provide much wider and thicker plates in better quality than before. This modernization has been one of the greatest investments in a European heavy-plate rolling mill in recent years.

Igor Sarkits, CEO of NLMK Europe, referred to the commissioning as a milestone for the company. “This modernization supports the sustainable growth of our core markets such as shipbuilding and construction machinery and offers great growth potential in future-oriented fields like offshore windparks and offshore oil rigs.”

NEW CVC® PLUS DESIGN

The heart of the modernization was the installation of the modern 4.2-m heavy-plate mill stand with CVC® plus technology, work-roll bending system, and hydraulic adjusting systems, which replaced the company’s more than 50-year-old 3.6-m mill stand. The new heavy-plate stand permits NLMK DanSteel to produce plates featuring widths of up to 4,100 millimeters and thicknesses ranging from five to 200 millimeters. As the very first heavy-plate stand worldwide, the 4.2-m mill stand is equipped with the so-called coaxial CVC® plus system. The new design solution provides for the shifting system to be moved in a vertical direction together with the work roll. This concept comes with a very wide roll gap and is characterized by a simple and robust construction.

The new mill stand completely operates with the X-Pact® electrics and automation by SMS Siemag, which includes energy distribution, drives, as well as the level-1 and level-2 systems. Especially worth mentioning in the field of the technological process models is, besides the Pass Schedule Calculation (PSC), the Profile and Flatness Control (PFC) model which calculates the ideal roll shifting position and the bending force for each individual pass with regard to the rolling force. Thus it is possible to attain very good plate qualities with a minimum of passes.

The new control stand with its ergonomic operator desk offers a perfect view of the rolling operation. The HMI systems are consistently focused on the users’ requirements and provide all relevant information in a clear and comprehensible form.
The stand is driven by two synchronous motors of 7,000 kW rated power each and flat-neck spindles. Thanks to their sturdy design, flat-neck spindles offer a distinctly higher torque capacity compared to other spindle types and also greater operational reliability. For shifting the work rolls, the spindles are provided with length compensation. In addition to the mill stand, SMS Siemag supplied a modern roll shop.

LEVELING AND TRANSPORTING WIDER PLATES
A further new component installed by SMS Siemag is a 9-roll hot-plate leveler. All leveling rolls are adjusted by a purely hydraulic system which allows for the entry and exit rolls to be adjusted separately. The drive is accomplished by three frequency-controlled group drives. The correct adjustment values as well as the drive torques are calculated by the X-Pact® leveling model. This new machine enables NLMK DanSteel to level plates with a thickness ranging from five to 100 millimeters.

CONVERSION WITH NUMEROUS CHALLENGES
The conversion had been intensively prepared in the preceding months. The mill stand and the hot-plate leveler were pre-assembled and tested in the SMS Siemag workshop in Hilchenbach. Furthermore, SMS Siemag tested the complete X-Pact® electrics and automation systems in its test fields to the Plug & Work principle in advance. This opportunity was used to train the operating and maintenance staff by simulating the relevant important operation and maintenance scenarios.

Part of the new switchgear systems and automation components were installed in the finished electrical operation rooms while production was still running. The energy supply system for the rolling mill was accommodated in a new building and put on stream in advance. This was the only way to achieve such a short conversion time.

The greatest challenge in the course of the conversion, however, was to dismantle the old stand and install the new one. The housings of the existing 3.6-m mill stand were divided and removed from the bay in large units. This step was followed by foundation adaptation work. Thanks to an own port, the housings of the new stand could be transported by ship directly to the works of NLMK DanSteel. The housings were moved to the bay via a slide system and then positioned in the rolling mill line by means of a lifting gear. Since the equipment had been pre-assembled in the SMS Siemag workshop, the stand and the hot-plate leveler could be finish-assembled without time-consuming remachining work within the short conversion period.

www.sms-siemag.com/hot-rolling-mills
Allan Thomasen, Project Manager at NLMK DanSteel, was responsible for the modernization measures on behalf of the customer. In the interview he talks about cooperation, consequences and the future of the company.

Mr. Thomasen, you have been largely responsible for this project on behalf of NLMK DanSteel in the last few years. How do you assess the cooperation with SMS Siemag?
The cooperation with SMS Siemag was really good. Its employees are very professional, and it was extremely easy and uncomplicated to work with them.

Looking back on the past two years, is there a special moment you are thinking of?
There are many moments, but the most impressive one was of course when we rolled the first plate on the new stand. The fact that we were able to manage this within such a short period of time was a sign of good cooperation.

What are the advantages of the new 4.2 m mill stand with a view to product quality?
We have demonstrated by now already that we can produce new grades. Furthermore, we are able to make plates of greater width and thickness. This gives us access to new markets.

What do you think about operating the plant from the new control stand and with the new HMI?
The new control stand combines the furnace and the mill, which provides us a good overview on the production process and assists the operators in better cooperation. The new HMI mainly supports the maintenance personnel who can now see at a glance what happens in the plant and what they have to do.

How do you assess the future of NLMK DanSteel?
My opinion is that this modernization project marked a big step towards the future for NLMK DanSteel as it has substantially improved our market situation in Europe.
Vyksa Steel belongs to the Russian OMK Group and, for many years, has specialized in the production of large-diameter pipes transporting crude oil and natural gas. The company supplied pipes for the Nord Stream underwater pipeline, for instance, which has been one of the most demanding pipeline projects in recent years.

In 2011, Vyksa Steel commissioned a new 5.0-meter heavy-plate mill supplied by SMS Siemag, to be able to produce high-quality plates as starting stock for the production of pipes by themselves. In 2012, during a cooperation project lasting several months, SMS Siemag supported Vyksa Steel in the development of process technologies for the stable and reproducible production of high-strength pipe grades.

**Stable and Reproducible Processes**

One of the challenges in producing premium pipe grades is how to describe the property combination of strength, ductility with low transition temperature as well as weldability. And this must be achieved in compliance with the known standards such as for instance the Russian GOST standard or the API 5L standard of the American Petroleum Institute and with the particular contract requirements of a pipeline project.

In a concerted action, the engineers of Vyksa Steel and the material experts from SMS Siemag developed process technologies tailored to Vyksa Steel’s plant. Its 120-MN mill stand is one of the strongest worldwide. The 42-meter-long spray cooling system and the process models of the X-Pact® electrics and automation are further state-of-the-art components used in thermomechanical rolling. Apart from the specified chemical composition, the development of know-how for high-strength pipe grades mainly focused on the process parameters for plate rolling, cooling and leveling. Special importance was laid on improving the rolling process for plates of series K60 (API-X70) and K65 (API-X80) in the 38-millimeter and 28-millimeter thickness ranges by multi-stage rolling strategies. Among others, these plates are used for the Nord Stream route through the Baltic Sea and for the South Stream pipeline.

Particular attention was paid to the homogeneity of the properties over the full plate length and width. The process parameters were adapted to suit this specific purpose. Hence, the technological properties over the plate length and width are within close tolerances, which in turn improved the output as head and tail scrap as well as side-trimming losses could be minimized.

In addition to the marketable grades up to strength GOST K65 (API-X80), plates of class GOST K80 (API-X100/ X120) were produced up to a thickness of 45 millimeters to lay the foundation for a later product launch. Furthermore, Vyksa Steel and SMS Siemag carried out first investigations for the purpose of producing line plates to the so-called strain-based design as are used for pipelines in earthquake-prone regions, for example.

**Material Tests in the Laboratory**

The determination and documentation of technological material properties in the test laboratory is a decisive factor for the approval of large-diameter pipes. SMS Siemag
assisted Vyksa Steel in establishing a new test laboratory that is equipped with all required modern devices and where all common experiments for material testing can be made such as tensile tests (up to 2,000 kN), folding tests, impact tests (up to 750 J), drop-weight tear tests (DWTT, 90,000 kN) and chemical tests to NACE standard.

The quality chain commences by checking the slabs. At present, Vyksa Steel purchases the slabs since it does not have its own slab production facility. Examination of the slabs comprises geometry control, inspection of the surface quality and the segregation.

A dividing shear in the shear line cuts a specimen from the finished plate. Sample strips are taken from the ends of the rolled plates or from the middle of the mother plate, as required. The sample strips, which may be up to 4,800 millimeters long, are cut to smaller and easier-to-handle pieces by a sample shear.

In addition to proving the technological properties, the quality check comprises further test methods such as isotopic measurement of plate thickness and plate profile, optical width measurement, examination for inside cracks by continuous ultrasonic testing, surface inspection of the plate top and bottom sides as well as laser-supported length and thickness measurement.

www.sms-siemag.com/hot-rolling-mills

**FACTS + FIGURES**

**5.0-METER HEAVY-PLATE MILL VYKSA STEEL**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning</td>
<td>November 2011</td>
</tr>
<tr>
<td>Capacity</td>
<td>1.2 million tons per year</td>
</tr>
<tr>
<td>Steel grades</td>
<td>pipe grades up to X120, steels for the machine and shipbuilding industries, for bridge construction, and other structural steels</td>
</tr>
<tr>
<td>Plate thickness</td>
<td>7 to 150 mm</td>
</tr>
<tr>
<td>Plate width</td>
<td>1,400 to 4,800 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>max. 40 tons</td>
</tr>
</tbody>
</table>
From Baosteel Zhanjiang Iron & Steel Co., Ltd., China, SMS Siemag received an order for the supply of a new 2,250-millimeter-wide hot-strip mill which is to be established in Zhanjiang.

The high-performance mill is designed for an annual capacity of 5.5 million tons of hot strip with final gages of 1.2 to 25.4 millimeters and strip widths between 800 and 2,100 millimeters. The product range extends from mild deep-drawing grades to high-strength structural steels and further to tube and pipe grades. Based on an improved layout, the hot rolling mill will comprise a slab sizing press, one two-high and one four-high reversing roughing stand each with flanged-on edger, seven CVC® plus four-high finishing stands, a laminar strip cooling section and two hydraulic coilers. The finishing mill will be equipped with numerous technology packages and component sets for the economic production of high-grade hot strip. These include the CVC® plus system with integrated work roll bending as well as profile, contour and flatness control plus the hydraulically operated differential-tension loopers in the finishing mill. Furthermore, included in the plant are newly developed SIEFLEX® HT high-performance spindles with improved work roll diameters. Integrated in hot rolling mills, the new spindle offers the advantage of reliably transmitting distinctly higher drive torques than before. Particularly in the initial stands of the finishing mill, it is thus possible to attain higher rolling torques and forces as are required to produce high-strength hot strip.

Using the SIEFLEX® HT spindle furthermore allows a greater degree of freedom when it comes to selecting the work roll diameter.

New high-capacity hot strip mill for Baosteel

SMS Siemag will establish the plant for Baosteel Zhanjiang Iron Steel Co., Ltd. in Zhanjiang, China.
Commissioning of the hot strip mill is scheduled for the end of 2015. The plant will set a new standard in effective and economical hot strip production in China and all around the globe.

Since the year 2000, SMS Siemag has gained 15 orders covering high-performance hot wide-strip mills. For Baosteel this will be the second hot wide-strip mill from SMS Siemag. The first one was commissioned at the end of the 1980s and produced more than 120 million tons of hot strip until now.

www.sms-siemag.com/hot-rolling-mills

At the beginning of July 2013, He Wenbo (8th from left), President of Baosteel Group Corporation, visited the LernWerk and the SMS Siemag workshop in Hilchenbach in the company of a large delegation. Guided by Dieter Rosenthal (10th from left), Member of the Managing Board of SMS Siemag, the dual vocational education system was introduced to him.
“Fortunately it happens rarely – but sometimes it does. A seemingly unimportant mistake during ongoing production has disastrous consequences, and a rolling mill catches fire. Keeping the adverse effects for the plant user as small as possible requires a lot of experience. With its expert knowledge and organizational skills SMS Siemag was able to actively support Wickeder Westfalenstahl GmbH, Germany, and led a challenging repair to speedy success,” Klaus Grimm, the responsible Project Leader Cold Rolling Mill Division, puts his experience in a nutshell. The four-high reversing cold rolling mill was supplied to Wickeder Westfalenstahl by the former SIEMAG. It commenced operation in 1969 and has repeatedly been modernized since then. It is a multitalent rolling a wide material range from soft to highest-strength grades and clad material in the medium strip-size area of up to 700 millimeters width to a minimum final thickness of 0.15 millimeters.

During ongoing production, a hydraulic pipe at the coiler was damaged. Oil emerged from the pipe and caught fire. The flames quickly spread to the mill stand and the drive side. The fire on the one hand and fire-fighting activities on the other caused heavy damage to the vapor exhaust system including stack, mechanical and electrical equipment as well as to media and measuring systems in the mill stand area and on the drive side.

After the loss had been verified, Wickeder Westfalenstahl entrusted SMS Siemag with the restoration of the plant and the coordination of the complete settlement which involved several suppliers. SMS Siemag supplied the mechanical equipment and was responsible for coordination of the overall plant assembly.

INEVITABLE EXCHANGE

The measuring devices close to the mill stand and the hydraulic valve stands on the drive side were seriously affected by the flames and also the extinguishing agents and had partly to be repaired or replaced. Mechanical equipment such as gear unit, drive spindles, hydraulic

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**DATES + FACTS**

**MILESTONES**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Order placement</td>
<td>September 1, 2012</td>
</tr>
<tr>
<td>First coil</td>
<td>March 18, 2013</td>
</tr>
<tr>
<td>Acceptance by Wickeder Westfalenstahl</td>
<td>April 17, 2013</td>
</tr>
</tbody>
</table>

By the date of acceptance already, the mill proved the production data like minimum final thickness at maximum speed for different grades. Thus, the plant could be re-integrated in the production process without delay.
“OUR AMBITION WAS TO RESTORE THE ROLLING MILL WITHIN A MINIMUM OF TIME: SMS SIEMAG GAVE ITS BEST SUPPORT TO ACHIEVE THIS GOAL.”

Andreas Wellié, Manager Technical Services, Wickeder Westfalenstahl

Adjustment system and work roll bending system were inspected in the Hilchenbach workshop of SMS Siemag. Seals and wear parts were renewed. The complete hydraulic piping in the mill stand area and on the drive side had to be exchanged.

Just slightly affected by the fire were the coil preparation station, carousel reel and recoiling line. In this area, hydraulic valves and cylinder seals were replaced as a preventive measure. All components in the oil cellar, such as central oil lubrication system and MORGoil® lubrication system, were not directly concerned, but were inspected as a precaution and could resume operation after they had been thoroughly cleaned.

The greatest challenge for SMS Siemag was to meet the very tightly calculated schedule of the project in order to restore the operational state of the reversing mill as early as possible. Another challenge was the existing documentation. During the many years of its existence, the plant had been modified several times. Some documents had to be reconstructed together with the project team of Wickeder Westfalenstahl. Thanks to an intensive and well coordinated cooperation of all participants the problems could be mastered in time, and the reversing mill could resume operation according to schedule.

www.wickeder.de
High-strength steels

Successful revamp at Taiyuan Iron & Steel.

SMS Siemag modernized the cooling line of Taiyuan Iron & Steel, China, and installed a new UNI plus coiler. The new equipment enables the customer to produce hot strip of highest strengths.

To increase the water flow and thus the cooling rates, the complete old laminar cooling system was replaced by high-capacity cooling groups. The trimming zones at the end of the line remained unchanged. Each cooling-pipe row can be controlled separately, which offers great flexibility in implementing a variety of different cooling strategies.

The new coiler is the first one of its kind in China. At an early stage already, X100 strips 20 millimeters thick and 1,829 millimeters wide could be coiled. As one of the world’s most efficient coilers it is designed to coil pipe or tube grades up to class X120.

Acceptance by Starcore

Success for SMS Siemag’s joint venture in India.

On March 20, 2013, Esmech Equipment Pvt. Ltd. received the Final Acceptance Certificate (FAC) from Starcore Co., Ltd. for the combined reversing and skin-passing mill installed at the Starcore facilities in Rayong, Thailand. After successfully rolling the first strip on October 26, 2012, maximum rolling speed was achieved just four days later. Starcore assumed responsibility for the single-stand cold rolling mill in four-high CVC® plus design after a short phase of optimization. Meanwhile, this cold rolling mill proved to produce cold strip of highest quality standard at low operational costs. Starcore now has at its disposal an annual production capacity of 200,000 tons of cold strip in the reduction mode and of about 160,000 tons using the skin-passing mode.

Expansion concept

Enlargement of KYCR’s cold rolling mill.

KYCR Coil Industries Ltd., Bangladesh, placed an order with SMS Siemag for the expansion of their existing CVC® plus six-high reversing cold mill to become a compact cold mill [CCM®]. Since 2002, the single-stand reversing cold mill (RCM), which had been supplied by SMS Siemag to KYCR Coil Industries Ltd. in Chittagong, has been producing cold strip with widths between 600 and 1,050 millimeters and final thicknesses of minimum 0.9 millimeters. Accordingly, this plant with CVC® plus technology had been specifically designed to roll thin strip which includes operation with thin work rolls having a minimum diameter of 200 millimeters for high reduction. The existing RCM will be expanded to a two-stand CCM® with CVC® plus in both mill stands. Thus, KYCR will increase its annual production capacity to approx. 170,000 tons.
A DOUBLE SUCCESS

After a smooth and fast commissioning, the Chinese aluminum producer Luoyang Wanji Processing Company granted SMS Siemag the FAC for the two new six-high CVC® plus cold rolling mills.

The first strip had already been rolled on cold mill No. 1 at the end of May 2012. In that same year, so-called hot commissioning was successfully completed on October 18 by granting the Final Acceptance Certificate (FAC) and the rolling mill could start regular production. Just a little later, on March 30, 2013, the success was repeated. Cold rolling mill No. 2 was finally accepted as well.

In its new works in the eastern Chinese province of Henan, Luoyang Wanji can now make use of an installed production capacity of 260,000 tons.

The trust Luoyang Wanji placed in SMS Siemag’s plant technology and high quality of the equipment was justified.

www.sms-siemag.com/aluminium
Highlights

The Multi Plate® filter

Speed-controlled filter pumps keep the flow rate of 11,000 liters per minute of contaminated rolling oil at a constant level throughout the entire filter cycle.

Kevin Six: satisfied with the results of the function tests.

Winding station for the used filter fleece.

The Multi Plate® filter convinces by its modular design.
In January 2013, in the Hilchenbach workshops of SMS Siemag, the three Multi Plate® filter systems were assembled, tested and prepared for shipment to Zouping in the Chinese province of Shandong. The three identical filter systems, size MPF 3-21, take care of cleaning the rolling oil in the new three-stand tandem cold mill at Shandong Weiqiao Aluminium Electricity Co., Ltd. With their cleaning capacity of 33,000 liters per minute they rank among the most efficient filter systems of this type that SMS Siemag has ever supplied.

The Multi Plate® filters are part of the major order that SMS Siemag had been awarded by the Chinese aluminum producer Shandong Weiqiao Aluminium Electricity Co., Ltd. at the end of 2011. They will be installed in the area of the new three-stand tandem mill which rolls aluminum cold strip of a maximum width of 2,150 millimeters and a thickness between 0.6 and 0.15 millimeters. The annual production capacity of this rolling mill is 300,000 tons. Accordingly, the rolling oil system needed for the rolling process had been designed for a capacity of 30,000 liters per minute.

This is an enormous oil volume to be cleaned, a task that is performed by three Multi Plate® filter systems, size MPF 3-21. Each filter can process a flow volume of 11,000 liters of rolling oil per minute. Three filter plate piles with 21 chambers each are available for this purpose. In January 2013, SMS Siemag assembled the three filter systems and subjected them to comprehensive function tests in its Hilchenbach workshop. Subsequently, they started their journey to the customer’s site completely mounted as one unit.

**Facts and details**

<table>
<thead>
<tr>
<th>Size</th>
<th>MPF 3-21</th>
</tr>
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<tbody>
<tr>
<td>Capacity</td>
<td>11,000 l/min</td>
</tr>
<tr>
<td>Filter plate piles</td>
<td>3</td>
</tr>
<tr>
<td>Filter chambers</td>
<td>63</td>
</tr>
<tr>
<td>Filter surface</td>
<td>87 m²</td>
</tr>
</tbody>
</table>

Pneumatic unit for compressed air distribution.
Ultra high-strength steels for the automotive industry

PRO-TEC (PRO-TEC Coating Company), U.S.A, successfully commissioned the continuous annealing line for ultra-high-strength steel coils.

The line was supplied by SMS Siemag and is located in Leipsic, Ohio. On February 28, 2013, the first prime coil was produced. “Congratulations to all PRO-TEC Coating Company Associates and the continuous annealing line project team for reaching a major milestone together today! We SAFELY produced our first prime coil on the first attempt and followed up with every cold roll full hard coil as prime,” said PRO-TEC President Bryan P. Vaughn.

Besides the design and production of the mechanical equipment, the complete electrical and automation package was part of the supply scope of SMS Siemag.

Just about 500,000 tons of high-strength steel for cars, trucks and sport utility vehicles can be produced each year on the line. The annealing process and special high cooling rates, along with tempering, reduce the strain hardening in the material caused by the rolling process and enable the high-grade metallurgical properties to be attained. It takes a coil of steel 20 to 25 minutes to complete the whole process in the continuous annealing line from entry to exit.

In the modern continuous annealing furnace by Drever International, the ultra fast cooling system and the water-quench system are combined to achieve high formability and strength.

This modular design gives PRO-TEC two options after slow cooling. It can choose between the ultra fast cooling system with cooling rates of up to 120 K/mm/s, and the water-quench system with cooling rates of over 1,000 K/mm/s.

To reduce weight and boost fuel economy, automakers are looking to use more high-strength steels. Additionally, these steels help to improve vehicle crashworthiness which is one of the most important characteristics of a car. The PRO-TEC annealing line is specially designed and engineered to produce unexposed high-strength and advanced high-strength cold-rolled steels for structural applications throughout the vehicle.

Furthermore, while using the water-quench system martensitic-containing ultra high-strength steel grades can be produced, which have yield strength of more than 1,000 MPa. These materials are used mainly for crash-resistant key structural components of the passenger compartment, including A and B posts as well as door beams. Used in this way, the steel products help improve safety while at the same time reducing the weight of modern automobiles. In some applications, weight savings of 30 to 40 percent are possible. These parts will be lighter than parts that are produced today, and they will also be of higher strength to protect the passengers for safety purposes,” says Bryan P. Vaughn, President of PRO-TEC.

ULTRA FAST COOLING SYSTEM

In the continuous annealing line for PRO-TEC, the Drever ultra fast cooling system for high-strength steel grades delivers cooling rates of 100 to 120 K/mm/s. The cooling system uses the properties of hydrogen (low density and high heat transfer) to increase cooling capacity. What’s special about the patented Ultra Fast Cooling method is the direct introduction of pure hydrogen into the cooling chamber. This results in a hydrogen content of 20 to 30 percent inside the chamber, enabling the high cooling performance. Due to the natural diffusion of the gas into the neighboring zones, there is no need for a complicated separation.

Bryan P. Vaughn, President of PRO-TEC.
between them and the cooling zone. That means the process does not use any more hydrogen than conventional furnace operation, with five percent hydrogen in the protective gas.

**WATER-QUENCH COOLING SYSTEM**

The manufacturing of ultra-high-strength steel grades – especially martensitic grades – requires cooling rates of more than 120 K/mm/s. The only way of producing these steels is to integrate a water-quench cooling system for rapid cooling after annealing. Water is sprayed onto the strip in a nozzle chamber to achieve these very high cooling rates. A special slot-nozzle bar configuration ensures uniform cooling over the entire strip width. That prevents flatness deviations, strip distortions, or faults. Anti-crimping rolls upstream the nozzle chamber monitor the strip shape. This configuration makes cooling rates of more than 1,000 K/mm/s possible.

After annealing, a nickel coating can be applied to both sides of the strip in the nickel flash section. The electrolytic nickel flash coating takes place in a vertical cell with insoluble anodes and an electrolyte that contains nickel. The coating gives the strip improved surface properties for the subsequent color and electrolytic coating.

**Facts and details**

- **Commissioning**: 2013
- **Production capacity**: 500,000 tons per year
- **Strip width**: 700 to 1,650 mm
- **Strip thickness**: 0.6 to 2.3 mm
- **Entry speed**: 200 m/min
- **Process speed**: 140 m/min
- **Exit speed**: 200 m/min
- **Products**: CQ, DQ, DDQ, EDDQ, HSLA, DP, MP, CP, BH, TRIP and MS

PRO-TEC is a joint venture between United States Steel Corporation, USA, and Kobe Steel, Ltd., Japan, with three coil processing lines in Leipsic, Ohio. As a leading supplier of coated steel for the extremely demanding automotive industry, PRO-TEC will be expanding its range of products with the new facility and will supply the automotive industry with cold-rolled high-strength and ultra-high-strength steel coils.
New oiling machine

Development by DUMA-BANDZINK.

Wuxi Changjiang Sheet Metal Co., Ltd. in Wuxi, Jiangsu, China, placed an order with DUMA-BANDZINK GmbH, Duisburg, Germany, for the supply of an electrostatic oiling machine which is a global novelty. For the first time, the nozzle beams for standard oiling and the spray chambers for micro oiling are fitted in one machine housing. Part of the components were manufactured in China. The contractor was SMS Siemag Technology (Suzhou) Co., Ltd. in Zhangjiagang where the machine housing and the tank system comprising two heated 500-liter tanks were manufactured according to DUMA-BANDZINK’s specifications. Technologically critical parts were supplied by DUMA-BANDZINK directly from Germany. At present, the machine is being commissioned.

Heat-treating wider plates

Acroni commissions roller-type quench.

The Slovenian steelmaker Acroni commissioned a new roller-type quench supplied by Drever International. With this quenching unit, Acroni is able to heat-treat wider plates. Apart from the supply and installation of the quenching unit, the contract awarded to Drever International comprised a new pump station, the piping as well as a new electrics and automation system. The quench is designed for plates up to a width of 2,560 millimeters and replaces a 2,000-mm-wide cooling unit.

Due to essentially higher cooling rates, Acroni is now able to extend its product portfolio for instance in the range of Duplex stainless steel grades. The upper pinch rolls control the water flow during the cooling process to ensure homogeneous cooling action. At the same time, they prevent the formation of flatness deviations particularly when handling thin plates.

Early production start

Nominal capacity achieved after one month.

The new annealing and coating line of ArcelorMittal St-Chély d’Apercher, France, processed the first coil on March 30, 2013. Thanks to the good cooperation of all participants, furnace production achieved the nominal rate only one month after the dry-out period of the furnace. With the new line, the company is increasing its production capacity of high-grade non-grain-oriented electrical steel strips (NGO).

Among others, the furnace processes the iCARe™ grade newly developed by ArcelorMittal. These steels help automakers to create environmentally friendly mobility solutions for a greener world.

This new line is already the third annealing and coating line in the ArcelorMittal works at St-Chély d’Apercher.
One highlight of the plants is their record strip width: This pickling line/tandem cold mill and annealing line will be the first in the world to be able to process strips with widths of up to 2,150 millimeters.

The lines are part of the new cold rolling mill No. 3 in the northern Chinese province of Liaoning. As of summer 2015, more than two million tons of annealed cold strip, including high-strength grades like DP and TRIP, will be produced there. In addition, MET/Con will provide technical assistance and know-how for the production of premium automotive grades on these plants.

Once again, Benxi is relying on the competence and experience of SMS Siemag. A hot rolling mill and two reversing cold mills supplied by the German manufacturer commenced operation in 2007 and 2008. Two 20-roll cold rolling mills also from SMS Siemag rolled their first stainless steel strips in fall 2012.

LOW ACID AND ENERGY CONSUMPTION

The pickling line/tandem cold mill processes a large material range comprising low-alloy carbon steels, high-strength and ultra high strength steels including multi-phase and martensitic steels. With pickling tanks of a total length of more than 100 meters and an upstream scale breaker of 60 tons tension, the turbulence pickling line is generously dimensioned. This permits the steel strip to be perfectly cleaned without over-pickling the material. Moreover, this method is characterized by its low energy and acid consumption and low maintenance and operating costs.

The pickling line comes with a double entry section including laser welding machine to join the coils to an endless strip. Two horizontal strip loopers serve to uncouple the process section, comprising scale breaker and turbulence pickling unit, from the entry and the post-treatment sections to ensure the strip speed keeps constant during processing.

At first, a scale breaker with 60 tons tension breaks the scale on the strip surface and, together with the tension leveler, improves the strip flatness, which in turn considerably speeds up the subsequent process. The strip then passes three 35-m-long plastic pickling tanks which are continuously sprayed with heated hydrochloric acid by nozzle beams. This generates turbulence in the horizontal pickling channel and hence permanently flushes fresh acid to the strip surface. The acid then penetrates into the cracks of the scale surface and removes the scale. Pickling tanks of thick-walled plastic material and covers on the acid basins help to achieve a good insulation effect and save energy. Downstream of the pickling tanks, there is a cascade rinse serving to remove residual acid from the strip which is finally dried by means of hot air.

Having passed the process section, the strip edges are straightened and cut to the desired width by an ASC (Automatic Setting Control) trimming shear. The surface quality is then checked in a strip inspection cabin. An automatic surface inspection system
The pickling line/tandem cold mill for up to 2,150-mm-wide strips and an annual capacity of 2.28 million tons.

The pickling line/tandem cold mill for up to 2,150-mm-wide strips and an annual capacity of 2.28 million tons. The five-stand tandem mill rolls the trimmed strip to final thicknesses of minimum 0.3 millimeters.

**PERFECT STRIP FLATNESS**

To make sure the strip quality satisfies the requirements of Benxi’s customers, all mill stands will feature the latest rolling technology by SMS Siemag. They will be of six-high design and provided with the new combined CVC® plus/ESS equipment (Enhanced Shifting System). In conjunction with the positive and negative work- and intermediate-roll bending system, this results in an enhanced setting range for optimum adjustment of the roll gap geometry which, together with multi-zone cooling, contributes to attaining excellent strip flatness. In addition, the mill stands will be prepared for later installation of an EDC® system (Edge Drop Control). EDC® serves to ensure consistent strip thickness up to the strip edges to thus reduce trimming losses and increase the output. A DS system in the last mill stand takes care of efficient strip drying and prevents emulsion droplets from hitting the finished strip.

The modular mill stand design with integrated piping to the all-in-one principle facilitates final assembly on the jobsite and shortens the time needed for installation. Thus, it will be installed downstream of the process section supports the operating staff. Following this, the strip runs through another horizontal strip looper to the tandem cold mill.

The five-stand tandem mill rolls the trimmed strip to final thicknesses of minimum 0.3 millimeters.

**DATES + FACTS**

<table>
<thead>
<tr>
<th>PICKLING LINE/TANDEM COLD MILL</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Material</td>
<td>mild to ultra-high-strength steels, multi-phase and martensitic steels</td>
</tr>
<tr>
<td>Strip width</td>
<td>1,000 to 2,150 mm</td>
</tr>
<tr>
<td>Strip thickness, ingoing</td>
<td>1.2 to 6.0 mm</td>
</tr>
<tr>
<td>Strip thickness, outgoing</td>
<td>0.3 to 2.5 mm</td>
</tr>
<tr>
<td>Speed, entry section</td>
<td>max. 760 m/min</td>
</tr>
<tr>
<td>Speed, pickling section</td>
<td>max. 270 m/min</td>
</tr>
<tr>
<td>Rolling speed</td>
<td>max. 1,500 m/min</td>
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<tr>
<td>Rolling force</td>
<td>33,000 kN</td>
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<tr>
<td>Annual capacity, cold strip</td>
<td>2.28 million tons</td>
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</table>
be possible to start production early. After the strip has been rolled down to its final thickness, it is coiled by a compact carousel reel. This type of continuous exit section offers Benxi the advantage that just one coil car system is needed to carry the finished coils away.

Further included in the supply package are an offline strip inspection station and an emulsion system with a capacity of 37,000 liters per minute.

CONTINUOUS ANNEALING LINES

Except for the strip widths to be handled, the two continuous annealing lines will be almost identical in design. While line No. 1 is able to process a maximum width of 2,150 millimeters, and thus features a record value, line No. 2 is designed for more narrow strips up to 1,630 millimeters wide. Highlights of the two lines are the Drever annealing furnace which stands out due to a very efficient and eco-friendly mode of operation at high production capacity plus a comprehensive product portfolio, and the inline skin-passing mills for perfect strip surfaces.

Both lines are equipped with double entry sections. To ensure continuous operation, the material ends are joined by a welding machine to form an endless strip. Since the strip surface is covered with abraded iron particles and rolling emulsion residues from the cold rolling process, the strip is initially directed to integrated alkaline and electrolytic strip cleaning sections. Two vertical spraying units each with downstream horizontal cleaning brushes remove most of the contaminations. To free the strip even from very small and fine dirt particles it passes, in both lines, through two vertical cells for electrolytic cleaning and a further downstream horizontal brushing unit. Finally, a cascade rinse washes off the alkaline solution from the strip surface which is dried subsequently. Each line comprises two large loopers and one smaller looper for inspection to decouple the individual sections in order to make sure the strip continuously runs through the process sections at constant speed.

In accordance with an exactly defined annealing curve, the strip is then efficiently annealed in vertical radiant-tube furnaces to be supplied by Drever. The annealing process is controlled by an automatically operating mathematical model. Each furnace zone is fitted with double entry sections. The distance from the entry to the exit sides of the two annealing lines is nearly 500 meters.

### DATES + FACTS

#### ANNEALING LINES

<table>
<thead>
<tr>
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<th>CAL 1630</th>
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<tbody>
<tr>
<td>Material</td>
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<td>mild to</td>
</tr>
<tr>
<td>High-strength steels</td>
<td>high-strength steels</td>
<td></td>
</tr>
<tr>
<td>Strip width</td>
<td>1,000 to 2,150 mm</td>
<td>800 to 1,630 mm</td>
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<tr>
<td>Strip thickness</td>
<td>0.5 to 2.5 mm</td>
<td>0.3 to 2.3 mm</td>
</tr>
<tr>
<td>Entry speed</td>
<td>max. 700 m/min</td>
<td>max. 700 m/min</td>
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<tr>
<td>Process speed</td>
<td>max. 420 m/min</td>
<td>max. 420 m/min</td>
</tr>
<tr>
<td>Exit speed</td>
<td>max. 820 m/min</td>
<td>max. 820 m/min</td>
</tr>
<tr>
<td>Inline skin-passing stand</td>
<td>six-high CVC® plus</td>
<td>six-high CVC® plus</td>
</tr>
<tr>
<td>Rolling force</td>
<td>13,000 kN</td>
<td>13,000 kN</td>
</tr>
<tr>
<td>Elongation</td>
<td>max. 3 %</td>
<td>max. 3 %</td>
</tr>
<tr>
<td>Annual capacity</td>
<td>1.04 million tons</td>
<td>0.93 million tons</td>
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with a strip-tension measuring instrument supporting the control system of the deflector rolls. An inert gas atmosphere in the heating zones protects the strip against oxidation. In the pre-heating and heating zones, gas-operated radiant tubes warm the strip up to the steel-specific recrystallization temperature of maximum 860 degrees Celsius at which it is kept in the soaking zone for a certain period of time. Thereafter, the strip is cooled down, first slowly then rapidly, to temperatures between 300 and 400 degrees Celsius. During this procedure, cooling rates may attain more than 120 Kelvins per second. After cooling, the strip passes an overaging zone where its temperature can be kept for more than two minutes to permit the separation mainly of carbides from the material and to minimize the risk of aging. The annealing process is completed by a final cooling treatment and an additional water quenching procedure.

**FROM HIGH-STRENGTH TO MILD STEELS**
The perfect “finish” of the annealed strip is accomplished by inline skin-passing mills at the exit ends of the two annealing lines. They serve to set the yield points and the properties of the strips like roughness and flatness as are desired for further processing. Both skin-passing mills are of six-high design and equipped for wet operation. Their components like CVC® plus, work- and intermediate-roll bending system as well as flatness control satisfy all demands in terms of strip quality, and the large setting range of the six-high mill stands helps attain a top flatness result. It is furthermore possible to skin-pass a broad material spectrum as both mill stands may be equipped with work rolls of various diameters. Small work rolls are used to treat higher- and high-strength steels at a comparatively low rolling force, whereas large-diameter work rolls are selected for skin-passing mild steels at sufficient rolling force and to provide the strip surface with the necessary roughness.

In the exit section, an ASC trimming shear straightens the strip edges and sets the demanded strip width. The shear comes with a second trimming group on turntables to permit fast knife changes. It is followed by strip inspection (horizontal/vertical) in the inspection station and an automatic surface inspection system plus an electrostatic DUMA-BANDZINK oiling machine to protect the strip surface with the selected oil type. A flying crank shear then divides the strip to the desired coil sizes and removes the welded seams. On this occasion samples can be taken and marked. In an alternating order, two coilers with belt wrappers reel the arriving strip to straight-edged coils.

www.sms-siemag.com/strip-processing-lines
The major part of the mechanical and process-technological equipment for Hyundai Hysco’s new cold mill complex in Dangjin, South Korea, was supplied by SMS Siemag. The hot-dip galvanizing line as well as the universal annealing and hot-dip galvanizing line were put on stream in April 2013. Since that time, the two lines have been producing high-strength steels for car manufacturers in Korea. In addition to the essential mechanical and process-technological components supplied by SMS Siemag, these lines are equipped with furnaces by Drever International and air knives by Fontaine Engineering.

In the entry section of the pickling line/tandem mill which started operation on March 29, 2013, very difficult-to-weld strips are joined to an endless strip by an X-Pro® laser welder. Up to now, there have not been any cracks in the welded seams in this line even though martensitic grades were connected and rolled at a reduction of 45 percent. On June 20, 2013, Hyundai Hysco signed the final acceptance certificate for the welder after all contracted individual tests had been carried out successfully.

**TOP QUALITY FOR THE INDUSTRY**

With the hot-dip galvanizing line and the universal annealing and hot-dip galvanizing line, Hyundai Hysco decided in favor of a flexible plant concept which permits two different product groups to be produced (annealed and galvanized). Already in the first month, each of the lines produced 9,000 tons of cold strip. In May, the output was increased to a total of more than 33,000 tons. The product range included deep-drawing grades and high-strength steel such as HSS 1200. All materials were used for the fabrication of car interior parts and supplied to Hyundai Motors and Kia Motors, among others. In the future, the line will also produce material for car exterior parts.

Two weeks after commissioning of the annealing and hot-dip galvanizing line, the operating mode was changed for the first time. Initially, the line was operated in the annealing mode and, after annealing and cooling, the strip was directly guided to an overaging zone to separate carbides from the material. Hence, the strip reaches the high quality level as attained by a fully equipped mere annealing line. In this mode the galvanizing section is bridged by means of a bypass.

For changing from the annealing to the hot-dip galvanizing mode the strip must first be cut and retracted in the galvanizing area. Then, it is threaded again by means of a special rope to run through the zinc pot after restarting. In that mode a bypass bridges the overaging zone.

**STEEP RAMP-UP CURVE AFTER COMMISSIONING**

Successful commissioning. Several facilities of the cold rolling mill at Hyundai Hysco commenced operation.
In the meantime, the operating mode has been changed several times. These changing activities took 16 hours each, and the line was restarted after 24 hours.

In both lines the strips are first freed from residual dirt in a pre-cleaning and a main cleaning section. Recrystallization annealing is accomplished in a Drever radiant-tube furnace.

HIGH COOLING CAPACITY
The strip is then cooled to zinc bath temperature by an Ultra Fast Cooling system featuring a particularly high cooling performance. After the strip has passed the zinc pot, a FDEN air knife system sets the thickness of the zinc layer with high precision. As a rule, Hysco heats the material once again downstream of the air knives in an induction furnace to produce galvannealed steel strips. The combined annealing and hot-dip galvanizing line is equipped with an additional overaging zone which the strip passes through in the annealing mode. A shuttle roll coater passivates the strip in the exit section and permits fast product changes to be made. Apart from the equipment described above SMS Siemag supplied the entry and exit sections for both lines as well as three vertical loopers ensuring continuous operation of the facilities at high process speeds.

### DATES + FACTS

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<thead>
<tr>
<th></th>
<th>CGL/CAL</th>
<th>CGL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning</td>
<td>2013</td>
<td>2013</td>
</tr>
<tr>
<td>Annual production</td>
<td>400,000 tons (annealed)</td>
<td>500,000 tons (galvanized)</td>
</tr>
<tr>
<td></td>
<td>300,000 tons (galvanized)</td>
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</tr>
<tr>
<td>Strip width</td>
<td>800 to 1,650 mm</td>
<td>800 to 1,650 mm</td>
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<tr>
<td>Strip thickness</td>
<td>0.3 to 2.3 mm</td>
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<tr>
<td>Entry speed</td>
<td>700 m/min</td>
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<tr>
<td>Process speed</td>
<td>350 m/min (annealing)</td>
<td>200 m/min (galvanizing, GI)</td>
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<td>200 m/min (galvanizing, GI)</td>
<td>180 m/min (galvanizing, GA)</td>
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<td></td>
<td>180 m/min (galvanizing, GA)</td>
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</tr>
<tr>
<td>Exit speed</td>
<td>800 m/min</td>
<td>350 m/min</td>
</tr>
<tr>
<td>Steel grades</td>
<td>CQ, DQ, DDQ, EDDQ, HSS, IF-HSS</td>
<td></td>
</tr>
</tbody>
</table>
MODERN LASER TECHNOLOGY
An X-Pro® laser welder by SMS Siemag was integrated into the pickling line/tandem cold mill of Hyundai Hysco. In the entry section of the plant this laser welding machine joins the steel strips to an endless strip which then safely runs through the pickling section and the downstream tandem mill. Despite more than 3,000 joints in the first two months, the welded seams did not show any cracks, neither in the course of pickling nor during cold rolling, a fact that impressively proves the quality of the seam. This is particularly worth mentioning as the material range comprised very demanding and hard-to-weld grades. A series of MS-W1200 strips were joined and rolled at 45 percent reduction, for instance. Even strips with a silicon content of 1.2 percent have repeatedly been processed without any problems. The laser welding machine developed by SMS Siemag had been completely assembled and tested in its Hilchenbach workshops. On that occasion, Hysco’s maintenance and operating staff was trained at the fully functioning machine. This turned out to be a great advantage for the commissioning of the welder that had been installed in the pickling line/tandem mill.

Innovative welding
The welding machine developed by SMS Siemag ensures safe and fast welding, automatically adapts the welding parameters to new material combinations, masters even difficult material connections and checks each welded seam.

Innovative welding
The laser welding machine joins even hard-to-connect materials such as high-carbon or silicon-containing as well as martensitic steels.

strip.processing@sms-siemag.com

<table>
<thead>
<tr>
<th>LASER WELDING MACHINE</th>
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<tbody>
<tr>
<td>Commissioning</td>
</tr>
<tr>
<td>Strip width</td>
</tr>
<tr>
<td>Strip thickness</td>
</tr>
<tr>
<td>Products</td>
</tr>
</tbody>
</table>

X-Pro® laser welder in Hyundai Hysco’s pickling line/tandem cold mill.
Without a break for the first five months after start-up, both furnaces in the new flattening and coating lines have been operating and produced, among other things, HiB materials in the low-temperature mode. The furnaces feature new technologies for thermal flattening as well as for strip cooling, which improve surface quality and process control.

From the date of commissioning, Wisco has been able to boost its production capacity of grain-oriented (GO) silicon steel strip, which is also referred to as electrical steel strip, including high-permeable strips (HiB) by a total of 180,000 tons per year. The outgoing material with a silicon content of up to 3.5 percent is mainly used for the construction of high-performance transformers.

The two furnaces serve the purpose of providing the strip with an insulating layer and drying it to thereby influence the surface tension. In addition, thermal flattening improves the evenness of the strip. The furnace atmosphere consists of nitrogen (95 percent) and hydrogen (5 percent).

**DRYING AND SINTERING**

The first part of the furnace is designed to the catenary principle in order not to come in contact with the coating. It serves to dry and sinter the water-soluble insulating layer. Here, a new development has been put into practice by dividing this furnace zone into a radiant-tube section for strip drying and a direct-fired section for sintering the coating. This considerably improves the quality of the surface and prevents surface wrinkles. In the second part of the furnace the strips are thermally flattened. For that purpose, they are heated to 870 degrees Celsius by radiant tubes and passed through a pair of flattening rolls. This is followed by a cooling action, first in the slow-cooling zone by means of the newly developed Radiant Tube Cooling system (RTC) which permits cooling speed and strip temperature to be controlled very exactly, and second in the downstream redesigned Rapid Jet Cooling section (RJC) for fast, precise and uniform cooling. Thanks to the innovative cooling technologies it is possible to substantially improve the process and the quality of the final product. 

**Technical data**

<table>
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<tr>
<th>Requirement</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Commissioning</td>
<td>2012</td>
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<tr>
<td>Annual production</td>
<td>180,000 tpy (90,000 each)</td>
</tr>
<tr>
<td>Strip width</td>
<td>up to 1,250 mm</td>
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<tr>
<td>Strip thickness</td>
<td>0.2 to 0.35 mm</td>
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</table>
PRODUCTION ACCORDING TO PLAN

The Level 3 production planning system (PPS) from SMS Siemag guarantees plant operators high quality and automatically detects quality deviations. Now a new version has been commissioned at the Russian customer Vyksa Steel Works (OMK).

At OMK, the PPS is being used for a 5.0-m heavy plate mill. The Level 3 system offers functions for production tracking, sequence planning, and reporting.

The PPS supports the plant operator when it comes to technology, production, and quality. It is designed so that a single employee from the Quality Department can configure it without any help from the IT Department. Quality decisions can be implemented and recorded in Level 3, and they support the end user during certification of products. As far as possible, allocation to quality batches and tests take place automatically so that the Quality Department only has to finally evaluate the results.

AUTOMATIC EVALUATION OF THE PRODUCTION RESULTS

Each quality control step (see information box) can be configured in the PPS. Most configuration data is saved in database spreadsheets in Level 3. There is a Rule Editor used to specify rules for the interpretation of the database spreadsheets as well as more complex relationships. In-depth programming skills are not necessary.

To minimize testing work, similar plates are grouped together in quality batches. It is only necessary to sample the first and last plate in a quality batch. Here is one example of a possible rule: The plates must come from the same heat and have the same nominal dimensions.

The cutting pattern for the cross-cutting shear is planned taking into account the sample pieces. The PPS automatically allocates the plates to the quality batches and automatically determines which plates the samples will be taken from.

Furthermore, the PPS compares the measured actual process parameters with the target values, taking

<table>
<thead>
<tr>
<th>QUALITY</th>
</tr>
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<tbody>
<tr>
<td>Quality assurance and control steps.</td>
</tr>
<tr>
<td>(1) Determination of customer’s quality requirements</td>
</tr>
<tr>
<td>(2) Definition of the internal production instructions</td>
</tr>
<tr>
<td>(3) Automatic evaluation of production results to determine quality batches and detect flaws</td>
</tr>
<tr>
<td>(4) Flaw treatment – reworking to remedy flaws, additional tests, etc.</td>
</tr>
</tbody>
</table>
Hi-tech from SMS Siemag

A 5.0-m heavy plate mill has been in operation at OMK since 2011. It has an annual capacity of 1.2 million tons. OMK mainly produces plates for tube production.

Staff from the Quality Department can manually overwrite the allocations to the quality batches. Here again, the cutting pattern is automatically recalculated and transmitted to the Level 1/Level 2 automation system of the cross-cutting shear.

At OMK, the PPS guarantees the high quality of the production.

into account the applicable tolerances. If irregularities outside the tolerance limits are found in production (e.g., initial furnace temperature too low), the plates are automatically allocated to partial batches and must be individually tested. Here, the cutting pattern is automatically recalculated including the test pieces.

Only certain plates in each quality batch must be tested. Sample pieces are cut out of the first and last plates. The test results then apply to the entire quality batch.
The new level-1 and level-2 automation package supplied by SMS Concast allows Feng Hsin to improve both the production processes and the output. In addition to the automation package for levels 1 and 2, SMS Concast also supplied a new, fifth casting strand, a hydraulic oscillation unit, a Z3-type air-mist cooling system, a withdrawal and straightening unit and stopper boxes to Feng Hsin. “The scope of supply was quite extensive. Nonetheless, we were able to cast the very first heat with all five strands,” says Stefan Rustishauser from SMS Concast. Since 1954, SMS Concast has been a leading supplier of electric steelmaking and casting technology. The SMS Concast staff combines specialist know-how, flexibility, openness and extensive experience. The services offered include consulting, engineering, commissioning and after-sales activities. The company is a subsidiary of SMS Meer.

Feng Hsin successfully cast the first heat into 150-mm-square sections.
The steelworks in Jizan, Saudi Arabia, produces up to one million tons of billets, the rolling mill up to 500,000 tons of rebar. The electric arc furnace from SMS Concast is equipped with eccentric bottom tapping and a full platform, and is designed for 24 charges per day. The ladle furnace is used for secondary metallurgy treatments. It is planned to use 80 percent HBI (hot-briquetted iron) and 20 percent scrap as charge material. However, the furnace can also process up to 100 percent HBI.

The electrode control system and the process automation in the steelworks meet very high requirements, providing the basis for a homogeneous, highly flexible, and productive process.

The continuous caster has five strands and can produce one million tons of billets in the formats 130 mm and 150 mm square.

Half of the cast billets are sold on the regional market, the other half is further processed while still hot in the rebar mill.

**Reduced Fuel Consumption**

The rolling mill from SMS Meer is equipped with a walking-beam furnace having several control zones. The fuel-air ratio is separately monitored in each zone, considerably reducing fuel consumption. The fully automated rolling mill consists of 16 housingless stands followed downline by a finishing block with six stands. The compact design of HL (housingless) roll stands and the use of a finishing block ensure compliance with close tolerances. Thanks to the HSD® (High Speed Delivery) system, final rolling speeds onto the cooling bed of up to 41 m/s are possible. Therefore, even with small product dimensions, the plant can reach a high hourly production rate.

“We are very pleased with the successful cooperation during this project,” says Stefan Rutishauser from SMS Concast. “Thanks to the high capacity of the components, the performance and the productivity of the mill are impressive, exactly as South Steel had expected them to be.”

The South Steel minimill is regarded as a major milestone in setting up a steel cluster. Jizan Economic City is one of six newly constructed cities with which the Kingdom aims to make the Saudi economy less dependent on the export of crude oil by 2030.
Higher output with tube welding line

California Steel Industries (CSI) from Fontana, California, U.S.A., has commissioned SMS Meer to supply a 24-inch HF-tube welding line.

The plant will produce tubes up to 400,000 tons, mainly line pipes according to API 5L. In addition to an increased manufacturing capacity, CSI is able to expand its product range by tubes with outside diameters of up to 24 inches and a length of up to 80 feet. At present, CSI is able to supply HF tubes with outside diameters of up to 16 inches.

SMS Meer has further developed the process and plant technology for CSI. The production line is designed such that tubes can be produced at a speed of 35 m/min.

Furthermore, the plant provides an in- and offline quick-change system for URD® (Uniform Rigidity Design) stands from SMS Meer. With this solution, productivity is up to ten percent higher than, in the case of a conventional change, by means of a shop crane. The quick-change system is supported by the CSS Quicksetting® system (Computerized Setting System) developed by SMS Meer making product quality reproducible and improving it permanently with the aid of database-backed plant adjustments.

Another advantage is the MF-seam annealing plant with transport equipment. It makes sure that in case of a plant shutdown the non-annealed tube portion which does not fulfill the quality requirements is re-annealed– in this way, the plant achieves a much higher yield.

The supply package includes engineering, commissioning and customer training. Additionally, all components for the complete HF-tube welding line will be delivered. On the new HF-tube welding line, CSI is able to produce tubes with diameters ranging from 8 5/8” (219.1 mm) to 24” (609.6 mm). Wall thicknesses are from 0.157” (4 mm) up to 0.750” (19.1 mm) and tube lengths are from 20 ft. (6 m) up to 80 ft. (24.4 m). The plant will come into operation in 2014.

www.sms-meer.com/tube-pipe-plants
A piercing mill of similar design will be supplied to V&M Star.

With the JCOE® forming process, an open-seam tube is produced and subsequently welded.

The tool heads (right) cut the thread into the clamped pipe.

Less maintenance

Cross-roll piercing mill for Vallourec.

SMS Meer has received an order from Vallourec & Mannesmann Star for the delivery of a cross-roll piercing mill for the Multistand Pipe Mill (MPM) at its Youngstown site in Ohio, U.S.A.

This enables the company to boost the product quality and reduce the maintenance efforts for the plant. In addition to a cross-roll piercer, the scope of the order also includes electrical equipment and basic automation plus transportation and handling equipment as well as billet end centering unit.

Features of the new barrel-type piercer are enhanced rigidity, an up-to-date disk arrangement and an exit side with the latest generation of three-roller guide pedestals. Installation of the new equipment is scheduled for the fourth quarter of 2014.

Pipes of up to 18.3 m long

Large-diameter pipe mill for Corinth Pipeworks.

Corinth Pipeworks from Athens, Greece, has signed a contract with SMS Meer for the supply of a JCOE® large-diameter pipe mill for longitudinally welded pipes. With this investment, Corinth Pipeworks is expanding its product range in order to meet the growing worldwide demand for high-strength pipes for oil and gas extraction and transit.

The new mill will be able to produce Longitudinal Submerged-Arc Welded (LSAW) pipes with outside diameters from 18 to 56 inches, wall thicknesses up to 40 millimeters and pipe lengths up to 18.3 meters in high-strength steel grades up to X100. The annual capacity will be 400,000 tons.

With the new mill which will be taken into operation in the first quarter of 2015, the company is now completing its production techniques for pipe welding.

87 tubes per hour

Threading machine for Seversky Tube Works.

MTMK’s OAO Seversky Tube Works from Polevskoy, Sverdlovsk, Russia, has placed an order with SMS Meer for two new threading machines, including transport facilities. With these new machines, Seversky Tube Works is expanding its production capacities for premium joints.

The threading machines of the CG 38/4 type are able to thread pipes in the diameter range from 169 to 340 millimeters with wall thicknesses from 7.3 to 16.5 millimeters and lengths up to 13.5 meters. Depending on the thread type and diameter, the machines manufacture between 46 and 87 pipes per hour.

The machines operate according to the “stationary tool - rotating pipe” principle. With this method, the machines can cut standardized inside and outside threads as well as all premium threads. Commissioning is scheduled for spring 2014.

www.sms-meer.com/tube-pipe-plants
With the 12-MW TemperLine™ more than 200,000 tons of tubes can be heat-treated per year.

30 tons heat-treated per hour

EVRAZ North America, based in Chicago, U.S.A., receives TemperLine™ heat treatment system.

The TemperLine™ supplied by SMS Elotherm will be designed for the heat treatment of up to 30 tons of OCTG [Oil Country Tubular Goods] per hour. Due to the high flexibility of Elotherm’s technology with very short downtimes for changing tube sizes or readjusting for new material grades, it will be possible to heat-treat more than 200,000 tons of tubes per year with this 12-MW TemperLine™.

“The Calgary expansions will allow us to offer a more comprehensive product portfolio to meet growing needs for premium OCTG products,” said Tigran Atayan, Executive Vice President, Tubular Products Group at EVRAZ North America. “This project as well as the premium threading line expansion already underway at our Red Deer facility demonstrates our strong commitment to customers in Western Canada.”

“In order to obtain the best metallurgical, mechanical and geometrical results on the heat-treated tubes, the hardening unit is split up into seven different zones, each fully independently powered and controlled,” says Dr. Guido Opezzo from Elotherm in Germany. “In this way it will be possible to finely adjust the power injected into the tubes and use the last heating coils as final standard heating zones for ERW pipes or as soaking areas, when seamless tubes and high-quality grades are heat-treated,” says Opezzo.

EVRAZ manufactures a wide range of OCTG tubular products, including carbon and alloy products and premium connections, as well as small- and large-diameter line pipes, all of which meet or exceed standards set by the American Petroleum Institute [API].

The induction heating unit is scheduled to go into operation in the fourth quarter of 2014.

200,000 tons of tubes can be heat-treated with the 12-MW TemperLine™ per year.
With the new induction reheating system, heavy oil consumption at Tung Ho is drastically reduced, and emissions are brought down at the same time. The ecoplants concept allows fast reheating of numerous materials and dimensions.

“In contrast to the through-feed mode in the minimill featuring Continuous Mill Technology [CMT™], heating takes place in the induction coils in the oscillation mode,” says Dr. Guido Opezzo from SMS Elotherm. The beam blanks, blooms or slabs are conveyed from the walking-beam furnace into the induction reheating system EloHeat™, where they oscillate back and forth inside the induction coils and very quickly reach a temperature of more than 200 degrees Celsius before entering the downstream rolling process.

“Depending on the steel bar’s geometry, the oscillation process only takes between just two and five minutes,” says Opezzo. “Since the induction process generates the heat directly inside the steel mass, it is a very quick process which inhibits the formation of scale.”

The 19.2-MW system is powered by four medium-frequency transistor converters with a rated power of 4,800 kW each. To reach the most suitable temperature for the downstream rolling process, the energy introduced into the sections has to be adapted. To achieve this, Laser-Doppler speed measurement devices in combination with optical pyrometers are therefore used to control the process.

**SHORT DOWNTIMES**

The entire product mix covers various materials and geometries, ranging from a 480 X 430 millimeter beam blank to a 1,250 X 220 millimeter slab, all between four and ten meters long. This wide variety of geometries can be reheated with only three different types of inductor sets. Combined with the Elotherm quick inductor change-over system, short downtimes can be ensured.

EloHeat™ is scheduled to be commissioned in the third quarter of 2014.

Henry Ho, President of Tung Ho Steel (right), and Dr. Andreas Seitzer from SMS Elotherm shake hands at the official contract-signing ceremony.
New standard extrusion press for China

The 18-MN extrusion press from SMS Meer is durable and suitable for use in a wide range of applications.

Developed and engineered in Germany – built in China: About 80 Chinese customers were recently attracted to a presentation of the newly developed standard extrusion press in the workshop of SMS Meer in Shanghai. In the course of a symposium the plant was presented by SMS experts. It is completely assembled in the Chinese workshop of SMS Meer and is exclusively available in the Chinese market.

The first aluminum extrusion press of the Schloemann series had already been supplied to China in 1968 to former customer Greatwall, now Changcheng Special Steel. Since then, the market has constantly developed. Particularly in the building, energy, automotive, railway and aviation sectors, the extrusion presses of SMS Meer are a key component of the production chain.

Advantages of the new press: compared to other presses in the same size range, the SMS Meer model is able to produce up to 2.5 tons more aluminum products per day due to higher availability and shorter non-productive times. The service life of the press is exceptional. Presses existing from the 1930s are still in operation.

With more than 99 percent the availability of the press is extremely high. The number of SMS presses successfully installed in China so far also speaks for itself: 51 units, of which 42 alone over the past seven years.

Various customers expressed great interest in a business partnership already during the event. Bauer: “We have succeeded in impressively presenting a wide range of possibilities offered by SMS Meer in the aluminum press sector.”

### Technical features of the 18-MN extrusion press

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>Press</td>
<td>16/18-MN short-stroke front loading system</td>
</tr>
<tr>
<td>Max. extrusion press force</td>
<td>18 MN / 1,800 mt</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>310 bar</td>
</tr>
<tr>
<td>Extrusion press speed</td>
<td>Up to 29 mm/s</td>
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<tr>
<td>Container diameter</td>
<td>184 mm [7” billet]</td>
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<tr>
<td>Billet length of extrusion press</td>
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<tr>
<td>Dead time [incl. vent cycle]</td>
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<tr>
<td>Billet container</td>
<td>3-part container with 2-zone heating</td>
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<td>Main hydraulic pumps</td>
<td>2x Rexroth variable displacement pumps, type A4V355</td>
</tr>
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<td>PLC system</td>
<td>Siemens 57</td>
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<tr>
<td>Process control systems</td>
<td>PICOS.NET and CADEX isothermal extrusion pressing</td>
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</table>
The picture shows a comparable batch homogenizing plant.

The project managers in front of the new “Metal Forming Center of Excellence”

In the future, Anhui Xinke will produce high-grade copper strips.

Heated up 20% faster

Batch homogenizing facility in operation.

Hertwich Engineering, Austria, has commissioned a batch homogenizing facility and a cooling station at DUBAL, United Arab Emirates. The homogenizing plant is the third of its kind to be built by Hertwich within the aluminum smelter complex of this company.

The batch homogenizing facility is designed for extra-fast heating of the ingots. A reversing air concept and regulation by flaps accelerates the heating of the ingots by an estimated 20 percent, and achieves improved temperature uniformity. The plant is fully automated and is regulated via measured air and metal temperatures. The same concept also provides more efficient cooling in the air-cooling station.

High tech for ATILIM

Extrusion press ordered for university.

Atilim University in Ankara, Turkey, has ordered a direct-indirect extrusion press with 10-MN press force from SMS Meer. The modern press will be installed in the university’s “Metal Forming Center of Excellence” and is to be used for fundamental research and test series by industrial companies. “We decided in favor of a press from SMS Meer because it offers us the latest technology from the market leader. Furthermore, SMS Meer will start cooperating with the university and will support us with process know-how and with lectures in the field of research and development,” says A. Erman Tekkaya, Founding Director of the Center of Excellence at Atilim University. SMS Meer cooperates with several universities and research institutes worldwide.

High-quality copper strips

Casting know-how for Anhui Xinke.

Anhui Xinke New Materials, based in Wuhu, Anhui Province, China, has placed an order with SMS Meer for the delivery of a vertical discontinuous caster for slabs. The casting plant features special mold technology that enables special alloys such as copper-iron to be cast into slabs. As a result, Anhui Xinke is able to produce high-quality copper strips for the electronics industry.

The new plant has an annual capacity of up to 20,000 tons of 620 millimeter x 200 millimeter slabs.

Carsten Bretz from SMS Meer: “The dedicated mold technology for special alloys requires specific casting know-how which we can offer to the customer. This technology allows the customer to achieve both a high output level and a homogeneous cast structure, essential for achieving the best results during subsequent rolling processes.”

www.hertwich.com

www.sms-meer.com/extrusion-presses

www.sms-meer.com/nf-metal-plants
ADVANCING TECHNOLOGY

New development: The new Sieflex® HT gear-type self-aligning spindle (photo), is able to transmit more than 50 percent higher drive torques.
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NEW SPINDLE CONVINCES BY HIGHER CAPACITY

High-strength materials require greater rolling torques and forces. The new Sieflex® HT gear-type self-aligning spindle is a key to meeting this demand.

With the new Sieflex® HT gear-type self-aligning spindle it is possible to reliably transmit drive torques that are more than 50 percent higher than those previously attainable. Especially in the initial stands of a finishing mill, the HT (High Torque) spindle allows attaining higher rolling torques and forces as are increasingly demanded for the production of high-strength hot strip.

A spindle represents a core element when it comes to the transmission of drive power from the motor via main and mill-pinion gear units as well as couplings to the work roll of a hot-strip mill finishing stand. As a consequence of the ever higher requirements involved in the production of high-strength grades it is necessary to increase the capacity of the entire drive train. "The space available for the spindles is set by the work roll diameter which in most cases cannot be enlarged. For this reason, we had to raise the capacity of the spindle components to transmit higher drive torques," says Klaus Lazzaro, General Manager Drives/Drive Components of SMS Siemag. The result of the improved Sieflex® gear-type self-aligning spindle is the new HT type with a more than 50 percent higher capacity.

The starting point was comprehensive FEM (Finite Element Method) analyses giving detailed information on the...
Innovations

loads incurred in the rolling process. The design of the new HT spindle and, above all, of the gears was carried out on the basis of these findings. The geometry of the gears was advanced to the effect that in spite of heavy misalignment the loads are uniformly distributed to the gear flanks. This means that even at a misalignment of 3.5 degrees almost full torque capacity is available.

Successful Field Test
For a period of more than two years, the newly developed HT spindle has been tested on the hot strip mill of Salzgitter Flachstahl. Temperature measurements directly at the gears showed a constant temperature of less than 40 degrees Celsius which proves the low friction between spindle teeth and wobblers. Klaus Lazzaro: “Additionally, we checked the contact pattern of the gears. After two years of use under tough rolling conditions, there were hardly any traces of wear.”

Use in New and Modernized Plants
In the future, SMS Siemag will equip all new hot strip mills with HT spindles to make sure they are ready to meet the ever-rising challenges to be faced in the next few years and beyond. The HT spindle may be installed in existing plants, too. A renewal of the drive train permits higher rolling torques to be transmitted, which is the key towards an extension of the product portfolio in the field of high-strength grades. The HT spindle can be supplied with two different lubrication systems, either oil circulation or grease, depending on the customer’s request.

The first contract covering the installation of HT spindles was awarded to SMS Siemag by a Japanese steelmaker who will replace the universal shafts of stands F1 and F2 by new HT spindles. The investment was split to permit settlement from the current maintenance budgets. The first Sieflex® HT gear-type self-aligning spindles with grease lubrication system will be installed in a hot strip mill in Europe.

»Additionally, we checked the contact pattern of the gears. After two years of use under tough rolling conditions, there were hardly any traces of wear.«

Klaus Lazzaro, General Manager Drives/Drive Components, SMS Siemag

Torque capacity of different spindles

The most important feature of the HT spindle is its almost full torque capacity up to a misalignment of 3.5 degrees.
HOT AND WIRELESS

High temperatures at the electric arc furnace easily lead to a hold-up of maintenance activities and loss of production. The solution: the transmission of measured values via radio.

For measuring the temperature of the cooling water in electric arc furnaces, the panels are fitted with measuring sensors. The measurements are critical to the operation of the furnace, because if the cooling water temperature is too high, countermeasures need to be taken. Only through these measures can the availability of the plant and the output be kept at constant levels.

In the past, measured values used to be transmitted via cable. But cables are extremely sensitive. They are easily damaged and must be constantly renewed not only due to the high ambient temperatures but also due to ejected slag and metal. The wireless measurement via radio, developed by SMS Siemag, helps to cut the expenditure on new cables as well as on the installation and maintenance of the cablework. Another advantage of this technology is the possibility of measuring the temperature even at difficult to reach spots.

Convinced about the benefits of the new technology, BGH Edelstahl Siegen GmbH introduced the radio-based system at its EAF together with SMS Siemag. The results have been highly satisfying. “Since we have been measuring the temperature at the electric arc furnace by radio, we have saved many cables – and other costs associated with each cable, such as wear, installation and maintenance. All these costs are saved now. Currently, we are thinking about which other components in our works could benefit from radio-based measurements,” says Thorsten Hebel, Electrical Operation, BGH Edelstahl Siegen GmbH.

The temperature values of the cooling water are captured at various points of the panels and cyclically transmitted via radio. A radio receiver sends the values as a data message over the databus to an automation system for further processing.

**BENEFITS**
- Low installation effort
- Safe furnace operation and high availability
- Maintenance-friendly and secure radio transmission of the measured values
- High availability of the radio sensors
- Flexible positioning of the sensors
- Reduced installation and maintenance costs
- Easy and quick replacement of the sensors
- Low downtimes as no maintenance of cablework
Efficient oil

Convincing: Outokumpu Nirosta utilizes the hot rolling oil PrimeLub HR TV 001 to roll thin stainless-steel hot strip.

In Krefeld, Germany, Outokumpu Nirosta GmbH runs one of the few industrial thin-strip casters for stainless steel worldwide. Since the demands on process as well as on quality are continuously rising, Outokumpu was in need of a new efficient hot-rolling oil and found a competent development partner in SMS Siemag. In coordination with Outokumpu, SMS Siemag developed the impressive hot-rolling oil.

The use of this oil meets two essential targets: improved strip quality and lower production costs. This can be seen from the operating results such as extended work roll life and reduced rolling force distortion between top and bottom work rolls.

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ADVANTAGES

Operating results when using PrimeLub HR TV 001 exemplified by a martensitic stainless steel

- Rolling force reduction by more than 50 percent and at the same time rise in pass reduction by 10 percent on average by adapting the oil volume
- Reduction of rolling force distortion between top and bottom work roll
- Rapid formation of a uniform lubricant film
- Improved strip quality (no formation of stains/residues)
- Extended work roll life
- Reduced energy consumption
- Less plant contamination
A high quality of the inner pipe surface directly contacting the medium to be transported is of fundamental importance. To ensure such quality, innovative measuring methods are necessary. For that reason, SMS Meer has developed the mobile, laser-supported measuring system InShape offering further benefits to plant operators beyond quality assurance. With InShape, the inside diameter of the pipe and its ovality can be precisely determined over the entire pipe length. The system even detects local deviations from the desired pipe shape it measures the welding seam contour and senses surface defects. Furthermore, InShape enables straightness measurements via freely definable pipe sections and measurements on several random pipe sides so that geometrical deviations are easily recognized.

InShape is a modern all-rounder for quality checking and optimizing the production process in large-diameter pipe manufacture. For each pipe, the measured values from InShape are stored in a database supplied by SMS Meer and are thus available for subsequent analyses.

A mobile robot platform measures inside the pipe. In this case, a laser sensor specially developed for InShape scans the inside of the pipe with high accuracy. Due to its mobility, precise geometrical measurements on large-diameter pipes can be performed at different times in the manufacturing process – for example before welding – and the following manufacturing can be optimized. Measuring errors by external influences can be avoided since all measurements are performed on an unmoved pipe stored at a defined location.

New laser measurement technology

InShape

Due to higher requirements for longitudinally welded large-diameter pipes, manufacturers are faced with challenges.
Continuous blowing

Crucial for economic production of quality steel: carbon and stainless steel production in the converter calls for high hitting rates in setting the final carbon content and the bath temperature.

By means of a sublance it is possible to make measurements and take samples of the liquid steel with the converter in the upright position. This means that blowing does not have to be interrupted, with the benefit of having a markedly shortened tap-to-tap time.

For more than 20 years, SMS Siemag has been using freely programmable robots, which standardize and cut the operating procedure. The industrial robot removes the sampling probe from a magazine and attaches it to the sublance. Upon completion of the measurement, the robot takes the probe off the lance and drops it through a down-pipe onto the working platform.

The robot’s degrees of freedom of movement allow SMS Siemag to flexibly adjust to the installation situation when modernizing or reconstructing existing plants, even if the existing space conditions are somewhat confined.

**SMS SIEMAG’S SUBLANCE KNOW-HOW PACKAGE**
The magazine can accommodate 160 sampling probes. It can be refilled without having to stop the plant. Up to eight different probe types can be freely selected via the software. Depending on the probe type, different dipping depths can be set for intermediate measurements and for measurements to determine the end of blowing. A measuring cycle takes less than 100 seconds. As a result of the optimized movement pattern, the time needed for attaching the probes is very short. A lance change can be effected in a very short time thanks to the provided quick-change coupling.

**THE TECHNOLOGICAL LEVEL-2 PROCESS MODEL**
Use of SMS Siemag’s process model (level 2) for carbon or stainless steels optimizes process control and makes it reproducible. This reduces the production costs, improves the product quality and increases the productivity. The tripping times for the sampling are dynamically calculated and optimized close to the process. Thanks to the modular structure of the process model, the sublance can be easily integrated into existing automation systems. All necessary target values for blowing (input materials, process gases, treatment steps, etc.) are determined. The model takes over the complete control of the blowing process. Metallurgical target values (hitting rates for temperature and carbon content after end of blowing) are defined and complied with.

The software structure and the design of the process model can be easily transferred to existing steelmaking plants and implemented within their automation environment.

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FOCUS ON FURNACES

Customers have been increasingly looking for plant builders who are capable of supplying integrated facilities complete with the related process know-how. SMS Siemag has this capacity, as was demonstrated during a symposium on furnace technology held in Beijing, China.

Approximately 150 experts from the Chinese steel and aluminum industries accepted the invitation from SMS Siemag and attended the symposium held under the title “Heat/Treat Your Business.” At the event, the Furnace Technology Division, which was established in 2011 and which combines the competences of SMS Siemag in Germany, of furnace builder Drever International (Belgium) and of Ares Furnace (China), presented its innovative solutions for furnace concepts. The focus was on cooling technologies, energy efficiency and environmental technology as well as process models and core components. “Our presentations did not cover specific production lines. We took a more process-related approach instead, looking at aspects such as material cooling, energetic and environmental issues of the heating process as well as process automation,” says Dr. Fritz Brühl, Executive Vice President of the Furnace Technology Division.

SMS Siemag offers furnace technology for flat products made of carbon and stainless steels and for electric strip. The range includes vertical and horizontal furnaces for continuous annealing and galvanizing lines, floater...
Great response during Symposium

Dr. Brühl, which concept in terms of content did you choose for the Symposium?

Our lectures did not cover specific production lines. We took a more process-related approach, looking at aspects such as material cooling, energetic and environmental issues of heating and the automation of the process. This also reflects the concept of the Furnace Technology Division. Our innovative solutions are not limited to individual process steps in steel or aluminum production. Instead, we always transfer our solutions to other steps of the process chain. This is what we understand by problem-solving competence.

Which presentations met with particularly great interest?

The presentation of various new cooling technologies met with great interest, especially the water-quench unit with cooling rates of up to 1,500 Kelvins per second. One unit of this kind was recently commissioned at PRO-TEC in the U.S.A. The objective cooling achievable by the water-quench technology and gas-jet cooling systems of the latest generation has the positive effect that the rates of expensive alloying elements can be reduced. Just as intensively discussed were new developments in the field of process modeling, summarized under the term “Intelligent Furnace,” and combined plant technologies.

Why did you stage the SMS Furnace Symposium in China and not in Germany?

We always try to be as close as possible to our customers, not to our competitors. Therefore, it was logical and right to present ourselves locally in the country which we consider our most important market. Another reason for presenting our newest technological highlights in Beijing was that especially in China there is great interest in and much knowledge of latest technological developments. In return, this provides us with a direct impression of our customers’ requirements, which we consider to be our obligation.

Dr. Fritz Brühl
Executive Vice President of the Furnace Technology Division moderated the Symposium.

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Infacon 2013

SMS Siemag participated in the Infacon conference, the meeting point of the furnace industry, especially in the field of furnace technology for ferroalloys and silicon metal. The conference took place in Almaty, Kazakhstan, in mid-June. With SMS being the platinum sponsor of the event, experts from SMS presented four papers, covering topics such as a new FeMn/SiMn model and possibilities of recovering energy and using process gases from the SAF process. Kazchrome, an SMS customer, offered the participants the opportunity to visit their works in Aksu and Aktobe. In Aktobe, Kazchrome is currently building a new FeCr plant. The core components of this plant are 4 x 72 MW DC furnaces, supplied by SMS Siemag, for a total production capacity of 440,000 tons of FeCr.

Aluminum market China

At the beginning of July, the SMS group presented itself on the trade fair ALUMINIUM CHINA in Shanghai. SMS has participated in the event since 2006. The group presented the entire portfolio from machines producing primary aluminium (Hertwich) to hot and cold rolling mills offered by SMS Siemag including associated electrical systems.

Ecoplants in focus

From November 9 to 12, 2013, the SMS group will be presenting its Ecoplants solutions at the China International Green Innovative Products & Technologies Show in Guangzhou. This show for environmentally friendly products is open to the general public. Further information: www.cigipts.cn

Forge Fair with Girard

Girard Associates, the North American specialist for control, hydraulic and robot systems for the forging industry, recently joined the SMS Meer family. At the Forge Fair in Columbus, Ohio, U.S.A., Girard and SMS Meer presented themselves for the first time in the same "look."
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This issue of the Newsletter reports about current projects of the SMS group, with a focus on the versatile service provided.

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Premiere in Jakarta

Experts of the SMS group presented machinery and services of the company at the Indometal trade fair which took place in Jakarta for the first time. At the exhibition stand, Frank Solomon, SMS Meer (center), and his colleagues demonstrated to Mustafa Abubakar, Indonesia’s Minister of State Enterprises (on the right in the picture), which machinery and equipment of the company is of interest for Indonesian customers. In the future, Indometal is planned to take place every two years. “We were able to establish many new contacts,” says Solomon.
Our new brochures at a glance:

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Order No.: H4-303E

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