

IN FOCUS

LEADING PARTNER IN THE WORLD OF METALS

SMS group stands by the side of its customers with sophisticated solutions and a wealth of know-how.

NEW STEELWORKS

In Texas, Steel Dynamics Inc. is establishing a new, record-breaking steelworks complex.

42

EXPERTISE IN COPPER

The competence center for rolling copper and copper alloys – in the Chinese city of Wuhan.

78

SMART LOGISTICS

A joint venture of DP World and SMS group revolutionizes port logistics.

150

CONTENTS 03/2019



IN FOCUS

SMS group as strong international partner

South Africa

The SAF Center of Competence supplies solutions for submerged arc furnace technology. **10**

Switzerland

Worldwide, SMS Concast is considered the expert in long product continuous casting. **16**

Russia

Proven technologies and new developments in the limelight. **22**

India

Competitive solutions for the growth market. **26**

U.S.A.

Minimill revolution on the U.S. market. **38**

PROCESS CHAIN

NEWS

New Dimensions

Steel Dynamics Inc. selects SMS group to supply a steelworks complex. **42**

IRONMAKING PLANTS

Modernization of BF cooling system

Paul Wurth supports MMK in the complete overhaul of No. 2 blast furnace in Magnitogorsk. **67**

METALLURGY AND ENVIRONMENTAL TECHNOLOGY

Upgrade for continuous caster

Salzgitter Flachstahl modernizes continuous caster No. 1. **68**

CO₂ savings improve climate balance

NLMK Group orders two gas recovery systems. **70**

Uninterrupted operation

First converter successfully commissioned at Hoa Phat. **76**

FLAT ROLLING MILLS

Support that customers can rely on

In Wuhan, SMS group operates a center of competence for rolling NF metals. **78**

Third CCM® installation in Pakistan

SMS group successfully commissioned compact cold mill at Aisha Steel Mills Limited. **82**

STRIP PROCESSING LINES

Innovations in the plate mill

New furnace for NLMK Dan Steel's plate mill with a capacity of 100 tons per hour. **88**

High-strength automotive grades at the Salzgitter site

Salzgitter AG orders new hot-dip galvanizing line. **90**

X-CAP selected for award

The furnace control system X-CAP was selected for the Tata InnoVista Award. **93**



LONG PRODUCTS

New technologies for improved quality

Cutting-edge technologies for the production of beams, sections and rails.

94

Rethinking proven technologies

Peak performances for billet and large bar mills.

98

Flexible and efficient

Padana Tubi places order for 16 ¾-inch ERW tube welding line.

106

Resource-efficient spiral pipe production

SMS group to supply new spiral pipe mill to AMERICAN SpiralWeld Pipe.

108

Daehan Steel completing facilities

New finishing mill for straight bar production in South Korea.

114

FORGING TECHNOLOGY

Valuable contribution to achieving progress

Expansion of capacity at titanium producer Western Superconducting Technologies.

116

ELECTRICAL AND AUTOMATION SYSTEMS

Going like clockwork

Advanced EMG eMASS® strip stabilizing system at Tata Steel Shotton generates substantial savings.

120

PRODUCTION

Expert knowledge seamlessly meshed

New manufacturing method of SMS group for herringbone gears.

128

TECHNICAL SERVICE

Wastewater-free and clean

New innovation process for water treatment plants.

132

STANDARDS

WELCOME	4
PHOTO HIGHLIGHT	6
PERFORMANCE MODULES	60
EVENTS	150
IMPRINT	161

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WHY WE ARE THE RIGHT PARTNER FOR YOU

Dear friends of SMS group,

In our slogan “Leading Partner in the World of Metals”, the word “partner” has a very special meaning to us. We are not merely the designer, supplier or manufacturer of your plants – we are your partner. In a world that is becoming increasingly complex, challenges can only be mastered jointly. Whether in situations of technological, economic or social change, we support you during any phase of your project – of whatever type and at whatever place of the world.

Trustful

What qualities do you expect today from a partner in business? The ability to react to and deal with challenges agilely, quickly and flexibly? Assuring operating and economic efficiency? Being open for and promoting new business models? All this is true, and in order to be all this, we have positioned ourselves accordingly during the last few years. But alongside these abilities, other qualities must not be neglected. Throughout the history of our company, our customers have been able to bank on our trustfulness, reliability and quality – values that have been the basis of all our acting and conduct for generations. Without these values, a partnership cannot be filled with life.

Future-oriented

Let’s create something new and great for the future together. Successful digital transformation is only achievable if there is a solid basis of trustful cooperation. New materials need new processes, and new processes need excellent cooperation to be successful. And, in order to find answers to ecological challenges that are economical at the same time, a strong network of specialists is paramount.

Consistent

Together with our customers, we have been launching innovations at a rate and of impact almost unprecedented in our industry. Being a life cycle partner, we are there for you throughout the decades-long service life of our machines. We work closely with our customers to assure that their machines remain competitive and up to date. In other words, also in the current era of digital transformation with its ever shorter innovation cycles, we think ahead, developing hand in hand with you, our customer, solutions for sustainable improvement.

Global

Probably, the most important element of a partnership is closeness – in two different respects: First, the way you and your partner think and do business must not be too much apart in order to work efficiently towards a common goal. The second aspect is geographical closeness. In whatever place around the globe you may be located, we are always close by. We can take part in your idea forming and planning processes from the outset. We implement our projects hand in hand with our customers – with full dedication and in direct exchange with them. And subsequently, after completion of the project, we are always within reach for any support that may be necessary.

Open

In this SMS group Newsletter, we would like to introduce to you our global staff and our global activities. We open for you the doors of our global branches, and our international manufacturing and service workshops. Feel free to step in and learn about the exciting projects our specialists are currently working on. In this issue, we focus on our activities in the U.S.A., India, Russia, South Africa and Switzerland. Other countries, China, Italy and Luxembourg, for example, are following in the upcoming issues. When reading the interviews and articles, you are likely to come across the word “partnership” quite often. This fact alone shows how important you are for us and that closeness to our customers has always been in our DNA. Our motivation and aspiration to move things stems from partnership based on mutual trust.

U.S.A.

In the U.S.A. we are going to build a new steel complex for Steel Dynamics Inc. (SDI). This ultra-modern 2.7 million ton-per-year mill will comprise the

complete process chain from the meltshop and CSP® plant down to the cold rolling mill and the galvanizing line. Together with the next expansion stage for Big River Steel and further contracts from U.S. customers, the steel capacity in the U.S.A. will increase by about six million tons as a result of new steelmaking facilities built by us. The new projects will have growth effects on entire regions, as they will create new jobs and attract new companies.

India

This year, SMS India celebrates its 30th anniversary. During the last three decades, we have become a very strong partner for our customers in India and the neighboring regions. We bring to bear our core competences not only in plant engineering, but also in EPC projects in the fields of water treatment technology, and electrification and expansion of railway systems. Currently, we are setting up a programming center that will enable us to support plant operators in India even more directly, on their way to the digital transformation.

Russia

In Russia, the partnership with our customers has evolved over many decades of mutual trust. We invite you to read what routes of development our Russian customers have taken and how they go about the issues of digitalization and Industrie 4.0. Our innovation offensive New Horizon, which includes facilities for metal powder production and 3D printing, for example, has been attracting very wide interest in Russia.

South Africa

In 2011, Metix, specialists in SAF technology and one of South Africa's most promising and interesting companies, became part of SMS group. Since 2018, Metix has been the global Center of Competence for all our SAF activities. The company's new furnace concept, which features a very high degree of digitalization, shows in which direction the technology of the future will take us. The innovative design takes our furnaces to an entirely new level in terms of operation, and in terms of monitoring and prediction capabilities. You may also read about Metix' achievements in the development of new materials. And we are pleased to introduce to you a new plant for the production of ultra-clean alumina, which has the potential to revolutionize the sapphire crystal industry and the



manufacturing of LED products and lithium-ion batteries.

Switzerland

Switzerland and Zurich will automatically come to the mind of people reflecting about the future potential of continuous casting. This is not surprising because Zurich is the place where Concast AG has been developing, designing and manufacturing continuous casting technology since 1954. From Switzerland, the company took the at that time entirely new process of continuous casting out into the world. Today SMS Concast is our Center of Competence for long product continuous casting. We are proud to say that you will not find a more experienced and, at the same time, more innovative partner for your projects anywhere in the world.

Would you like to learn more?

Don't hesitate to contact us for more information about how we develop solutions in partnership with you, our customer – solutions that not only mean progress and transformation for your company, but that may have an impact on the entire sector or even our society. Use the innovativeness of our new developments and projects as a benchmark and see why we are your right partner.

Yours,

Burkhard Dahmen

Chairman of the Managing Board
of the SMS group GmbH





NEW GENERATION OF
CSP[®]

EA
F

U.S.A.

NEW MEGAPROJECT IN TEXAS

The American steel producer Steel Dynamics Inc. (SDI) has selected SMS group to supply a High Throughput production line from the steelworks to the CSP[®] plant and further to the cold rolling mill and the galvanizing / galvalume line. The plant complex will be established in Sinton in the state of Texas and start operation in mid-2021. The works will have an annual production of more than 3 million short tons (2.7 million metric tons) of steel. This productivity will set new standards within the thin slab casting and rolling technology. For further information on this megaproject and the related economic importance for a whole region, please refer to the article starting on page 42. ♦

 **Contact**
www.sms-group.com

WORLDWIDE

LEADING PARTNER IN THE WORLD OF METALS

With sophisticated solutions and extensive know-how, SMS group provides global support to its customers. How and where exactly? Find out more on the following pages. ▶

Photo: Getty Images/monstij



SOUTH AFRICA
Metallurgy: Global competence center of SMS group for submerged arc furnaces (SAF). → 10



INDIA
Entire process chain: Establishing a new programming center for SMS digital. → 26



SWITZERLAND
Continuous casting: Global competence center of SMS group for long products. → 16



U.S.A.
Entire process chain: Among US-American steel producers minimills are currently gaining more and more popularity. → 38



RUSSIA
Entire process chain: Wide and highly advanced product range satisfying also demanding customers. → 22



SOUTH AFRICA

METALLURGY Between 30 and 90 percent of the world's natural deposits of rare metals – gold, platinum, iron ore, manganese, chromium or copper, for example – are found in Africa, making the continent an ideal location for assets and activities that focus on metallurgical technology.

INTERVIEW

FROM SOUTH AFRICA ACTIVE WORLDWIDE

The SAF Center of Competence supplies competitive solutions for submerged arc furnace operations worldwide.

Mr. van Niekerk, where does Metix fit into SMS group?

Metix was founded in South Africa in 2003 as a privately-owned company with a focus on the submerged arc furnace (SAF) business. Although the company initially focused on SAF technology and equipment, our later worldwide participation in large Engineering, Procurement and Construction (EPC) projects was the key to our success. We joined SMS group in 2011 with an initial Sub Saharan African footprint. In 2018 we were announced as the worldwide Center of Competence (COC) for the SMS group's SAF business.

How did you experience the initial phase as a member of SMS group?

We received both good guidance on the key performance figures and the required autonomy in order to achieve these targets. Continuous guidance and assistance by SMS group board members - up to the present day - ensured us access to German technologies and partners, allowing us to grow smoothly into the group. We partnered with SMS group divisions such as Paul Wurth and MME on a range of very successful projects.

What challenges did you face in becoming the Center of Competence for SAFs?

Progressive actions under the Task Force '21 initiative, which had the targets to optimize costs, improve competitive pricing and ultimately be the Leading Partner in the World of Metals was not an easy nor comfortable task. Our focus was to do business on a sustainable basis, ensuring continued client support on completed and ongoing projects as well as technological queries. The availability of key individuals from the previous SAF division, who are now members of the non-ferrous division, was vital for continuity and support during that period. An important aspect is to synchronise our current processes and activities with the more than 100 years of successful SAF business conducted by the SMS group.

What lies ahead of the new Center of Competence?

Our focus will be to concentrate our core competences in one location, while supplying competitive solutions for metallurgical furnaces, equipment and complete plants for the production of ferro-alloys, silicon metal, special metals and slags to customers around the world. We plan to do so by interacting with our sister companies and through the understanding of the competitive needs of our customers.

How do you do that in practice?

We stay close to our customers and support them also through difficult times. But even more importantly, we allow them to boost during periods of growth by offering them today tomorrow's groundbreaking technology from within the group. The recent METEC 2019 was a perfect showcase of how SMS group has evolved over the last decade in terms of Industrie 4.0, new business, improved environmental processing and manufacturing methods, shared services and much more. It enabled us to meet clients from countries such as Germany, Finland, Russia, China, Saudi Arabia and Brazil. All



these clients were highly impressed by the SMS group booth and showed great interest in the group's activities.

We at Metix are very excited to see our sister companies' capabilities in the fields of digitalization, additive manufacturing, 'Green steel', non-ferrous processes, UrbanGold and hydrometallurgy. These are key technologies that will catapult us into the next era.

What of these best practices are you applying at Metix?

We have a keen interest in additive manufacturing, and we have made good progress in understanding the current status of the market and application potential of SAFs. In-house and external consultations have given us new ideas of how to overcome the challenges of extremely hard operating conditions characterized by high temperature, high currents and fluctuating pH regimes.

Our latest furnace offering is digitalization-ready and we have made good progress in understanding the groundbreaking potential of the different products offered. The level to which we can monitor, predict and manipulate SAF operation is 'next level' and very flexible. By applying the right basics, we can offer clients a gradual plug-and-play set of upgrades that improve productivity, environmental accountability, output and availability.

As an integrated, multidisciplinary EPC company as well as an original equipment manufacturer (OEM) of SAF ▶

“We take ongoing responsibility for our clients. Going forward, we continuously work on supplying technologically, environmentally and commercially superior products as well as providing top-class project execution.”

Andrew van Niekerk, Managing Director, Metix

equipment, we have a unique set of software packages that provide us with highly efficient Building Information Management (BIM) and assist us by Design for Construction 'D4C', which stands for the philosophy of 'getting it right before the site'. We are continuously developing systems that improve constructability through 4D planning, fault detection and the workflow. Our focus is to minimize the exposure to health, safety, the environment, costs and time on the construction sites.

We are continuously striving to maximize the value chain. Therefore, the recovery of valuable elements from by-products and wastes plays an essential role here. Our latest product, developed with our non-ferrous partners, improves the recovery of Cu metal from slag considerably. We are applying slag cleaning and matte settling technologies to other commodities with potentially very profitable returns for our customers. This permits not only the recovery of valuable metals, but also the declassification of by-products that otherwise have to be stored in highly capital-intensive, environmentally compliant facilities - in some cases, even resulting in commercial products as, for example, inert slag sold to the construction industry as aggregate material.

What is currently happening in your markets?

Renewable energy is a hot topic and therefore the production of solar-grade Si-metal is high on the priority list. The Si raw material must be of the purest form as well as have the right thermal characteristics, making it a highly specialized material. The secret now lies in developing solutions that upgrade older technologies in terms of energy efficiency, product quality and ultimately production costs. Having supplied some of these plants ourselves, we know how to best go about their optimization and what concepts have proved successful.

Vanadium is on the tip of everyone's tongue. If it is not in connection with Redox batteries, then possibly in connection with ways of how to increase the structural integrity of construction rebar through higher vanadium content. Although our SAF technology deals with the tail end of this value chain, it is still an exciting market, especially when you also look at the markets for titanium and magnetite.

FeCr, FeMn, SiMn, ilmenite and other materials are in a constant state of flux. Supply and demand force us into geographical competition with players that are willing to take higher risks. Here we are readily positioned with cost competitive, robust and trouble-free solutions.



Large-scale projects with furnace technology that makes the world of tomorrow cleaner and recovers value.



Latest development in rotating DC furnace technology for Si-metal.

→ More business activities of SMS group in South Africa will be presented in the next issues.

What projects are you currently working on?

Most of our time, right now, is going into developing bespoke projects that assist clients in improving their value chain offering by recovering valuable materials at the lowest cost and effort. We see this as a much-needed approach to optimize the planet's resources.

We are now pushing the boundaries on furnace sizing and optimized processes. We are excited to offer solutions to recover the maximum of any element, boost the reduction of valuable metals and reduce the impact of by-products on the environment.

We are currently involved in a project for Altech Chemicals Ltd. where SMS group has partnered with a client to

build a plant for the production of a high-purity alumina product (4N = 99.99%) that will revolutionize the sapphire crystal industry, LED lights and Li-Ion batteries. Metix has started construction and is now in the basic engineering phase implementing latest knowledge from our D4C approach as part of our BIM philosophy. ♦

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 **Further information**
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SWITZER- LAND

CONTINUOUS CASTING

SMS Concast AG was founded in 1954 with the business focus to propagate the technology of continuous casting of steel in the industry. What used to be an innovation at that time has meanwhile established itself worldwide as an industry standard – with SMS Concast as trailblazer.



FROM SWITZER- LAND INTO ALL FOUR CORNERS OF THE WORLD

Within SMS group, SMS Concast AG is the expert in long product continuous casting.

SMS Concast has its headquarters in the center of Zurich. The selection of Zurich as its base of operations stems from the company's history and its – from the very beginning – highly international business orientation. Irving Rossi founded the company in 1954 under the name Concast AG with the objective to globally market the new and at that time groundbreaking technology of continuous steel casting. As Rossi realized very early the enormous potential of the new technology, he did not hesitate to set his young company on a clearly international course. His first customers were based in Europe. But soon continuous casting machines from Switzerland met with increasing demand from all regions of the world.

Today SMS Concast is the center of competence for long product continuous casting within SMS group. During more than 65 years, SMS Concast has accumulated a wealth of expert knowledge in continuous steel casting. Building on this expertise, the company today supplies an outstanding range of continuous casting technology and related services. The portfolio covers everything from high-speed billet casting

Mold tubes
manufactured by
SMS Concast.





TAEWOONG in South Korea successfully casts round blooms of 1,000 millimeters in diameter on an SMS Concast machine.

machines to casters for heavy bloom caster including the biggest cast sections. The company's expert service division assures highly efficient spare parts and consumables supplies, and provides a wide range of metallurgical, technical and revamping services. SMS Concast's portfolio today includes a broad spectrum of smart products and digital solutions that help operators of continuous casting machines improve the quality of the cast products and the productivity of the casters.

SMS Concast has a long track record of successfully implemented continuous casting projects, including the design, manufacture and commissioning of the machines. Open communication, flexibility and reliability of the SMS Concast experts assure highly efficient and successful project management. Every project starts out with the development of solutions in close cooperation with the customer, an approach that has proven to provide optimal results. SMS Concast sets greatest priority on diligent planning, top-quality equipment ▶



Square blooms cast on a continuous casting machine built by SMS Concast.

and reliable support during commissioning and the optimization phase. The service for the customer is rounded off by efficient spare parts supplies, diagnostic analyses and other services performed at various stages of the entire life cycle of the continuous casting machines.

IN-HOUSE MOLD MANUFACTURING

Since 2002, SMS Concast has had its own mold manufacturing capabilities. The mold, which gives the cast product its shape, is the centerpiece of every continuous caster. SMS Concast has two mold manufacturing sites, one in Switzerland and one in Canada. The customers can be sure to receive tailor-made mold tubes manufactured using longstanding metallurgical expert knowledge and with a design optimally tailored to their production needs in terms of geometry and surface characteristics. Additionally, the customer benefits from SMS Concast's extensive range of mold-related services. These include process analyses to identify potential for improvement and the reconditioning of used mold tubes allowing the tubes to be re-used up to five times.

PLANT MODERNIZATION

Every continuous casting machine reaches a point during its life cycle at which it will be necessary to replace certain components or perform a general overhaul of the plant. Here, SMS Concast supplies a full range of diagnostic services, and technological and digital products, starting from minor revamping measures limited to individual components, such as the replacement of the mold oscillation system, for example, or of a pinch-roll, up to a general upgrade of the plant. Building on its encompassing metallurgical expert knowledge and proprietary simulation tools, SMS Concast helps its customers to identify potential for optimization and design highly efficient modernization concepts. SMS Concast can assure smooth implementation of its modernization projects, including the commissioning phase, as it brings to bear vast experience in the overhaul and modernization of continuous casting plants performed in close cooperation with its customers.



“We trust in an international team of experts, which communicates openly and proactively with our customers and within our company.”

Dr. Stephan Feldhaus, CEO, SMS Concast

With the invention of the CONVEX mold in 1991, SMS Concast set a milestone in continuous casting technology. The introduction of this innovative mold type achieved a 30 percent increase in throughput compared to conventional continuous casting molds. Another important benefit of the CONVEX mold is its optimized geometry leading to a highly homogeneous strand shell and increased heat transfer, both of which result in an overall enhancement of the quality of the cast strand.

The INVEX® mold is the result of the successful further development of the proven CONVEX mold. While the traditional mold tubes used to have a plain outside surface, INVEX® molds come with integrated cooling channels at their outside faces. This increases the heat transfer of the mold and enables even ultra-high casting speeds to be reliably controlled, an indispensable requirement, for example, for the direct casting and rolling of long products from one heat. ♦



Further information
www.sms-concast.ch

Environment protection, digitalization and better product quality

Shijiazhuang Iron & Steel Co., Ltd. (Shigang), a member of HBIS Group, has awarded an order to SMS Concast, a company of SMS group, covering the supply of a second continuous bloom caster. The order was placed within the frame of a relocation program to improve environmental protection. Within the same program, Shigang had already ordered two 130-ton SHARC electric arc furnaces and a three-strand vertical continuous caster producing high-quality blooms from SMS group at the beginning of the year.

The second continuous caster will be a typical bow-type machine for the production of high-quality steel grades from alloyed steel up to roller bearing steels and tire wire grades. With its three strands, the machine will cast blooms of 410 x 530 millimeters cross-section and lengths between 5.0 and 6.1 meters, using CONVEX mold technology.

SPECIAL STEEL PRODUCTION POSSIBLE

The selected radius of 16.5 meters will permit the production process to be run at optimized casting speed for all steel grades with a wide operating window to perform Dynamic Mechanical Soft Reduction (DMSR). Just like the vertical caster, this machine will be equipped with cutting-edge technology to produce special steels for a broad range of applications and a wide selection of alloys. The technological package will include electromagnetic CONSTIR mold and final stirrers, a high-precision tandem resonance oscillator and a finely adjustable air-mist secondary cooling system with seven independent cooling zones. The MSR system will have eleven separately driven modules particularly designed for improved metallurgical soft/hard reduction processes. In addition to the mentioned special characteristics, the caster will

feature an infrared temperature monitoring system arranged upstream the straightener and serving for bloom quality control as well as for supervising the dynamic cooling system. A laser length measurement system and an online weighing system will provide a high degree of bloom weight accuracy. The technological package is completed by an online water-box quenching system.

AUTOMATION SYSTEM WITH DIGITALIZED QUALITY CONTROL

Within the scope of digitalization, the plant will be provided with a state-of-the-art automation system to ensure end-to-end and fully digitalized quality control and tracking. The system will also include a software for the optimization of productivity in order to achieve maximum yield. Thus, the automatic quality control module for the Level 2 will allow to identify the faulty strand section and optimize the cutting schedule accordingly. This function includes that strand section which need to be scraped can be cut out directly in the cutting stations. The scope of Industrie 4.0 automation furthermore comprises solutions for higher safety and productivity. These include robot technology for the casting platform, a temperature monitoring system, an eddy-current mold level control with autostart function, the COOL online/offline solidification model, flow and thermosimulations as well as 3D oscillation measuring unit. ♦



Further Information
www.sms-concast.com



RUSSIA

COMPLETE PROCESS CHAIN

In Russia, SMS group was, is and will remain active and successful. The basis for this is provided by the company's good reputation, the close contact with its customers and the broad and highly advanced product range as well as consistent new developments.

INTERVIEW

RELIABLE SUPPLIER OF CUTTING-EDGE TECHNOLOGY

The mixture of tried and tested technology together with new developments makes SMS group attractive to Russian customers.

Mr. Gubanov, would you please give us some reasons why Russian steel producers should select SMS group to handle their projects?

The portfolio of SMS group covers the entire scope of supply needed for the production of steel. In addition to the tried and tested technology confirmed by numerous references and often wanted by Russian customers, SMS group is consistently working on new concepts and developments that are of great interest to our Russian clientele, as well. At regular intervals, we inform our partners in Russia on proven technologies, but also on new developments on occasion of symposia and innovation days.

The demands of the Russian market for new products and trends, such as new steel grades, better product quality, higher availability of the production equipment, energy efficiency, environment-friendly production and last, but not least, the topic of digitalization cause our customers to invest in modernizations and new facilities. For all of such projects SMS group can render support to its partners.

The trusting relationship with our Russian customers is based on a long and successful history. SMS group has been accompanying its customers for many decades and has proven to be a reliable supplier of cutting-edge technologies.

What challenges does the Russian market present and how are they mastered by SMS group?

Apart from the massive pressure on prices, the most essential challenges influencing business in Russia are stagnating growth and a lack of investment in industrial development. The consequence is that investments in new plants undergo

thorough and lengthy examination procedures and, after a long and expensive project distribution phase, do not come to a decision. Adding up are the effects of sanctions that considerably impair the access to long-term and favorable project financing conditions, especially for the customers. Another fact to be mentioned in this connection is the dramatic worsening of the competitive situation. SMS group masters these challenges through active key account management, custom-tailored technical solutions, advancing innovations, assistance in organizing long-term financing as well as a unique after-sales service and outsourcing service portfolio.





NEW MANAGING DIRECTOR IN RUSSIA

In October 2019, Uwe Schroeter was appointed Managing Director of SMS Metallurgical Service LLC. Before, he was active for SMS China as Vice President Service for almost ten years.

IGOR GUBANOV –

HEAD OF LIAISON OFFICE MOSCOW, SMS GROUP

Mr. Gubanov, how do you see the development of SMS group on the Russian market in the years to come?

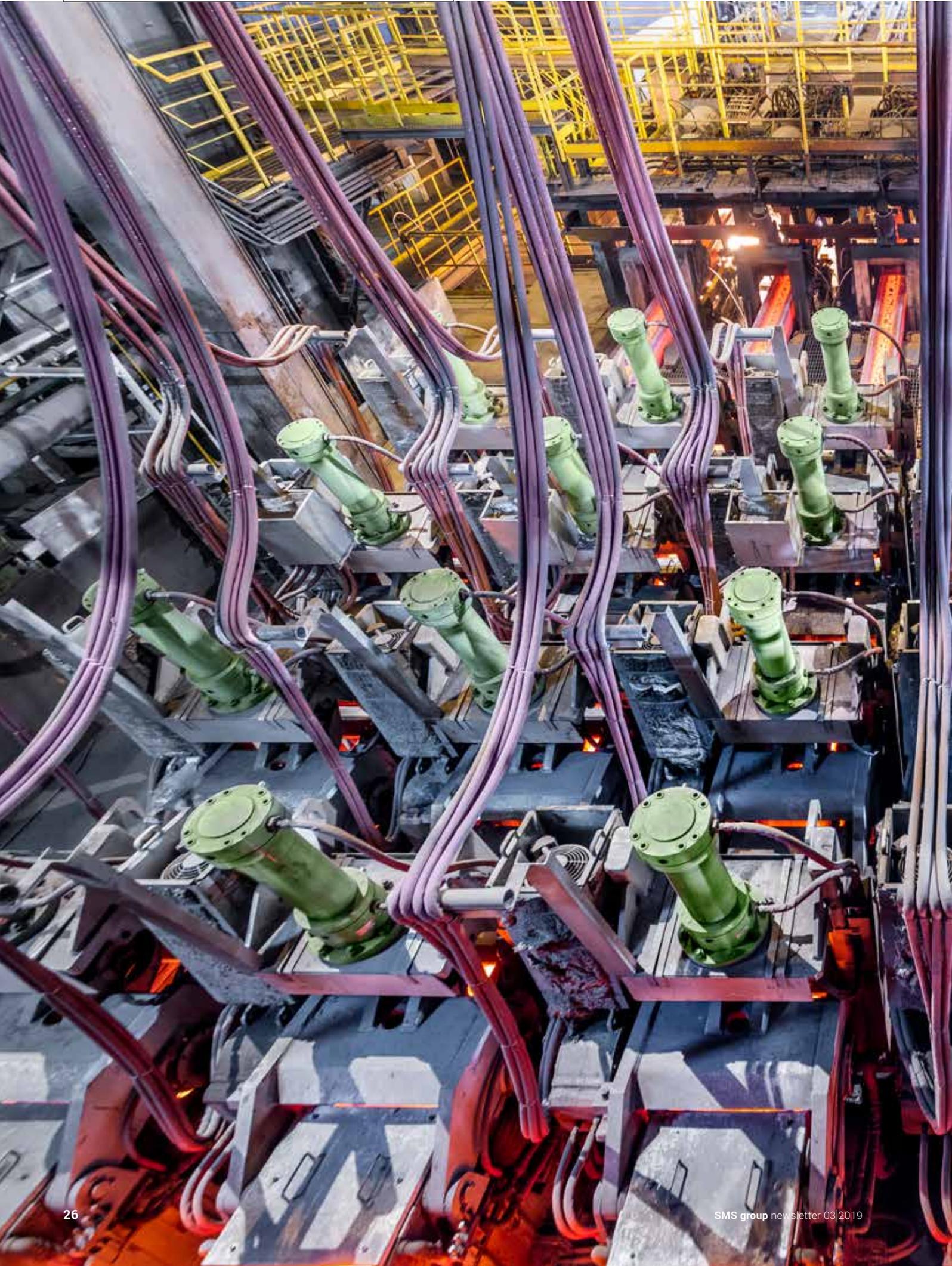
In Russia, SMS group was, is and will remain active and successful. The basis for this provides our good reputation, the close contact with our customers and our broad and highly advanced product range as well as consistent new developments. Our digital solutions and “New Horizon” topics open up further opportunities. Digitalization and Industrie 4.0 are important indicators in Russia and at the local steel producers. One year ago, we started to organize joint workshops with some of our major customers for the development of concrete projects in this area in a spirit of partnership.

SMS group’s facility for the production of metal powder and 3D printing is meeting with great interest here in Russia. First customers already asked for an offer. ♦



Igor Gubanov

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INDIA

COMPLETE PROCESS CHAIN

India is striving to advance its position as the worldwide second largest steel producer over the next few years. This ambition offers new growth potential to SMS group as well, for example in the field of EPC projects in water conditioning, electrification and rail traffic.

INTERVIEW

DRIVING THE PORTFOLIO FORWARD

In India, steel producers are offered optimum growth conditions not only by governmental investment projects, but also by SMS group.

Mr. Greiner, recently you have become the head of SMS India. What is your business strategy?

This year, SMS India will celebrate its 30 year anniversary. Our objective is to continue this long success story in the steel industry and strengthen our position as Leading Partner in the World of Metals in India.

These activities include the expansion of our portfolio in those sectors in which the group has a strong market position worldwide, as for instance aluminium and other NF metals as well as forging technology. Further, there are several EPC projects in selected fields like water conditioning, electrification and rail traffic. There is great need in India for investment in the mentioned fields and there are respective governmental plans.

As regards electrical and automation systems, we have been able for some time to establish proprietary business outside of India together with Esmech and SMS group S.p.A. in Vietnam and Italy, and we expect further growth.

In our Odisha workshop, capacity utilization is high at present. The quality of products manufactured there has attracted the attention of other companies from the basic materials industry, and we want to increase the portion of manufacture on behalf of companies out-

side SMS group. It goes without saying that we will continue to support the group and manufacture components for it within the scope of global engineering. Here, too, we are facing new and exciting challenges as more and more colleagues from SMS group want to place design and programming services with us.

Why should steel producers in India handle their projects with SMS group?

Most customers in India have a clear preference for the technology of SMS group. This fact combined with our customer orientation and our aim to complete every order successfully provides the basis for the market position of SMS India. The plants of our customers are digitally commissioned during the Plug & Work test in our Gurgaon test field. All new automation systems are completely set up there, tested and pre-optimized long before erection work on site is started. This concept permits valuable time to be saved already in the forefront of the erection and commissioning phase.

What are the challenges faced on the Indian market and how does SMS group master them?

One thing is clear in India which is the intention to advance the country's position as second

largest steel producer worldwide. However, it is more difficult to predict the time frame for this expansion. Nevertheless, India will remain one of the largest growth markets for steel. At the moment, the market is experiencing a concentration with the result that Tata Steel and JSW Group headed by Sajjan Jindal in addition to state-run steel producers are the three major customers of SMS group. Said concentration makes us continue to provide maximum quality, and this applies to our sales activities, the handling of orders and our service performance.

What role does digitalization play at SMS India?

SMS India is establishing a programming center for SMS digital. The project is supported by our electrical and automation systems organization as the staff there has already gained digital expertise. Some time ago, our E&A department in Kolkata programmed an app transferring production and plant data from the level-2 system to the mobile devices of the customer's staff and visualizing the data there. This pilot project was implemented for a steel-works of JSW Group.

Can modernization concepts be easily implemented in the plants of our Indian customers?

Most of the modernization projects SMS India is currently engaged in come from the field of environmental technology sector as governmental emission requirements have become more stringent in India. Further modernization projects in the hot rolling mills sector were and are executed in cooperation with the Flat Rolling Plants division in Germany, with SMS India being responsible for electrical and automation systems. The Technical Service division is handling some interesting projects covering the renewal of hydraulic systems for presses.

With the Technical Service and own workshops, SMS group is close to its customers



ULRICH GREINER PACTHER,
CEO & MANAGING DIRECTOR, SMS INDIA PVT. LTD.

worldwide. How is the situation in India? And where does the customer find SMS group there?

The service workshop is part of our manufacturing facilities in Bhubaneswar. It is active in the reconditioning of core components (among them AGC cylinders, gear units, drive spindles, coiler mandrels). In addition, mold copper plates are electrolytically plated, rollers repaired by buildup welding and defined process rollers ceramically coated (HVOF). A mobile service department is presently being established for forging technology equipment. Over the last few years, the service business has experienced an annual growth of 15 to 20 percent. ♦



Ulrich Greiner-Pachter
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SHAPING THE FUTURE OF MOBILITY IN INDIA

Two current orders demonstrate how SMS group is shaping modern mobility in India with its plants and equipment.

With the new factory for forged railway wheels in Rae Bareli, the Indian customer Rashtriya Ispat Nigam (RINL) will be able in future to produce 100,000 wheels per year. This not only strengthens domestic production, but also reduces India's dependence on imports of rolled wheels that are used for locomotives and passenger cars. The plant will create between 500 and 600 new jobs in total.

RINL chose SMS group for this major project since the SMS staff had already proven to be a competent partner in the construction of a continuous casting plant.

Together with the German NSH Group, SMS group is in charge of the engineering, delivery, assembly, and commissioning of the new wheel rolling mill in Rae Bareli, while, apart from the delivery of the furnace equipment, SMS India is responsible for the entire EPC scope. Commissioning is scheduled for 2019.

ORDER FOR NEW RAIL WELDING LINE FOR INDIAN RAILWAYS

The order is part of a project of National High Speed Rail Corporation Ltd. (NHSRCL), a joint venture between the Government of India and participating state governments, and makes SMS India directly contribute to building up India's first high-speed railway system.

SMS India will establish the entire facility for the rail welding line for the high-speed rail corridor between Ahmedabad and Mumbai in Sabarmati Ahmedabad. The scope includes the engineering, delivery, erection, and commissioning of the plant.

In addition to the rail welding line, SMS India will also build a Rail Service Center for short rails 13 and 16 meters in length and for 260-meter-long welded rails. The welding line is designed for long welded rails (LWR) for India's first high-speed train. An ambitious lead time of 14 months is planned for this significant project of Indian Railways. ♦



Rail production plant.



An 18 MN extrusion press „Made in India“, ready for delivery to the customer.

Close to Indian customers

Since 2011, the equipment of the forging division of SMS group has been successful in the Indian market. During this period, SMS India started preparations for manufacturing extrusion presses in India. This approach was in sync with the “Made in India” concept floated by the Government of India to promote Indian resources. SMS India is the only company manufacturing extrusion presses of world-class standard in India. It took about a year to design the first machine from concept to completed product. To date, SMS India has manufactured and delivered to its customers six extrusion presses of different sizes. Meanwhile, the market could be opened up and a close relationship was established with all customers.

Tata Steel highly appreciates X-Pact® Service

Tata Steel expressed its full satisfaction with 24/7 hotline and TELEServices of SMS group in its Jamshedpur CSP® plant.

In 2012, SMS group and Tata Steel jointly commissioned the X-Pact® electrical and automation systems for CSP® plant, BOF converters, twin LFs and the secondary metallurgy at the Jamshedpur site.

Recognizing the usefulness of TELEServices even in the warranty stage and the need for expert assistance for the automation systems, Tata Steel placed another order in 2014 covering technical support for the CSP® automation via 24/7 hotline and TELEServices. Since then, the contract has been renewed every year.

In its Letter of Appreciation issued in June 2019, Tata Steel acknowledged the usefulness of the services provided under this contract according to which the company was not only provided with support related to the application software and the installed automation systems, but also with further suggestions and solutions relating to operational and quality targets.

The support has been jointly rendered by teams of SMS group in Germany and SMS India Pvt. Ltd. to meet Tata Steel's expectations of fast response and problem resolution. ♦



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Ralf Mackenbach
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The equipment of Esmech Equipment Pvt. Ltd. includes a high share of components manufactured in-house. The photo shows the Warda production site.



More than

500

employees are working for Esmech in the fields of design, manufacture, commercial management and on-site activities.

SUCCESSFUL TOGETHER FOR MORE THAN A DECADE

In order to be even closer to customers in the emerging markets and to support them with expertise in cold rolling mills and strip processing lines, the joint venture Esmech Equipment Pvt. Ltd. was founded ten years ago.

Driven by the intention to provide especially the young emerging steel industries in Asia and neighboring regions with optimally customized technology for cold strip production, SMS group and HB Esmech Pvt. Ltd., India, founded the joint venture company Esmech Equipment Pvt. Ltd. in 2009. Since that time, the joint venture has helped to significantly reduce the dependency on imports of high-quality cold strip for numerous countries, like Pakistan, Bangladesh, Vietnam and Thailand, by systematically establishing state-of-the-art production facilities. In recent years, several new cold strip production facilities, comprising rolling mills and strip processing lines, were supplied and commissioned by Esmech. Technical responsibility for the electrical and automation systems was with SMS group who tested the new equipment by means of real-time simulation in the Gurgaon Plug & Work test field.

PLANT TECHNOLOGY AT FAIR PRICES

With this localized setup of SMS group, ambitious cold strip producers are getting ac- ▶

cess to premium plant technology and holistic systems expertise at fair prices. Moderate investment costs are realized by manufacturing equipment in-house in the modern production facilities of Esmech in Thane and Wada near Mumbai. This ensures that the demanding quality standards of SMS group are met without any compromise. Components directly influencing the quality of the cold rolled products are supplied from SMS group Germany. For cold rolling mills these include the CVC®plus roll shifting technology as well as the X-Shape flatness measuring system. Numerous customers are convinced by this concept and based on their positive experience, they again trust in Esmech Equipment Pvt. Ltd. in cooperation with SMS group as supplier for further capacity extension.

A fact worth mentioning is that in Vietnam alone, in the past six to seven years, Esmech has installed a cold rolling capacity of three million tons per year and a strip coating capacity of one million tons per year. ♦

PRODUCT RANGE OF ESMECH EQUIPMENT PVT. LTD.

- Single- and two-stand reversing cold rolling mills
- In- and offline skin-pass mills
- Galvanizing and aluminium-zinc coating lines
- Color coating lines
- Pickling lines
- Cut-to-length and slitting lines
- Recoiling lines
- Electrolytic cleaning lines
- Tension levelling lines
- Rewinding (recoiling) and trimming lines
- Blanking lines
- Special-purpose lines



Pickling line at Nam Kim Steel, Vietnam.



Continuous galvanizing line (CGL1) featuring an inline skin-pass mill at Nam Kim Steel, Vietnam.



Two out of three CCM®s completely supplied by Esmech Equipment and SMS group to the Vietnamese cold strip producer Hoa Sen Group.



Successful in growth markets

Included in the impressive number of totally 419 plant references are complete cold rolling complexes, comprising rolling mills and strip processing lines, supplied by Esmech Equipment in recent years. Among the customers are:

- Tata Group (Tata Steel, Tata BSL, TSPDL), India
- JSW Ltd., India
- Starcore Ltd., Thailand
- Nam Kim Steel, Vietnam
- Hoa Sen Group, Vietnam
- BMW Industries, India
- My Viet, Vietnam
- ISL, Pakistan

In the field of cold rolling mills, there is a special demand, in addition to single-stand reversing cold mills (RCM), for two-stand Compact Cold Mills (CCM®) designed for annual production capacities between 500,000 and 900,000 tons. Regarding this type of mill, SMS group has gained market leadership. Plant owners operating on dynamic markets find it especially attractive to use plant concepts as well as electrical and automation system solutions the joint venture offers for the cost efficient extension of an existing RCM into a CCM®. Esmech's reference list includes five new two-stand reversing cold mills and the expansion and conversion of two single-stand mills into two-stand reversing mills.

INTERVIEW

“THERE IS NO ALTERNATIVE TO IN-HOUSE MANUFACTURE”

Suresh Joshi and his son Vijay Joshi, both part of the managing board of Esmech Equipment Pvt. Ltd., talk about tradition, potential and customer benefits.

Mr. Joshi, Esmech Equipment Pvt. Ltd. has been operating in the market for more than ten years. When you look back on this period – is there anything special that makes you proud?

Suresh Joshi: Yes, certainly. There are many such events and developments. The first proud moment was when SMS found us to be competent enough and approached us for forming a joint venture. I had always regarded the technology of SMS to be the ultimate one in the field of metallurgical equipment and had a dream to be associated with SMS. This dream has come true. Thereafter, there were many of such occasions, for example the successful commissioning of the first single-stand CVC® reversing cold mill, a twin-stand reversing cold mill and follow-up orders from the customers.

The latest one we received last year when SMS group, satisfied with our performance and capability, chose us to be a major consortium partner for providing two pickling line/tandem cold mills for JSW in India. We have been entrusted with the manufacture and supply of most of the mechanical equipment, the process sections and also the media systems. On the whole, this decade since setting up the joint venture with SMS group has been the most exciting part of my life.”

As founder and owner of the company HB Esmech Pvt. Ltd. you have brought your engineering experience, but also resources, such as workshops and facilities in



“In our company, technology has always enjoyed top priority.”

Vijay Joshi, Managing Director of Esmech Equipment Pvt. Ltd.

Thane and Wada, into the joint venture. From your point of view, what are the advantages and benefits resulting for the customers?

Suresh Joshi: Based on my experience of about four decades in the manufacture of such equipment, I firmly say that there is no substitute or alternative to in-house manufacture. Apart from optimizing the cost of manufacture and hence the price for the customer, it offers several further advantages, both for us as well as for the customer. So, quality checks of all components are possible and also stage inspections of sub-assemblies and assemblies. No-load



***“The more we sweat
in our workshop,
the less we bleed at
the customer’s site!”***

*Suresh Joshi, Chairman of
Esmech Equipment Pvt. Ltd.*

tests carried out for all units before delivery to the customer and making sure each supply unit is complete, enables shortest installation and commissioning periods at the customer’s site. This saves the customer considerable costs. In-house manufacture also allows us to thoroughly test any new design concept in practice and to carry out improvements to the existing design. We say: “The more we sweat in our workshop, the less we bleed at the customer’s site!”

I am very proud of our well-equipped workshop facility and our highly skilled and experienced workforce. Additionally, I have to point out that our highly experienced engineering staff and the permanent site personnel are a great asset.

Mr. Vijay Joshi, for many years now you have been standing side by side with your father and you are working in a leading position at Esmech Equipment Pvt. Ltd. What kind of customers and countries has your

business been focusing on? And where do you see potential for your further business development?

Vijay Joshi: It has been 23 years now, since I joined Esmech. Technology has enjoyed top priority in our company ever since its inception in 1981. The company’s motto has always been to provide the world-class technology at affordable cost. Our work is mainly aimed at the regions of Asia, the Middle East and Africa. However, we have been exporting to Western countries like Germany, USA, Singapore and Japan, too. We are striving to advance our strengths and to offer projects with high quality and timely deliveries.

In my opinion, steel is shifting very fast from a global to a local matter. Most of the developing countries are therefore building up their own steelmaking and processing facilities. In the flat products sector this means the production of hot rolled strip. The rapidly increasing capacity for hot rolled coils in the developing countries including India will open up a huge market for downstream processing equipment (cold rolling and strip processing plants), which is exactly our expertise and field of operation. For the coming decade, I envisage a huge potential for our company.

We also manufacture equipment for the processing of other NF metals such as aluminium, copper and copper-based alloys. This adds up to the potential. ◆

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 **Further information**
<https://www.esmech.com/aboutUs.html>



U.S.A.

COMPLETE PROCESS CHAIN

The major challenges in the U.S. market are the speed at which steel producers require their projects to be developed and realized, and the fiercely competitive nature of the CAPEX market.



INTERVIEW

IN THE LAND OF OPPORTUNITY

The U.S.A. are not only the country where some of the largest steel plant complexes worldwide are being established. Minimills, too, have been enjoying great popularity there for quite some time.

Professor Dr. Tesè, could you please explain why U.S. steelmakers should turn to SMS group as their project partners?

SMS group has been present in the U.S.A. market for 74 years, and during this time our North American customers have developed a long-term partnership with SMS group based on trust and cooperation. For the past 30 years, our CSP® technology has been the heart of the minimill revolution in the U.S.A. for some of the most successful steelmaking customers in the world such as Nucor, Steel Dynamics and Big River Steel. SMS group's capabilities in all disciplines of plant and equipment engineering for both greenfield and modernization projects help us meet our customers' expectations. In addition, we can prove our strengths in the fields of equipment manufacturing, global logistics, service and maintenance of all facets of production equipment thanks to our network of service locations and after-market spare parts.

What kind of challenges does the U.S. market pose and how does SMS group go about these challenges?

The major challenges in the U.S. market are the speed at which our customer base requires projects to be developed and realized, and the fiercely competitive nature of the CAPEX mar-

ket. As the Leading Partner in the World of Metals, we provide price competitive solutions with low CAPEX and maintenance friendly design, along with incentivized commissioning and start-up commitments which lead to high plant availability and help our customers secure the lowest OPEX during plant operations. Modern plant design paired with minimizing the total project execution time and the implementation of SMS digital solutions, leads to overall cost savings and shorter start-up times to reach the designed plant capacity along with a better return on investment.

Very soon, we will see SMS group's next large-scale project in the U.S.A. kicked off at SDI. In your opinion, how will SMS group's positioning in the U.S. market develop in the years to come?

SMS group's position as the leading equipment manufacturer and service provider to the U.S. steel industry has been reaffirmed by the concurrent implementation of the Steel Dynamics minimill in Texas, Big River Steel's phase-2 capacity expansion and other major orders that create a record U.S. order backlog for the SMS group. These, along with three other ongoing projects, which will be realized within 2019, will increase the U.S. steel capacity by approximately six million tons to meet the market



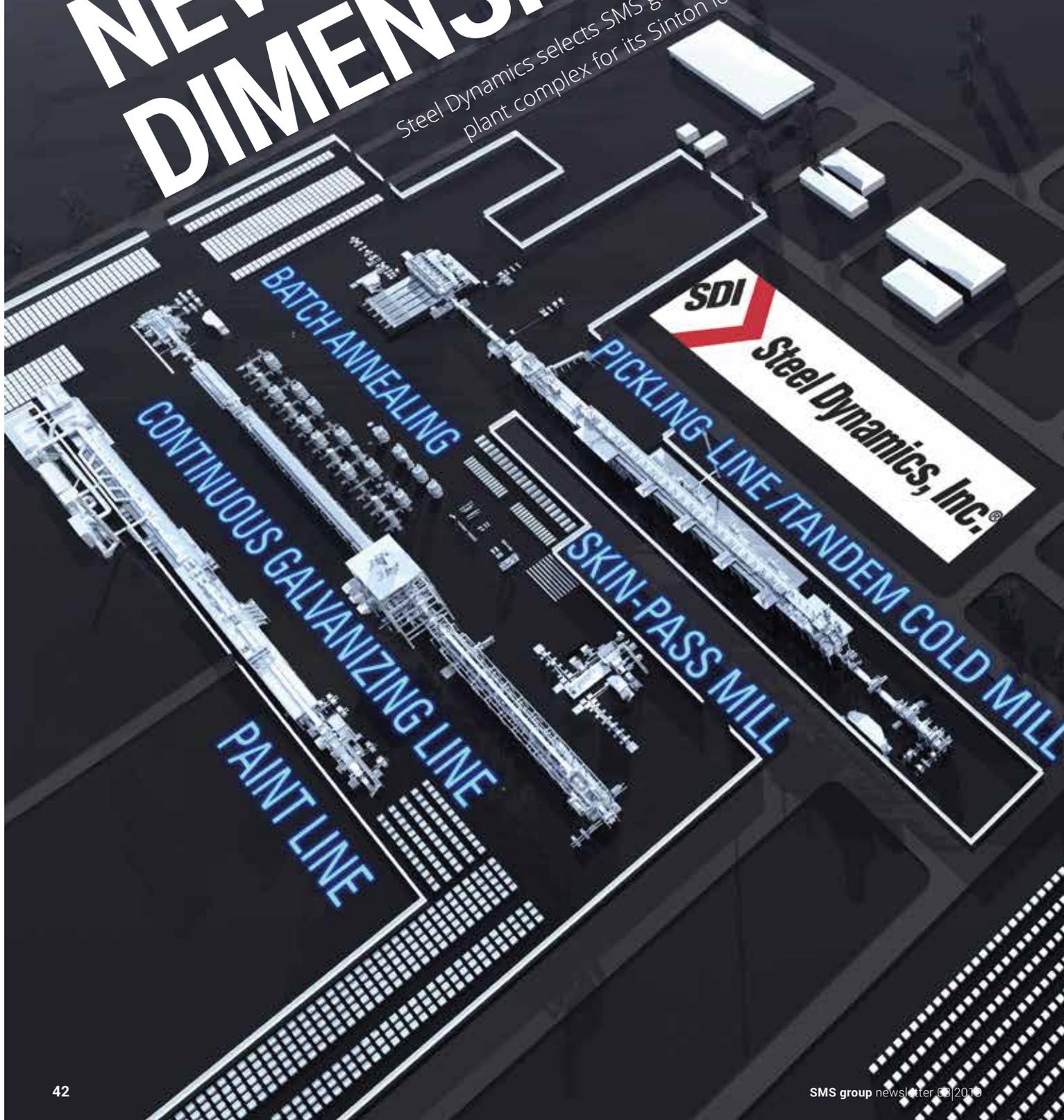
PROF. DR. PINO TESÈ,
PRESIDENT AND CEO, SMS GROUP INC.

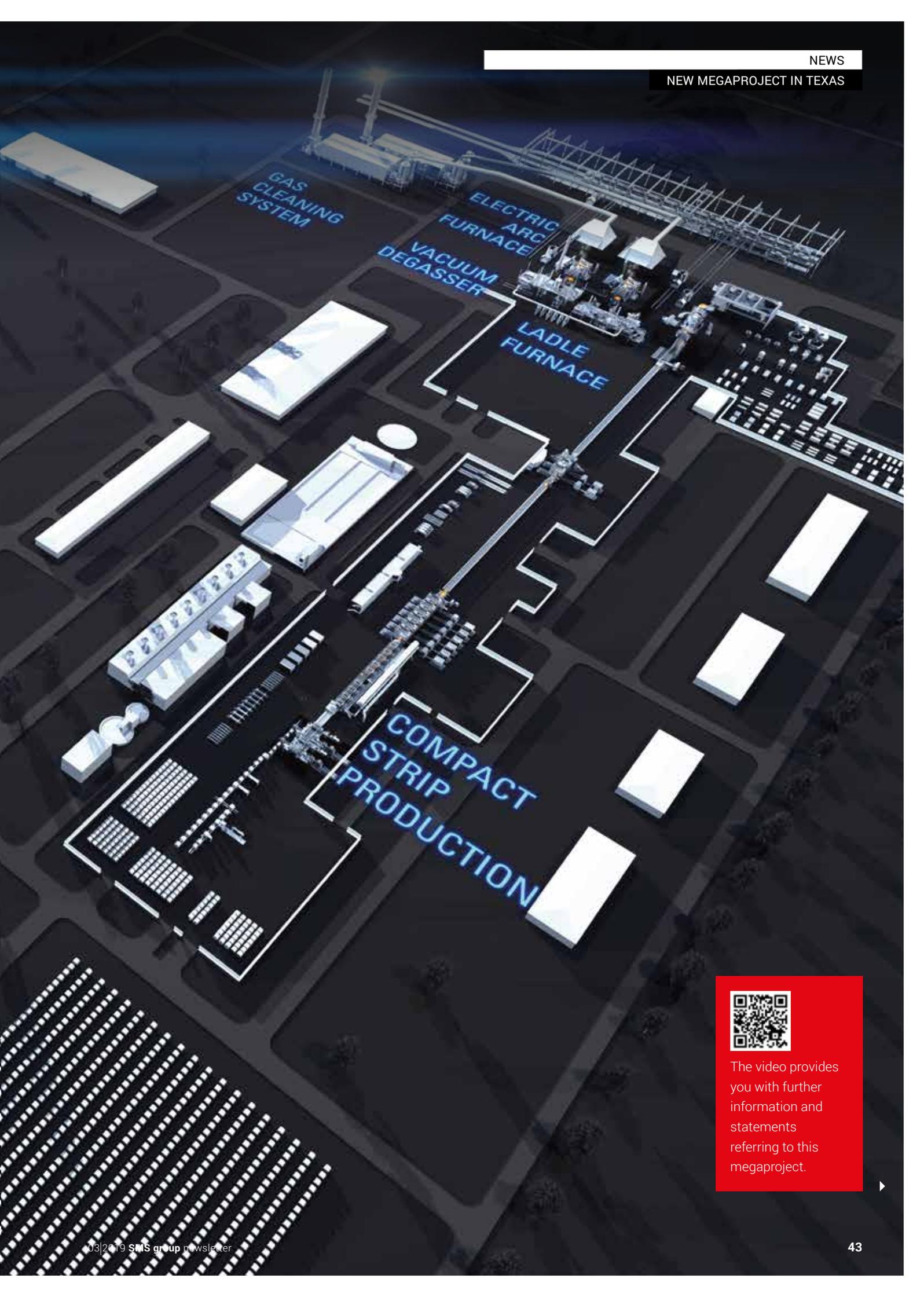
requirements of the automotive, oil and gas, and infrastructure industries. Despite this additional capacity, the U.S.A. will remain a net importer of steel. This leaves room for additional strategic projects to reduce the import volume. There are existing steel production facilities that are inefficient or obsolete and in need of modernization. The required modernizations cover both mechanical as well as electrical and automation equipment, because of the obsolete existing hardware. We strongly support the digital transformation of the U.S. steel and aluminium industry with our existing products and the development of new digital tools while continuing to further develop our U.S. based engineering and service teams, comprehensive after-sales support and quick response in emergencies. ♦

U.S.A.

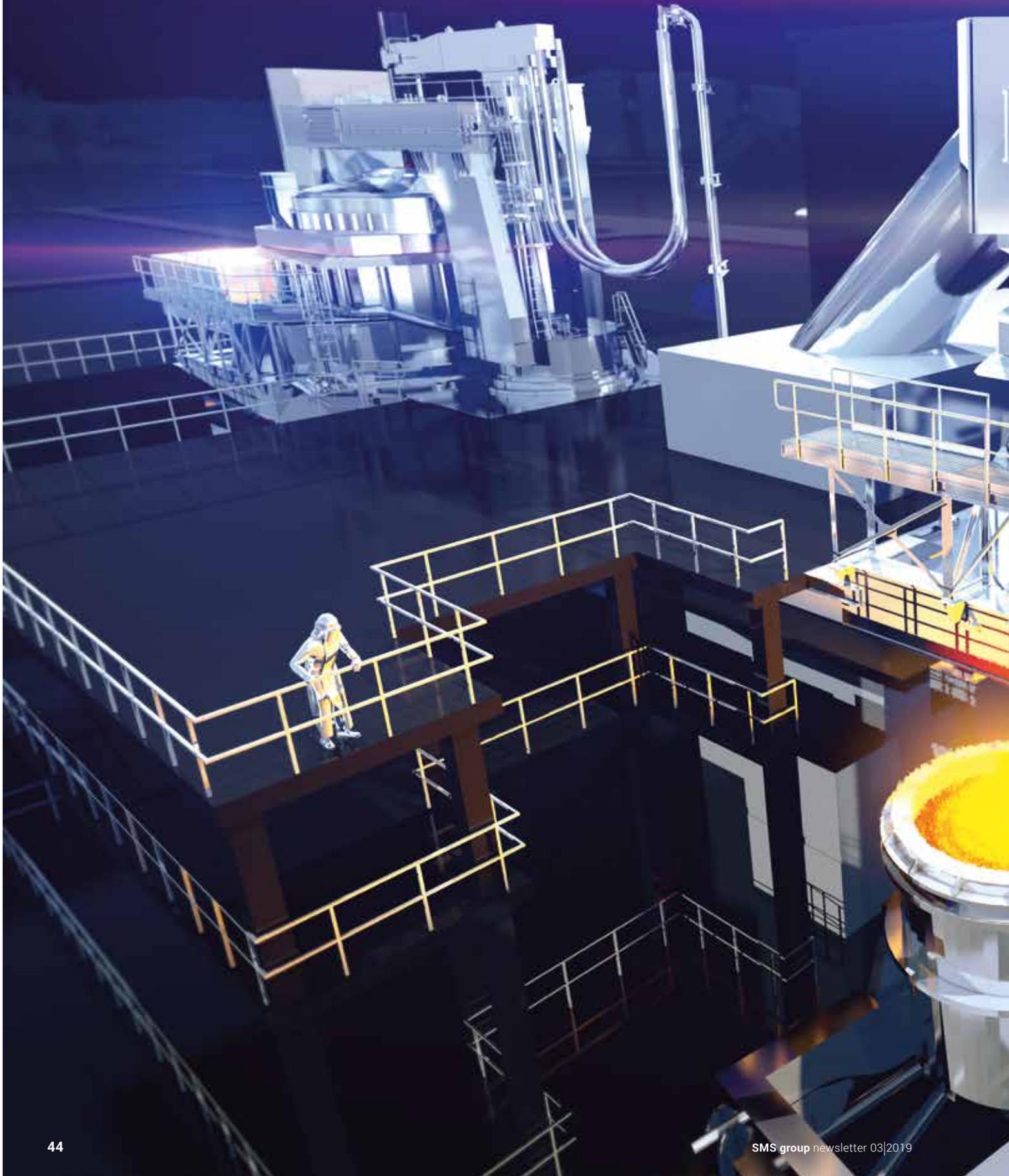
NEW DIMENSIONS

Steel Dynamics selects SMS group to supply a steel plant complex for its Sinton location in Texas.





The video provides you with further information and statements referring to this megaproject.



NEW DIMENSIONS 1

Steelworks

Equipped with two direct-current electric arc furnaces, two twin ladle furnaces and a double vacuum tank degasser.

210 short tons

(190 metric tons) is the ladle size of each of the two electric arc furnaces.

2

twin ladle furnaces

45 minutes

is the minimum tap-to-tap time to provide a ladle with liquid steel.

NEW DIMENSIONS 2

Caster

For its new production line, SDI counts on a new CSP® caster designed as single-strand curved mold plant.

8.2 short tons

(7.5 metric tons) per minute will be the caster throughput.

19.7 ft

(6 meters) per minute will be the casting speed.

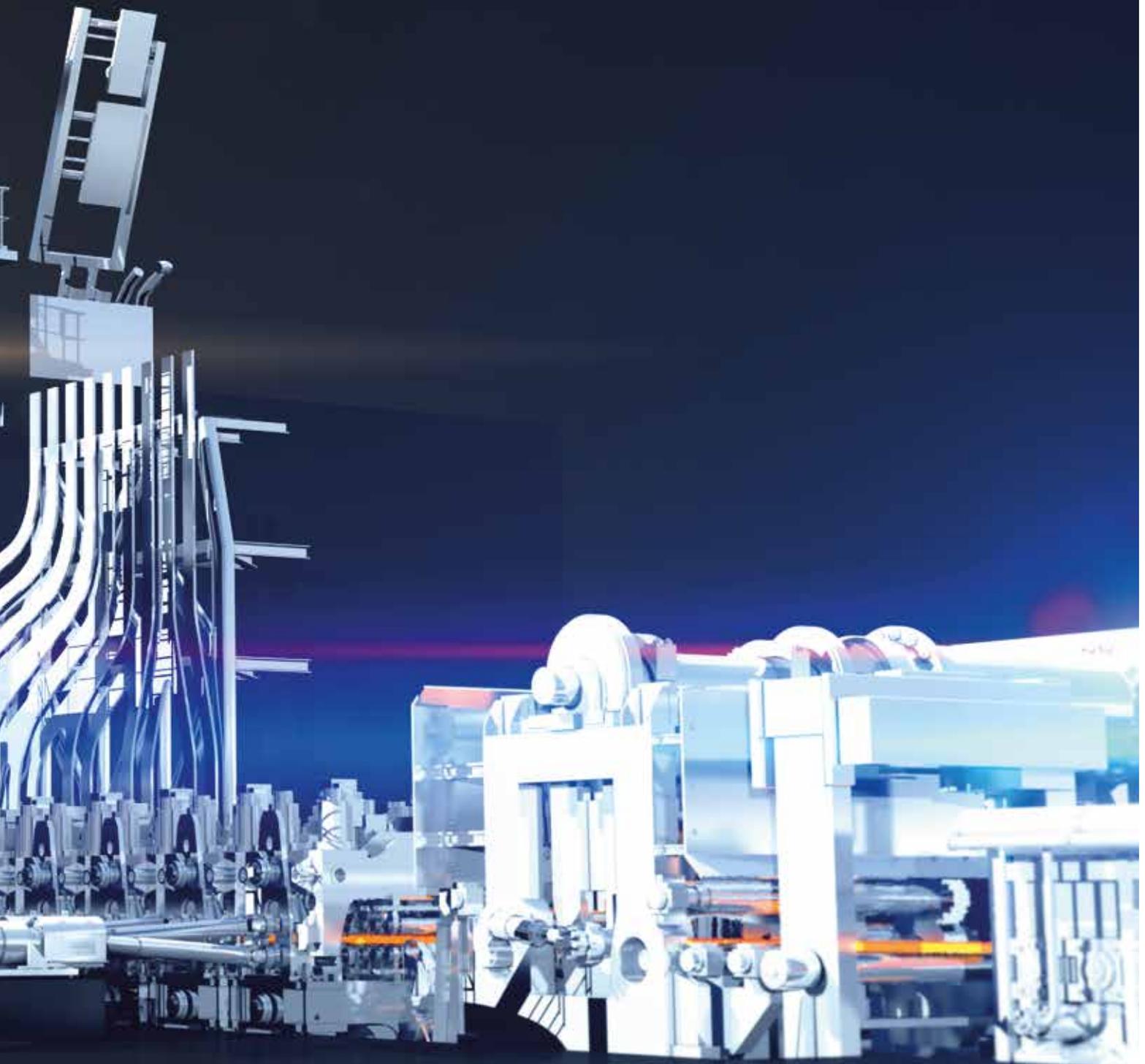
82 ft

(25 meters) metallurgical length will provide optimum conditions for production.

5.2"

(130 millimeters) will be the thickness of the thin slabs.





NEW DIMENSIONS 3

High throughput CSP[®] roughing mill

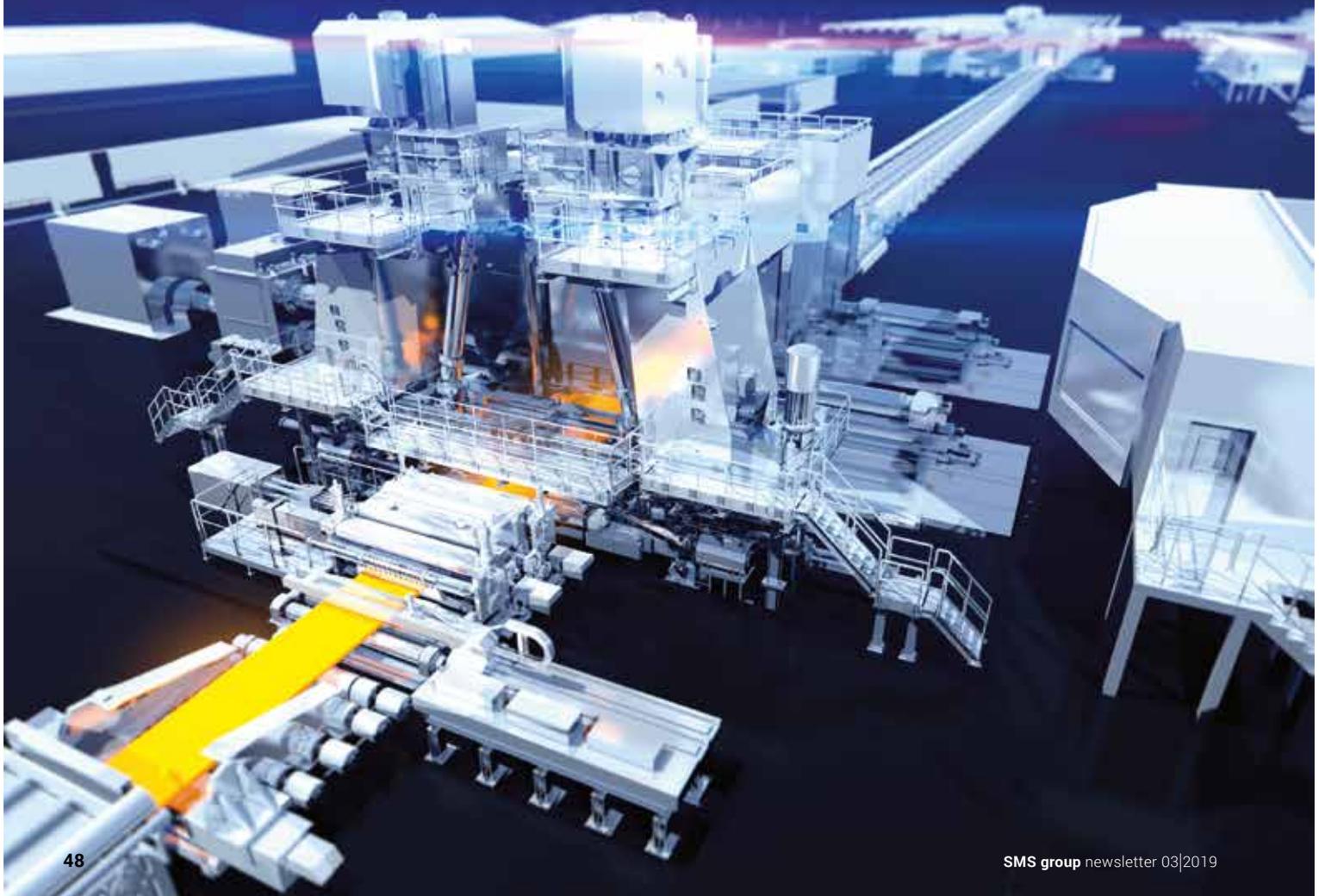
The CSP[®] roughing mill will be equipped with two mill stands.

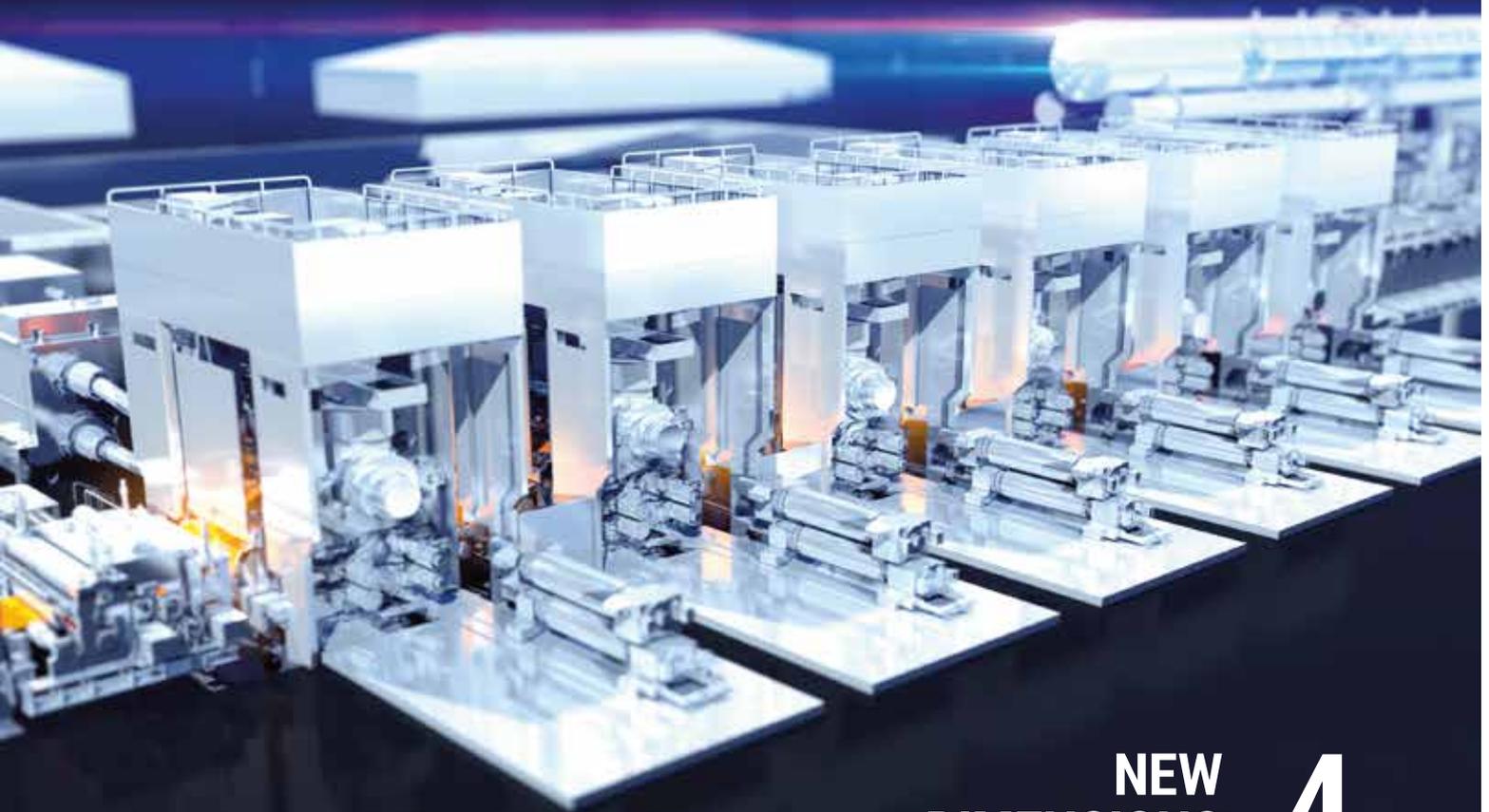
84"

(2,134 millimeters) will be the maximum width of the thin slabs to be produced.

5.9"

(150 millimeters) is the capacity of width reduction by edging.





NEW DIMENSIONS 4

High throughput CSP[®] finishing mill

Six further stands are in the finishing mill for thermo-mechanical rolling and rolling of API grades X80.

3 million short tons

(2.7 million metric tons) is the planned annual hot strip capacity of the CSP[®] plant.

1"

(25.4 millimeters) will be the maximum thickness of the API hot strip grades to be produced.

0.047"

(1.2 millimeters) will be the minimum strip thickness. ▶

NEW DIMENSIONS 5

Continuous pickling line / 6-high tandem cold reduction mill

The CSP® plant will be followed by a five-stand pickling line/tandem cold mill equipped with the latest turbulence technology.

1.1 million short tons

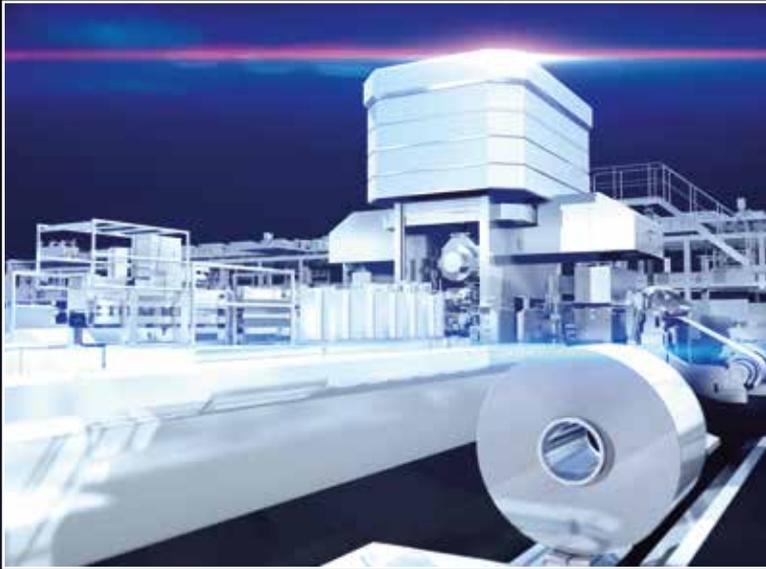
(1.0 million metric tons) is the planned maximum pickling capacity per year.

78"

(1,981 millimeters) will be the maximum strip width.

0.08"

(0.2 millimeters) will be the minimum cold strip thickness at the end of the rolling process.



NEW DIMENSIONS 6

Temper mill

SDI's new skin-pass mill will be able to process hot and cold rolled strip, however, with the focus on cold strip skin-passing.

440,000 short tons

(400,000 metric tons) of hot and cold strip is the planned annual capacity of the plant.

NEW DIMENSIONS 7

Continuous galvanizing / galvalume line

The continuous galvanizing line will provide all conditions needed to process high-strength steel grades.

550,000 short tons

(500,000 metric tons) per year is the planned processing capacity of the galvanizing line.

0.16"

(4.0 millimeters) will be the maximum possible strip thickness referred to 76" (1,930 millimeters) strip width.



- **The new steel plant complex** will have an annual capacity of 3 million short tons (2.7 million metric tons) and set new standards in plant productivity.
- **The supply scope of SMS group** covers two electric arc furnaces, a CSP® plant, a pickling line/tandem cold mill, a cold rolling mill, a skin-pass mill and a galvanizing line.
- **From 2021 on, the works** will produce high-strength steel tubes, multi-phase steels for the automotive industry and structural steels.

Steel Dynamics, Inc. has awarded SMS group an order covering the supply of a steelworks complex for its Sinton location in Texas, U.S.A. Steel Dynamics, Inc. (SDI) has selected SMS group to supply a complete steel production line from the steelworks to the CSP® plant, further to the cold rolling mill and to the galvanizing line for its Sinton location in the state of Texas, U.S.A.

With an annual capacity of over 3 million short tons (2.7 million metric tons) of steel the plant's productivity is setting new standards. In addition to the mechanical equipment from the liquid phase up to strip processing, the scope of supply by SMS group comprises X-Pact® electrical and automation systems as well as technical support during installation and commissioning.

PERFECTLY HARMONIZED SOLUTIONS

For SDI's production line, the systems supplier SMS group will supply the following components: The steelworks will be equipped with two direct-current electric arc furnaces (DC-EAF) having a capacity of 210 short tons (190 metric tons) each and two twin ladle furnaces (LF) and a double vacuum tank degasser (VD). It will have an annual capacity of liquid steel of over three million tons.

The CSP® plant will enable SDI to produce thin slabs with thicknesses of up to 5.2" (130 millimeters) and slab widths of up to 84" (2,134 millimeters).

The CSP® continuous caster is designed as a single-strand curved mold plant (VLB – Vertical Liquid Bending). With a metallurgical length of over 82 ft (25 meters) a yield of 8.2 short tons (7.5 metric tons) per minute and casting speeds of up to 19.7 ft/min (6 meters per minute) are attained.

An eight-stand rolling mill will enable SDI to produce API hot strip grades with thicknesses up to 1" (25.4 millimeters) and widths up to 84" (2,134 millimeters). The mill is designed for a minimal strip thickness of 0.047" (1.2 millimeters).

This CSP® plant will have a hot strip capacity of 3 million short tons (2.7 million metric tons) per year. "With this new plant for SDI, SMS group will again make a statement for cost-

efficient production paired with higher throughput and better quality," says Cosimo Cecere, Head of Sales and Project Management CSP® Plants, SMS group.

Following the CSP® plant, a five-stand pickling line/tandem cold mill will be arranged. To meet future demands, the process section of the pickling line/tandem cold mill (PL/TCM) will be equipped with SMS group's latest turbulence technology and a 600-kN leveling unit. With the aid of a payoff reel upstream the tandem cold mill, the pickling line and tandem cold mill can be operated in parallel and independent of each other. This permits the hot strip to be pickled and oiled or directly guided to the tandem cold mill. The annual pickling capacity will be 1.1 million short tons (1.0 million metric tons).

The five-stand, six-high tandem cold mill will have a wide roll gap setting range and thus ensure excellent cold strip tolerances and strip flatness. The maximum strip width will be 78" (1,981 millimeters). The tandem cold mill will be able to roll the cold strip down to 0.08" (0.20 millimeters) thickness. A carousel reel will finally coil the rolled cold strip. In coupled mode with the continuous pickling line the annual capacity will be 850,000 short tons (0.77 million metric tons).

The skin-pass mill for post-treatment of hot and cold strip, with emphasis on cold strip skin-passing, is designed for an annual capacity of 440,000 short tons (0.4 million metric tons).

FIT FOR THE FUTURE

For cold and hot strip galvanizing, the plant will be equipped with a continuous galvanizing line including a horizontal Drevler furnace heated by a direct-fired and a radiant-tube zone. The line will be prepared for the later installation of an ultra-fast gas cooling section to allow for future production of high-strength steel. The scope of supply also includes a DUMA-BANDZINK air knife system that will homogeneously and precisely set the zinc layer thickness to ensure high surface quality. A change system with two zinc pots will permit the strips to be coated with a conventional zinc layer or an aluminum-zinc alloy. For post-treatment, the line will be equipped with a four-high skin-pass mill stand, a tension leveler and two

Smart investment
For its new steel plant complex, SDI will invest in state-of-the-art technologies – and hence in a promising future.



“The leading position in technology and the longstanding partnership between SDI and SMS group were the decision-making factors for awarding the order to SMS group.”

Mark D. Millett, Co-Founder, President and CEO, Steel Dynamics Inc.

horizontal shuttle-roll coaters, as well as with an oiling machine in the exit section. The galvanizing line will be able to process strips with a thickness of up to 0.16" (4 millimeters) and a width of up to 76" (1,930 millimeters). Its annual capacity will be 550,000 short tons (0.5 million metric tons).

For the complete technological part of the new plant complex, the X-Pact® electrical and automation systems included in the supply scope are an important factor. They make sure that productivity, production flexibility and quality of the final products will meet both actual and future requirements. The applied concept and the equipment provide a solid foundation for the digitalization of the plants and processes and for future-oriented extensions and applications. Diagnosis and visualization concepts will be used throughout the entire plant complex. They assure and sustain effective and preventive maintenance activities.

SDI intends to sell the products in the rapidly expanding markets of high-strength steel tubes, multi-phase steels for



“Steel Dynamics and SMS group have successfully completed numerous highlight projects in the past. In constructing the new plant complex in Sinton, Texas, we continue our fruitful and trusting partnership. The new project will once again illustrate the position of SMS group as Leading Partner in the World of Metals.”

Burkhard Dahmen, CEO, SMS group

vehicle construction and structural steels for various applications. With this new type of minimill, SDI will become the leader in hot strip production. In particular, it is the new, extremely high-performance continuous caster in combination with the proven thermo-mechanical rolling process that will allow the production of special steels in unprecedented dimensions.

Steel Dynamics, Inc. (SDI), headquartered in Fort Wayne, Indiana, is one of the largest steel producers and metal recyclers in the United States with production facilities located throughout the U.S.A. and in Mexico. ◆



Roger Smith
roger.smith@sms-group.com



The contract for the megaproject was signed in Pittsburgh. In the front row: Glenn Pushis - showing the contract document - between Pino Tesè (right) and Frank Benner, both SMS group.

NEW DIMENSIONS THE PROJECT IS WELL UNDERWAY

Representatives of Steel Dynamics Inc. came to Germany to discuss details of the recently signed contract with SMS group and visited SMS group's locations in Germany.

Shortly after the contracts for the megaproject in Texas had been signed, a high-ranking delegation of Steel Dynamics Inc. visited the SMS group locations in Düsseldorf, Mönchengladbach and Hilchenbach. The delegation stayed several days at each location to discuss details of the project.

In Mönchengladbach, Gunnar Böttcher, Sales Additive Manufacturing and Powder Metallurgy, showed the guests from the U.S.A. and SMS group representatives in charge of the project around the powder atomization plant, explaining, among others, the crucial role of the powder quality in 3D

printing. The guests were eager to ask questions about the production process, which Gunnar Böttcher was happy to answer. Summarizing this first part of the tour, he states: "The group showed great interest in our powder pulverization plant and I got the impression that the guests from SDI greatly enjoyed the opportunity to see this new technology live for the very time."

The tour continued with a visit of the workshop. Tino Stiels, Head of Assembly, accompanied the guests through the various production halls. "The visitors showed enormous interest in our facilities. They were deeply impressed by our production capabilities," comments Tino Stiels.

The tour was concluded with a visit of the test center. Blagoje Uscumlic and Matthias Tornow, representing the Business Unit Electrical and Automation Systems, explained the Plug-and-Work tests, how they are employed and what benefits they provide for the customers. Again, the guests were extremely interested in the technology and eager to learn more about it.

Glenn Pushis, Senior Vice President – Special Projects at SDI, summarizes his impressions from the visit of the SMS group facilities in Mönchengladbach: "This is my first visit to Mönchengladbach, and I'm really impressed. Everything is very professional. It has been a great experience to see the SMS group test center, and I'm very happy for my colleagues who will soon be working intensively with this great technology."

Frank Benner, responsible for the SDI project on the SMS group side, adds: "We had many meetings on every day of the visit. But not least the tours of our facilities allowed SDI to get to know us – and our products and services – even better and see how we manage and implement our projects to the full satisfaction of our customers." ♦



GLENN PUSHIS, SENIOR VICE PRESIDENT –
SPECIAL PROJECTS, SDI

INTERVIEW

PIONEERS IN NORTH AMERICA

Mr. Pushis, what are your feelings about this mega-project lying ahead of you?

It's such an honor to be in charge on the SDI side and working with SMS group on this extremely important project. There are no large steel mills in Sinton, Texas. Therefore this project is going to be very exciting. We have been very well received in this portion of the south-western part of the United States. It's an honor to be working on this.

What is so special about this project?

The new generation of CSP® technology merges the minimill front end and the meltshop along with the integrated steel mill for thermal mechanical rolling. We are excited to be pioneering this with SMS group in North America.

You and your colleagues have come to Germany to discuss further details of the project. How has the cooperation with SMS group been so far?

The team work is excellent. We had two intense days of meetings. Great communication - from the steelmaking plant all the way through to the out-of-line temper mill. We had a great exchange of ideas and we are looking forward to getting this important project up and running quickly together with SMS group.

What is your impression about the production facilities that you have seen?

The SMS production facilities are absolutely first-class. This is one of the reason why we chose SMS group for this important SDI project. The production facilities are very professional, very organized and very clean. ▶

GREAT!

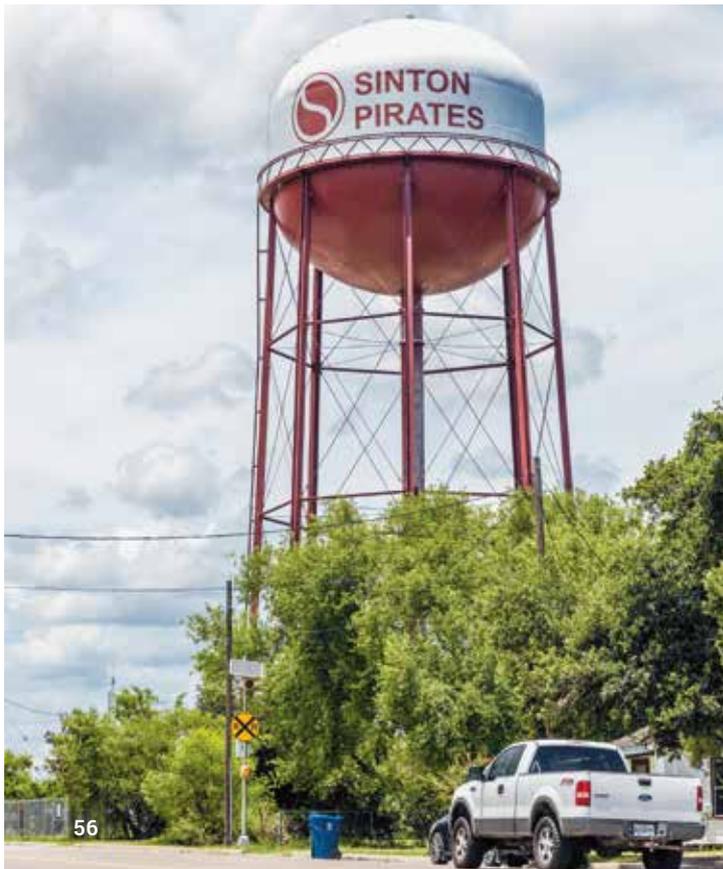
A high-ranking delegation from Steel Dynamics Inc. visited the German locations of SMS group.



NEW DIMENSIONS WINNERS WHEREVER YOU LOOK

A whole region benefits from the construction of SDI's new steel production line.

The new works of Steel Dynamics Inc. (SDI) is scheduled to go on stream in mid-2021. Service providers and regional representatives around the new Sinton site in the state of Texas are awaiting the day of production start with rising anticipation. This large-scale project will not only increase steel production, but also strengthen the regional economic power in San Patricio County which has its administrative headquarters in Sinton. Another important city is Corpus Christi, a seaport located close to Sinton on the Gulf of Mexico. From here, SDI's end products will be shipped to the customers by sea routes, among others. ♦



John Hobson,
Manager,
City of Sinton

"The inhabitants of Sinton are pleased that SDI as a major employer selected our city as production site. Building the new plant will open up new opportunities to many people in Sinton and especially to the young generation. They are ready and look forward to working with SDI."



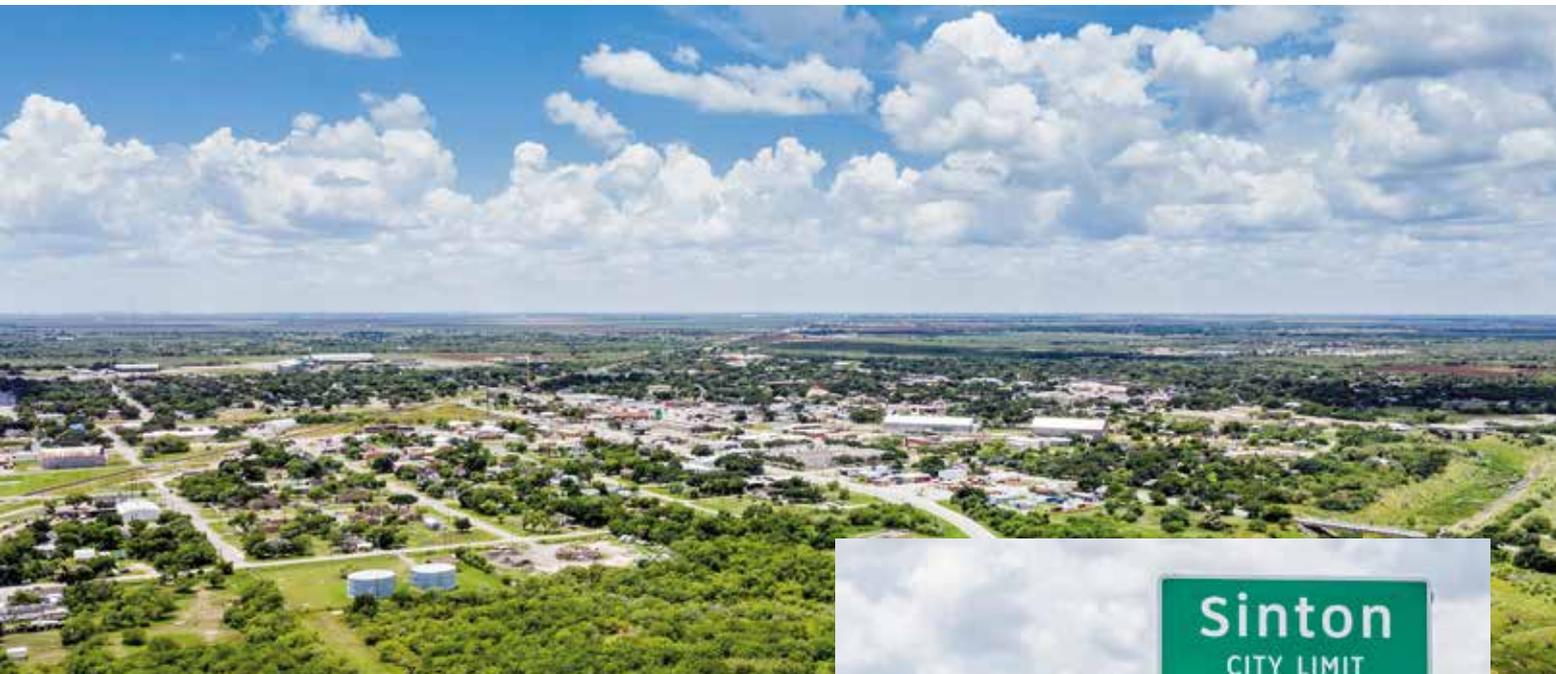
Foster Edwards,
Executive Director,
San Patricio
Economic
Development
Corporation

"SDI creates new job opportunities in San Patricio County. We hope that many other companies will follow and come here as well to participate in the SDI project."



Wes Hoskins,
Commissioner,
Port Corpus Christi

"I am looking forward to the partnership with SDI. It is a benefit for us and the entire San Patricio County. The port in Corpus Christi and the surrounding area have been cooperating with many international companies for long. SDI will soon enlarge the number, and that is nothing but an asset."



Iain Vasey,
President and CEO,
Corpus Christi
Regional Economic
Development
Corporation

“Many international companies have settled in the Corpus Christi region. The new project of SDI and SMS group demonstrates that our region is becoming more and more attractive. The increasing number of new industrial sectors provides an incentive to the young generation, too, to stay at home for work.”



Tommy J. Kurtz,
Vice President,
Corpus Christi
Regional Economic
Development
Corporation

“It is not SDI’s new works alone that will create jobs. Further companies will come to the south of Texas as a consequence, and will help the economy of the region to keep on growing.”

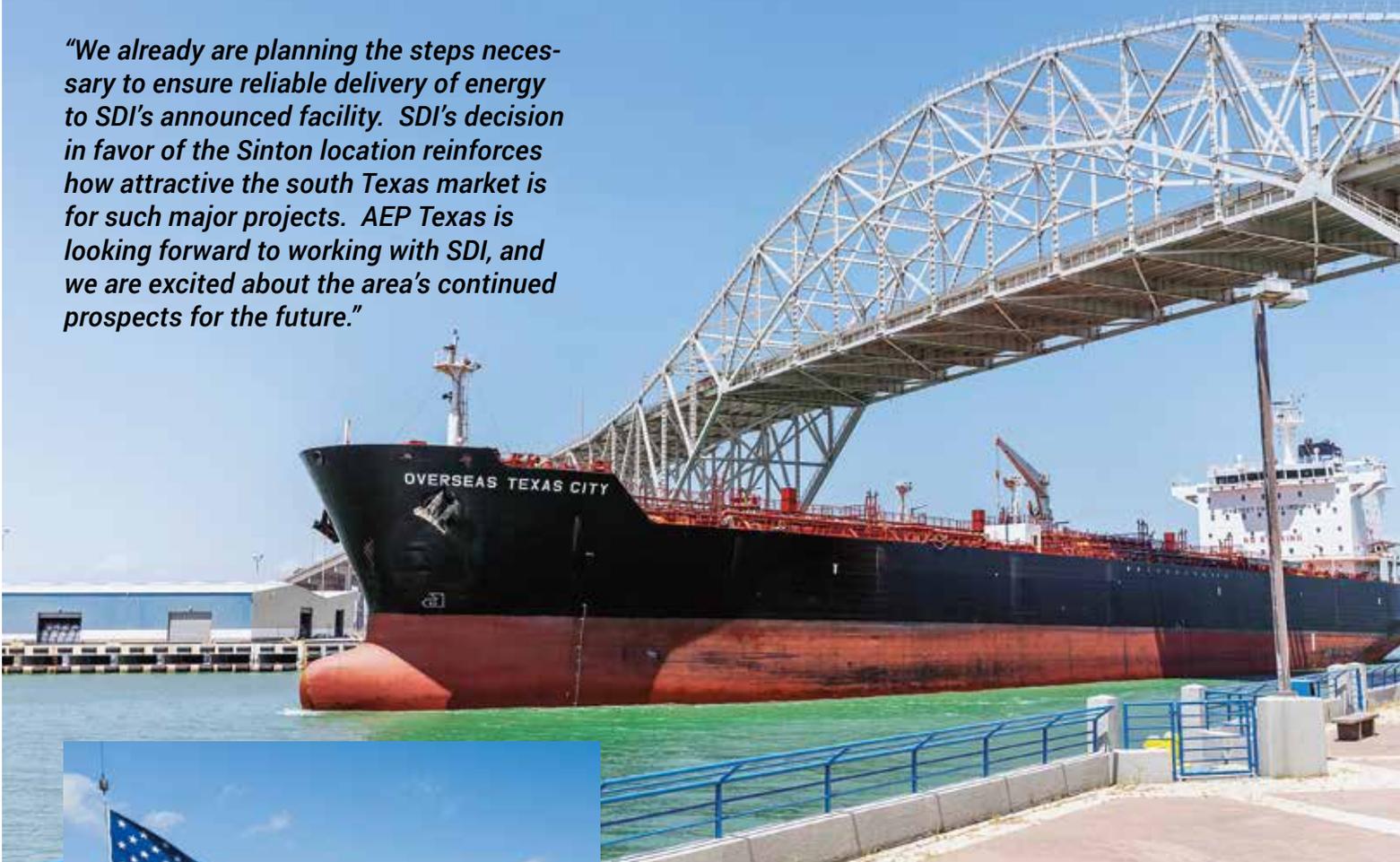


Within the next two years, the new steelworks complex of Steel Dynamics Inc. (SDI) will be established on green field. Together with his colleagues from SMS group, Will Hawley, Construction Manager at SDI, is watching the progress in construction. ▶



Judith E. Talavera,
President and COO,
AEP Texas

“We already are planning the steps necessary to ensure reliable delivery of energy to SDI’s announced facility. SDI’s decision in favor of the Sinton location reinforces how attractive the south Texas market is for such major projects. AEP Texas is looking forward to working with SDI, and we are excited about the area’s continued prospects for the future.”



The port of Corpus Christi is purely used to handle goods. As to the tonnage it is the sixth largest port of the United States of America.



Joe McComb,
Mayor, City of
Corpus Christi

“For Corpus Christi and its environs, the new works of SDI will certainly be an asset and create new jobs. I am sure that sooner or later many of the employees will discover our city for themselves and for their families.”



Sean C. Strawbridge,
Chief Executive
Officer, Port
Corpus Christi

“SDI and SMS group have maintained a longstanding partnership, and the Port of Corpus Christi supports these type of relationships by providing critical infrastructure necessary for such large industrial developments. SMS group and SDI can rest assured we will continue to develop the necessary marine facilities and multi-modal connectivity to handle the large equipment and materials SDI requires to be successful here in South Texas.”



David R. Krebs,
County Judge,
San Patricio County

“We welcome SDI as well as all companies working on behalf of them with open arms. I am sure San Patricio County will see further development.”



Marshall Davidson,
Chair, San Patricio
Economic
Development
Corporation

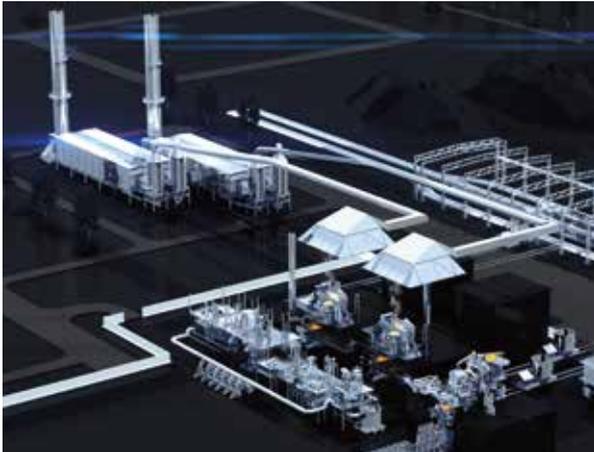
“We feel honored that with SDI the steel industry has found its way to our region. So, families will meet with good working conditions in their immediate neighborhood. And this is a reason to settle here for a long time.”

AMOVA – COIL TRANSPORT WITH INTEGRATED SAMPLING STATION AND INSPECTION UNIT

Being part of SMS group, AMOVA was selected to supply the logistics systems for the hot rolling mill. The walking beam conveyor integrated in the transport line advances steel coils up to a weight of 48 tons and 2.4 meters in diameter from the coilers to the unloading stations. In addition to strapping machines and marking robots made by AMOVA, the transport line includes an inspection station serving for cropping, sampling and the visual inspection of strips that are up to six millimeters thick.

For the purpose of sampling, the coils are directed to a sampling station which is arranged parallel to the coil transport line and able to handle strips up to a thickness of 25.4 millimeters. It is especially high-strength steel grades and X-grade tube steels that are processed here since, under conventional conditions, they are extremely difficult to process. The fully automated sampling station can handle up to ten coils per hour. This sampling station is the fourth one of all and the second one integrated in a transport line for hot coils having a temperature of up to 700 degrees Celsius.

With this worldwide patented sampling station, AMOVA continues to strengthen its position as market leader in automated sampling stations for high-strength and ultra-high-strength steel grades with strip thicknesses of up to 28 millimeters.



Quality



Industrie 4.0



Productivity



Efficiency

PERFORMANCE MODULES

Improving competitiveness with manageable investments.

SMS group is continuously developing a multitude of solutions to substantially improve the competitiveness of plants with manageable investments. These technologies, components, automation solutions and services are classified as performance modules. Each individual module helps customers improve the performance of their plants in one or several dimensions and hence achieve a competitive edge in a tough market environment. This means the modules will not only increase plant productivity and product quality, but also reduce operating costs and permit new, high-margin products to be introduced. Performance modules will also be integrated in the new steelworks complex of Steel Dynamics Inc. Here, you will find a selection. ♦



Contact
performance@sms-group.com



Continuous casting plants

X-Pact® Cast Optimizer – Best process optimization

Performance Checkbox



Challenges

- Operator guidance
- Production optimization
- Quality evaluation
- Product documentation

Solution

- Most flexible production optimization
- Best models for mixed zone, cut length, width changes, speed, etc.

Key features

- Outstanding operator guidance
- Unbeatable cut length optimization
- New dimension quality evaluation
- First class nozzle supervision
- Best taper optimization

Productivity

- Most effective production

Efficiency

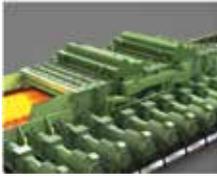
- Lowest material losses

Quality

- Superior quality evaluation

Industrie 4.0

- Gapless product documentation



Hot strip mill/CSP® plant/
plate mill

Efficient fluid system for descaling

Performance Checkbox



Challenges

- Cost efficient descaling of slabs/strips/plates
- Minimized maintenance costs for descaling equipment

Solution

- Latest piston pump technology with frequency controls
- No requirement of high pressure accumulator
- Latest valve technology highly wear resistant and with optimized flow characteristic design
- Latest nozzle technology

Technical advantages

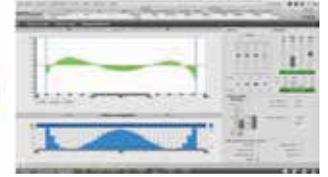
- Resource efficient and saving of energy

Productivity

- Increase of operation time

Efficiency

- ROI of less than two years due to reduced energy costs and water consumption



Cold rolling mill, hot strip/steckel mill,
processing lines, stainless steel lines

X-Shape Flatness Measurement and Control

Performance Checkbox



Challenges

- Reliable and precise flatness measurement and control

Solution

- Stand-alone measuring system with closed roll surface
- Flatness control perfectly tailored to the process requirements

Technical advantages

- Mark-free measurement due to closed roll surface (hardened/coated)
- Up to 3,000 mm measuring width, max. 96 sensors with variable pattern
- Reliable and wear-free signal transmission
- Re-calibration not required
- Model-based signal evaluation: one system for all products
- Robust flatness control, for all plant types and available control elements

Quality

- Optimized strip flatness
- Minimized off-flatness lengths

Productivity

- Increased rolling speed

U.S.A.

OPERATING MORE SUSTAINABLY WITH ARTIFICIAL INTELLIGENCE

Noodle.ai and SMS group partner to advance the Learning Mill for Big River Steel.



As early as 2017, Big River Steel has been a LEED (Leadership in Energy and Environmental Design) credential holder for its sustainable and eco-friendly steelmaking operations.

Cutting-edge Enterprise Artificial Intelligence® and powerful process automation systems work together to maximize production yields, enhance product quality, conserve energy and reduce costs.

Leading Enterprise Artificial Intelligence® provider Noodle.ai and SMS group, with its digital business fields – trailblazer in digitalization for plant and equipment used in steel and nonferrous-metals production and processing – today announced a partnership to jointly further optimize the world's first learning steel mill for Arkansas-based Big River Steel.

To help Big River Steel conserve resources and control energy output, SMS group and Noodle.ai came together to

couple the deep experience SMS group has in the metals industry and process knowledge with Noodle.ai's AI expertise. The joint solution was created by implementing Noodle.ai's learning algorithms into SMS group's X-Pact® MES 4.0. Noodle.ai was able to seamlessly leverage the fact that SMS group's X-Pact® MES 4.0 was engrained into the steel mill's IT environment and into their SaaS (Software as a Service) applications. The new end solutions digitize applications throughout every stage of the steelmaking process – starting at the liquid phase all the way to strip finishing.

Noodle.ai's software and Enterprise AI Data Platform analyze historical and current high-frequency data from the mill's about 50,000 sensors attached to SMS group's equipment.



“The collaboration of Noodle.ai, SMS digital and Big River Steel brings together three areas of expertise which together are driving forward our Learning Mill.”

David Stickler, CEO, Big River Steel

Noodle.ai uses the mill’s data plus these sensor values and external data sources to sense, predict, and recommend corrections that maximize production yields, enhance product quality, mitigate safety risks, and minimize costs.

ALL-ENCOMPASSING OPTIMIZATION

For example, these insights can help minimize transition losses regarding steel grade, strip width or strip thickness, and predict how much energy is being consumed by the mill each hour and/or each day. This allows the steel mill to trade back energy to the market or change production schedules to make consumption more predictable.

“By working with SMS digital, we are empowering an industry to turn business challenges into competitive advantages through the use of Enterprise AI®,” said Noodle.ai CEO Steve Pratt. “Our mission is to create a world without waste. Given the intensive energy and material needs of the metal industry, efficiency improvements will not only improve business operations and the bottom line, but positively impact the entire ecosystem that surrounds manufacturers.”

“In order for SMS group to implement digital solutions and therefore increase value for customers like Big River Steel, we knew that strong partners who boost our existing AI and machine learning capabilities were essential,” said Bernhard Steenken, CEO at SMS digital GmbH. “Together with Noodle.ai, we activated the full potential of the first solutions we had already installed at Big River Steel to help them achieve maximum plant performance with minimal maintenance effort, along with high product quality and revenues.” ♦

THE COMPANIES AT A GLANCE

Noodle.ai

Noodle.ai applies advanced data science (Artificial Intelligence AI) to industries at the core of the global economy to create a world without waste. With advanced AI applications business leaders who make, move, and sell things are empowered to make better decisions, reduce wasted energy, money, and resources, and ensure their businesses are built to last. Founded in 2016, Noodle.ai is led by executives previously with the top firms in data science, artificial intelligence, machine learning, and management consulting. Noodle.ai focuses on radical efficiency for supply chain, transportation & distribution, and manufacturing using leading-edge artificial intelligence.

SMS digital

In close collaboration with its customers, SMS digital identifies and develops innovative products for the metals industry building on most advanced development techniques, in-depth metallurgical process know-how and technological expert knowledge. SMS digital helps its customers make their plants and machines ready for the digital age by means of digital applications and the use of AI.

SMS  **digital**

 **Leslie Poston**
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Development of smart applications and services for the Industrial Internet of Things (IIoT).

WORLDWIDE

FURTHER DEVELOPMENT OF IIOT PLATFORMS

Voith and SMS digital are joining forces to push business digitalization with smart applications.

Voith Cloud

OBJECTIVES OF THE COOPERATION

- Bundling of resources and exchange expertise for joint platform development
- Cross-industry applications and services for the IIoT
- Deep domain knowledge to address customer needs for digital applications

VOITH GROUP

The Voith Group is a global technology company. With its broad portfolio of systems, products, services and digital applications, Voith sets standards in markets such as energy, oil & gas, paper, raw materials and transport & automotive. Founded in 1867, the company today has more than 19,000 employees, sales totaling EUR 4.2 billion and locations in over 60 countries. This makes it one of the large family-owned companies in Europe.

The Group Division Voith Digital Ventures bundles the Voith Group's long-standing automation and IT expertise with the deep know-how in the fields of hydropower, paper machines and drive engineering. As an incubator, this Group Division propels the development of new digital products and services. In order to actively shape the digitalization of mechanical and plant engineering, Voith is driving forward the Industrial Internet of Things (IIoT).

This Group Division plays a central role in developing digital innovations and applications for new markets, advancing new digital venture activities and in taking the responsibility for existing ones.

Voith and SMS digital, the digital subsidiary of SMS group, are going to bundle competencies in platform development. The aim of the cooperation is to offer platform services for their Industrial Internet of Things (IIoT) solutions. Both companies are joining forces to digitalize business with smart applications and efficiently share development resources and competencies.

The joint platform exchange provides both companies the opportunity to use new applications across different industries in the other's worldwide core markets and speed up the development process of customer-relevant applications. For example, SMS digital can introduce its digital product Smart Alarm more efficiently in Voith's core markets and the process industries. On the other hand, SMS benefits from Voith's OnCumulus apps designed for production efficiency enhancement and asset management.

HIGHLY EFFICIENT APPLICATIONS

While most of the platform services are industry-independent and can be jointly used by both companies, some of the services, which are app- or industry-specific, will be reserved for the respective company. The customer gateways myVoith and mySMS still remain the central and cross-sector contact points for customers, partners and suppliers of each company. Additionally, these gateways serve as company-specific access points to the respective IIoT applications. The platforms and applications are accessible via all common mobile devices.

Building on deep domain knowledge in their respective industries, both the Voith Group and SMS group make effective use of these competences by developing highly efficient digital applications specifically for their customers needs. Both companies share not only this common background, but also a common vision. "Together, we provide platform solutions and technologies for the digital age which generate real added value for our customers," states Dr. Benedikt Hofmann, CTO Voith Digital Ventures.

"SMS digital identifies and develops innovative products for the metals industry and we are very pleased to have the opportunity to take a further step in the digital transformation of key global industries together with Voith," says Prof. Dr.-Ing. Katja Windt, Member of the Board of Management, SMS group GmbH. ◆



Angelina Hegele

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TURKEY

TWO NEW BLAST FURNACES BY ERDEMIR GROUP

Erdemir Group relies on Paul Wurth's expertise for construction of two new blast furnaces.

Paul Wurth has been awarded with orders for two new blast furnaces to be built by Erdemir Group, Turkey's largest steel-maker, at their Ereğli and Iskenderun integrated steel plants. In both cases, one completely new furnace will replace an older production unit.

At Ereğli at Turkey's northern Black Sea shore, Erdemir's new BF2 will have a hearth diameter of 10 meters, 24 tuyeres and two tapholes; it will produce 5,000 tons of hot metal per day from an inner volume of 2,188 cubic meters. At Isdemir works in Iskenderun at the Mediterranean Sea, the new BF1 will be sized at 12.5 meters in the hearth and 3,587 cubic meters of inner volume; it will be fitted with 32 tuyeres and four tapholes and will produce 7,900 tons daily, which further increases the hot metal capacity at this site.

INTENSIVE SUPPORT

Paul Wurth will execute both projects on an EP basis including the supply of technological key items and related supervision of erection and commissioning. The orders include basic

engineering of the blast furnaces with profile, cooling and lining concepts as well as the design of the stockhouses, top gas cleaning plants, slag granulation plants and BF cooling units. Paul Wurth will provide detail engineering for some non-supply items like process vessels, especially (but not only) the BF shells, and for the piping of the BF cooling systems. While Erdemir's new furnace will be plate cooled, the thin-wall concept with vertically arranged staves will be applied to the furnace at Isdemir.

For both furnaces, Paul Wurth will supply Bell Less Top® charging systems and bleeder valves, refractories for the hot blast mains and bustle pipes, tuyere stocks with tuyere phenomena detection system (TPDS), technological and critical items for the top gas cleaning plants (consisting of axial cyclones, annular gap scrubbers) as well as for in total three INBA® slag granulations systems. Extensive sets of TMT probes and process recorders include, inter alia, 3D TopScan™ burden surface profilemeters and SOMA™ acoustic top gas temperature measurement. Under the same contracts, TMT will also supply fully hydraulic taphole machinery for equipping all the six tapholes in total.

At Erdemir, some auxiliary plant units will be re-used fully or partially making necessary a certain scope of customized adaption engineering. In the case of Isdemir, Paul Wurth will additionally supply key items for the 4-stoves hot blast generation plant (Paul Wurth top-fired stoves), the common L1 automation of the BF plant and a Level 2 BFXpert® package.

Challenging project schedules foresee blow-in of the new blast furnaces for March 2021 (Erdemir) and May of the same year (Isdemir). ♦



The Erdemir steel plant in Ereğli.



Further information
www.paulwurth.com

RUSSIA

MODERNIZATION OF THE BLAST FURNACE COOLING SYSTEM

MMK selects Paul Wurth for modernization of blast furnace cooling system.

As part of its development strategy, PAO "MMK" (Magnitogorsk, Chelyabinsk region, Russia) will conduct a complete overhaul of its No. 2 blast furnace in 2020. After fundamental renewal and modernization, the blast furnace will appear as a structure without a lintel ring. In this project, Paul Wurth will help MMK define the profile of the modernized furnace by considering the raw materials base and process conditions of the customer. Detail engineering will be provided for the high-heat loaded bosh and belly areas, cooling elements and primary cooling system. Paul Wurth will also supply horizontally arranged copper cooling plates, highly conductive graphite refractory bricks and ramming mass. A complete set of EIC equipment for the dedicated pump house with heat exchangers and the related cooling circuit will be part of the deliverables. On-site supervision will be performed during pre-shutdown and shutdown periods until commissioning.

Paul Wurth received this order as a result of a tender which was explicitly calling for a system with horizontal cooling elements. The supply contract between Paul Wurth and MMK became effective in the beginning of the current year. A challenging schedule foresees fulfilment of the contract obligations within fifteen months.

At present, MMK's BF No. 2 is a typical furnace developed by AO "Magnitogorskiy Gipromez" with an inner volume of 1,380 cubic meters, two tapholes and a daily production of 3,800 tons of hot metal. In March 2010, it was equipped with a compact-type BLT®, developed by Paul Wurth. In total, six original Paul Wurth Bell Less Top® charging systems are being operated at MMK's ironmaking facilities. ♦

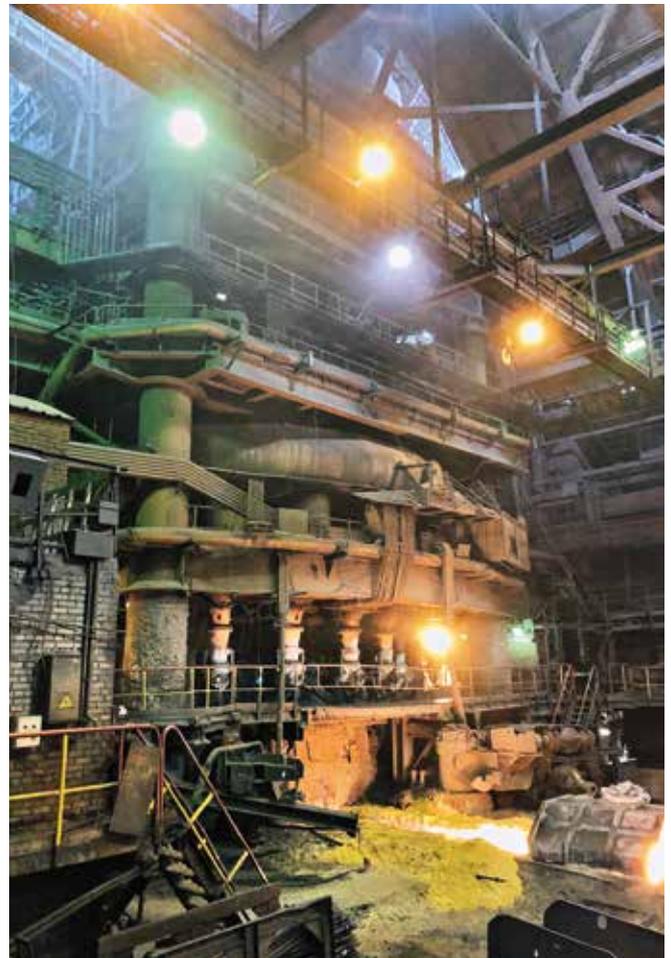


Photo: MMK

MMK's No. 2 blast furnace currently produces around 3,800 tons of hot metal per day.

The four continuous casters at the Salzgitter Flachstahl plant were supplied by SMS group.



GERMANY

UPGRADE FOR CONTINUOUS CASTER

Salzgitter Flachstahl commissions SMS group to revamp continuous caster No. 1.

Salzgitter Flachstahl has commissioned SMS group to revamp continuous caster No. 1 at its Salzgitter works. The plant, which was built by SMS group in 1981, is to be fitted with a new machine head with mold, oscillator, and segment 0.

The revamp is aimed at upgrading the plant with a range of trendsetting features, including the use of a hydraulic resonance oscillator and the digital alignment assistant HD LASr [mold].

REVAMP DURING SCHEDULED SHUTDOWN

The revamp is set to take place during a scheduled plant shutdown in October 2020. Salzgitter Flachstahl plans to measure and align molds in its maintenance workshop using the digital HD LASr (High Definition Laser Aligning System remote) alignment assistant, an SMS group development. The ability of HD LASr [mold] to align the molds perfectly has a great influence on the quality of the slabs. In addition, SMS group will supply a new, universal mold alignment and service stand for the workshop. The aligning stand can be used for the molds in all four continuous casters and their respective casting widths.

Salzgitter Flachstahl GmbH produces around 4.7 million tons of steel every year in its integrated iron and steel works and its four continuous casters. The portfolio of advanced grades includes thin sheet (ULC and LC), strength grades up to microalloyed tube steels, for example API X70/X80, and carbon steels up to 80 degrees Celsius. ♦



Photo: Salzgitter Flachstahl



Ulrich Kerp
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Gasholder for converter offgases – SMS group's expertise in environmental engineering.

RUSSIA

CO₂ SAVINGS IMPROVE CLIMATE BALANCE

NLMK Group orders the supply of two gas recovery systems for its Lipetsk site.

At its Lipetsk site, NLMK Group operates two BOF steelmaking plants with three converters each. Up to now, the offgas containing carbon monoxide that is generated during the converter process has been burnt off on a flare and discharged unused into the atmosphere as CO₂. The new gas recovery systems from SMS group will allow this gas to be collected in future and used to produce heat and electricity in NLMK's power generation plant, which is currently under construction.

Steelmaking shop No. 1, which has three 160-ton converters, and steelmaking shop No. 2, featuring three 330-ton converters, are each to be equipped with a switch-over station, a gas transfer station and a gasholder with a capacity of around 60,000 respectively 90,000 cubic meters.

The switch-over stations will be installed between the primary gas blowers and the gas flares. They consist of several special-purpose valves that were designed by SMS group and constructed specifically for cyclical converter operation. They allow the system to be safely switched between flare and gas recovery mode.

Both gasholders are operated with a diaphragm seal, which is adapted to suit the fluctuating climatic and operating conditions. With the new gasholders two converters can be run simultaneously in gas recovery mode. SMS group's scope

650,000 tons

of CO₂ can be saved thanks to the new gas recovery system. This equates to the average CO₂ balance of a town of approx. 60,000 inhabitants.

of supply covers the engineering, delivery of components, and technical support for erection and commissioning which are scheduled for 2022.

NLMK is one of Russia's largest steel producers and is active in markets around the world. Building this new power generation plant to produce electricity from secondary technological gases, NLMK is making its contribution to achieving the goals of the "Clean Air" project as part of the "National Ecology Project" in Russia. ♦



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THAILAND

REDUCED OPERATING COSTS AND ENHANCED SAFETY

Siam Construction Steel Company Limited upgrades electric arc furnace with CONDOOR® and electrode regulator from SMS group.

The Siam Construction Steel Company Limited, a subsidiary of Tata Steel (Thailand) Public Company Limited, Thailand, has awarded SMS group the contract to upgrade its 80-ton electric arc furnace (EAF) at its site in Rayong. SMS group's scope of supply includes a new CONDOOR® slag door (enhanced automatic slag door) and a new advanced electrode regulator, known as the AEREG. Commissioning is scheduled to take place already this year.

The aim of the upgrade is to improve the furnace seal and so increase productivity. What's more, the installation of the CONDOOR® slag door will improve safety for the operating personnel, as they will not be required to work directly in this area.

The new electrode regulator is capable of automatically regulating the injection of carbon with less energy and, at the same time, significantly lower electrode consumption.

With the combination of the plants, the increased foam slag is used to improve the effectiveness of the electrical energy use. This means a more stable and longer arc, lower power consumption and lower electrode consumption. This also reduces Power ON times and tap-to-tap time. ♦

 **Andrea Taurino**
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CONDOOR®-slag door with automated cleaning system.



TAIWAN, R.O.C.

IMPROVED PLANT AVAILABILITY

China Steel Corporation (CSC), Taiwan, awards SMS group the contract to supply three 160-ton converters for its No. 1 steel making plant in Kaohsiung, Taiwan.

The aim of the upgrade is to improve the availability of the converters and reduce the need for maintenance. Replacement of the old and commissioning of the three new converters are scheduled for the period 2020 to 2022.

Hung-Ta Lin, Ass. General Superintendent, Steel Making Dept. CSC Taiwan: "We have been operating a BOF converter shop from SMS group at Dragon Steel Corporation for some years now. Our experience with

SMS group has been so good that the choice for this order was an easy one. We look forward to working with SMS group in the years to come."

The scope of supply covers the converter vessels, the trunnion rings, the proven lamella-type vessel suspension system, the tilt drives, the X-Pact® electrical and automation systems for the tilt drives, and supervision of erection and commissioning.

SMS group will ship the trunnion rings of 9-meter-diameter each in one piece to the customer's site in Taiwan, considerably reducing the overall installation time.

The maintenance-free lamella-type converter suspension system ensures unrestrained arrangement of the converter vessel in the trunnion ring. Thanks to the use of the lamella suspension system, a larger air gap between

BOF converter shop from SMS group.

“Our experience with SMS group has been so good that the choice for this order was an easy one. We look forward to working with SMS group in the years to come.”

*Hung-Ta Lin, Ass. General Superintendent,
Steel Making Dept. CSC Taiwan*

the vessel and the trunnion ring and high-quality, and high-strength fine-grained structural steels, the converters can cope easily with the alternating thermal stress during operation.

The X-Pact® electrical and automation systems for the converter tilt drives feature frequency-controlled three-phase drive technology which guarantees not only a high level of plant availability but also safe and reliable positioning of the converter vessels under constantly changing dynamic loads. ◆

 **Christian Thiede**
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INDIA

IMPROVED QUALITY AT HIGH CASTING SPEED

Tata Steel Ltd. places order with SMS group for upgrade of CSP® continuous caster. Tata Steel Ltd., India, has awarded SMS group the contract to upgrade its CSP® continuous caster at its plant in Jamshedpur.

Both strands will each be equipped with an electromagnetic brake. This brake reduces the flow velocity of the liquid steel immediately when it has entered the mold, and thus steadies the mold level. As a result, the quality of the hot strip can be further improved while maintaining a consistently throughput rate.

SMS group's scope of supply covers the engineering, delivery of the electromagnetic brakes, the implementation, and the X-Pact® electrical and automation system.

Commissioning of the first strand is scheduled for late 2019, with the upgrade of the second strand planned for the end of 2020.

The CSP® plant supplied by SMS group in 2007 and 2010 is designed to produce 2.4 million tons of hot strip between 900 and 1,680 millimeters in width, and 1.0 to 20.0 millimeters in thickness.

Tata Steel uses its CSP® plant to manufacture high-quality products. Besides carbon steels, the product mix includes non-grain oriented electrical steel strip, tube grades, and dual-phase steels. ◆

 **Ralf Bauer**
ralf.bauer@sms-group.com



Electromagnetic brake.

CHINA

HIGH-QUALITY SLABS FOR HIGH-GRADE PRODUCTS

Benxi Steel orders smart slab caster from SMS group.

Benxi Steel (Bengang Steel Plates Co., Ltd.), Liaoning Province, China, has placed an order with SMS group for the supply of a single-strand slab caster to be installed at the steel-maker's works in Benxi in north-east China.

The new casting plant will be designed for an annual production of up to 1.6 million tons of steel slabs of 230 millimeter thickness and between 1,000 and 1,900 millimeters wide. The caster equipment will be prepared to be extended to a slab thickness of 250 millimeters. Commissioning is scheduled for the end of 2020. The new caster will produce slabs in high-grade steels, primarily for the automotive industry.

Smart and proven technologies, including various X-Pact® Level 2 process models such as X-Pact® Level Control, X-Pact® Width Control und X-Pact® Solid Control, will be implemented to assure high-quality slab production. With X-Pact® TechAssist, Benxi Steel will receive a system by means of which the metallurgical parameters can be managed centrally. This SMS group-developed software supports the mill operator in selecting the optimal process parameters for the steel grade being processed.

Segments 2 to 15 will be equipped with STEC-Roll® technology. Rolls of this technology optimize the casting process and set new standards for efficient maintenance due to their long service lives and the possibility of being re-used. The Vertical Liquid Bending (VLB) machine will come with an HD moldTC (TC – thermocouples). In the newly built maintenance shop, Benxi Steel will measure and align molds and segments using the digital alignment assistant HD LASr (High Definition Laser Aligning System remote), also an SMS group development. Perfect alignment of the molds by means of HD LASr [mold], of the segments by HD LASr [segment] and of the strand by HD LASr [strand] is key to the attainment of high slab quality. SMS group is also going to supply the quality assurance software Product Quality Analyzer. The PQA® system documents, monitors and secures the entire production process in the continuous casting plant.

PQA® supports high-quality production by capturing a great number of quality parameters along the complete pro-



Contract signing ceremony: First row, from left to right: Liu Xiaomeng, SMS Siemag Technology (Beijing) Co., Ltd.; Cong Tiedi, Plant Director Bengang Group Corporation; Zhang Yongshuai, Manager of International Economic & Trading Co. of Benxi Steel Group; Jochen Wans, Vice President Continuous Casting, SMS group Germany; Christoph Stappenbeck, Vice President SMS Siemag Technology (Beijing) Co., Ltd. Standing in the middle: Zhang Guiyu, Vice General Manager Bengang Steel.

duction process. All these data will be available as an important data basis for evaluation and optimization purposes.

The X-Pact® process models and digitalization systems such as X-Pact® TechAssist, HD LASr and PQA® will make the new continuous caster smart in the sense of Industrie 4.0.

SMS group's order scope comprises the complete engineering, supply of the mechatronic and digital components including the X-Pact® electrical and automation systems as well as supervision of installation and commissioning.

Benxi Steel operates an integrated iron and steel works in the Liaoning Province. The steelmaker exports its products – hot and cold-rolled steel products, among others for the automotive and chemical industries – to more than 80 countries in the world. ♦

 Ingo Oelgemöller
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SMS group BOF converter, equipped with the maintenance-free lamella converter suspension system.



INDIA

HIGHER PRODUCTIVITY THROUGH ADVANCED CONVERTER TECHNOLOGY

SAIL Durgapur awards SMS group a turnkey contract for new converters and environmental facilities.

Steel Authority of India Limited (SAIL) Durgapur, India, has awarded SMS group a turnkey contract for the supply of three new 110-ton converters for its steelmaking plant No. 2 to replace the converters SMS group supplied 25 years ago. The new converters will be rated for ten percent more volume.

Moreover, SMS group will supply secondary dust collecting systems for the three converters. The new systems will be installed in the works for the first time and will more than meet the relevant environmental requirements.

REDUCED CONSUMPTION OF ALLOYING ELEMENTS

The new converters will be equipped with a bottom stirring system for combined blowing, which cuts the stirring and homogenization time, reduces surface vibrations, and minimizes refractory lining wear. The objective is to reduce the use of alloying elements previously required.

Thanks to the maintenance-free lamella converter suspension system developed by SMS group, the converter

vessel can be arranged in the trunnion ring without restraint. The use of the lamella suspension system, a larger air gap, and high-quality special-purpose steel grades will ensure the converters are suitably adapted to the thermal loads. This is achieved without additional cooling fluids. Sufficient cooling is ensured by the natural thermal current alone.

The X-Pact® electrical and automation systems for the entire converter shop will ensure cost-effective production and high steel quality.

SMS group's scope of supply comprises the turnkey installation of the equipment, design and supply of the converters, the bottom stirring system, secondary dust collection systems, and X-Pact® electrical and automation systems, as well as the erection and commissioning work. ◆



Jan Bader
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The project teams of Hoa Phat, Vietnam, WISDRI Engineering & Research Incorporation Ltd. and SMS group, Germany, are proud of the smooth commissioning.



In total, the new converter steelworks is to produce four million tons of liquid steel per year.

VIETNAM

UNINTERRUPTED OPERATION

First of four converters successfully commissioned at Hoa Phat.

SMS group has successfully commissioned the first of four converters at Hoa Phat Group in Vietnam. More converters will be commissioned before the end of 2019. In total, the new converter shop shall produce four million tons of liquid steel per year.

The scope of supply comprises four converters, each of them with a capacity of 120 tons, including converter tilt drives and the maintenance-free lamella suspension developed by SMS group as well as oxygen lance systems, sublances and relining facilities. All converters will be equipped with the dry ESP primary dust collecting system from SMS group. The converters, trunnion rings, converter tilt drives and parts of the dust collecting system are manufactured in the SMS group workshop.

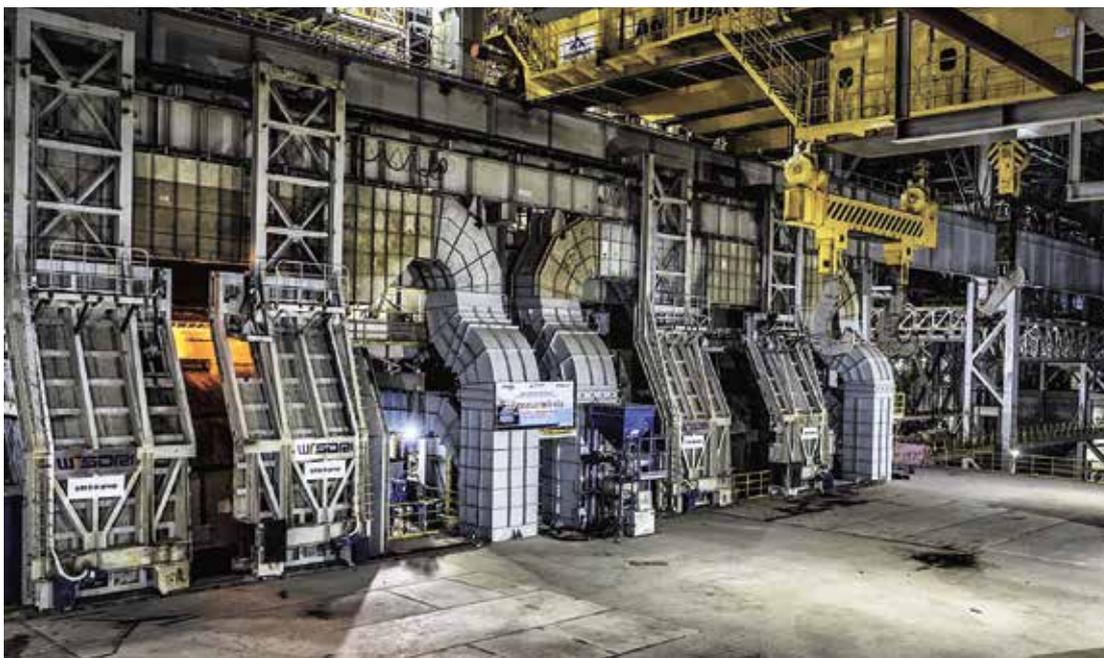
The contracted scope also includes engineering services, supervision of erection and commissioning

activities and training of the customer's staff. The converter shop will be equipped with X-Pact® electrical and automation systems and the X-Pact® Process Guidance System. The X-Pact® Process Guidance System provides the plant with a new automation standard that ensures uninterrupted operation thanks to process-oriented operator guidance.

Hoa Phat Group is listed on the stock exchange and considered one of the leading producers of long products in Vietnam. The new meltshop is part of an expansion program to be realized in the Dung Quat Economic Zone close to Da Nang. ♦



Michael Wimar
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All of the four 120-ton converters will be equipped with the maintenance-free lamella suspension system developed by SMS group.

CHINA

SUPPORT THAT CUSTOMERS CAN RELY ON

Flat rolling mill expertise in Wuhan.

Our Flat Rolling Mills division in China is represented by the branch office of SMS Siemag Technology (Beijing) Co., Ltd. in Wuhan. Wuhan Branch not only operates successfully in its main market of China but is also active at an international level too. In recent years it has gained a reputation for its solid expertise in products for rolling non-ferrous metals, especially copper and copper alloys.

SMS Siemag Technology (Beijing) Co., Ltd. – Wuhan Branch, which has been based in Wuhan since 1995, is the name of SMS group's China-based branch of its Flat Rolling Mills division. It was founded as SWE (SMS Demag Wuhan Engineering Ltd.), and in 2007 this branch became part of SMS group China. Today the Wuhan site employs 77 people. It has been headed by Christoph Andrycz since 2013.

The city of Wuhan is regarded as one of the industrial heavyweights of Central China. The past tradition of producing iron from domestic ore and coal, together with the steel industry, which SMS group helped to develop by supplying a number of rolling mills, is now giving way to more advanced technologies in a process of dynamic transformation.

EXCELLENT SUPPLIER

As part of the SMS group family of companies, the Wuhan sales office staff are actively and very successfully involved in looking after their customers primarily in China as well as internationally too. Their activities also include the largely independent acquisition and handling of customer orders. The several tandem cold rolling mills for lead rolling, which Wuhan Branch successfully delivered in collaboration with Johnson Controls Power Solutions, are one example of this. As a result of this excellent cooperation, Johnson ▶





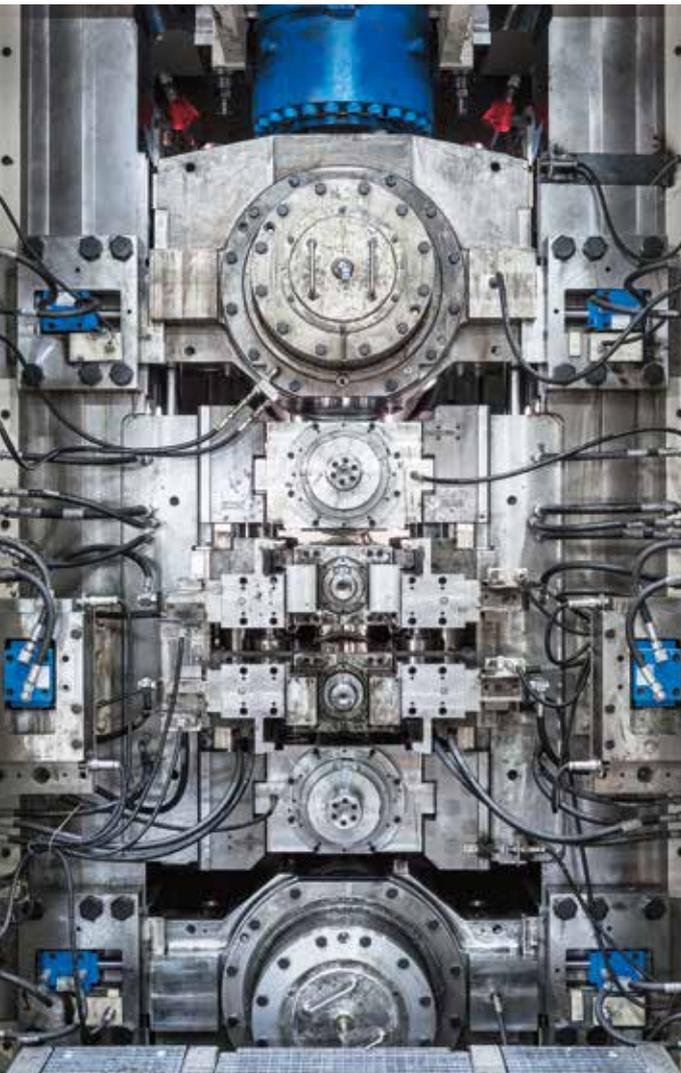
Achieving success together: the teams from Zhejiang Huayuan and SMS group are pleased with their fruitful collaboration on the installation and commissioning of the new copper cold rolling mill.

AREAS OF EXPERTISE

- Flat rolling mills, especially mills for non-ferrous metals, as well as two-, four-, or six-high skin pass mills
- Equipment for the rolling mills including core and precision components, some of which are manufactured by SMS group in Germany

Technical equipment highlights:

- CVC®plus (Continuous Variable Crown)
- Automatic Gap Control (AGC)
- Automatic Flatness Control (AFC)
- Multi-Zone Cooling (MZC)
- Horizontal Stabilization System (HS)
- Technical Control System (TCS)



Controls presented Wuhan Branch with the “Asia Supplier Excellence Award” in December 2016.

Another current contract awarded by Johnson Controls is for two additional tandem lead rolling mills, to be delivered to India.

In terms of electrical and automation systems, SWB and SMS Siemag Technology (Beijing) Co., Ltd. (SDT) also work in close collaboration. This is why a branch office of the E&A division was set up in Wuhan and is mainly responsible for digitalization as well as for research and development. The new offices, which are located right next to the SWB office, were opened at the beginning of July 2019.

As a consequence the teams can work more intensively together and exchange experience directly in many areas of technology.

For some years SWB has been an established center of competence for copper cold rolling mills. December 2012 the contract to supply a four-high cold rolling mill for copper strip was awarded to SWB, represented by SMS Siemag Technology Beijing. A 20-roller finishing stand, which is equipped with core components made by SMS group in Germany, was supplied jointly with SMS group GmbH to the same customer, Ningbo Shine Copper.

Following the surge in investment activity at the end of 2017, other Chinese customers placed orders for a further four copper rolling mills (two of the six-high and two of the four-high design).

The new six-high cold rolling mill for copper strip at Zhejiang Huayuan Copper Co. Ltd. was successfully commissioned after only 15 months, 34 days ahead of the contractually agreed date. A record-breaking time by any standard. The state-of-the-art plant rolls strips with widths of up to 1350 millimeters down to a final gage of up to 0.15 millimeters. The scope of the order covered the engineering, mechanical components, X-Pact® electrical and automation system, as well as the commissioning and on-site deployments. The order was executed under the leadership of SWB in Wuhan. ♦

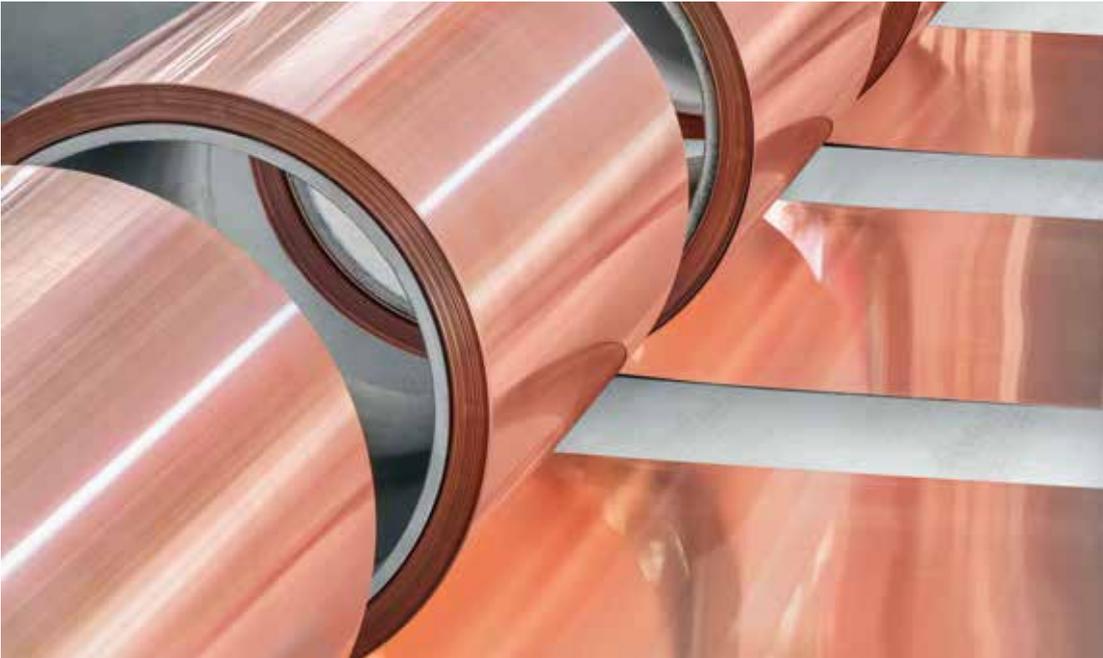


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Further information
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The CVC®plus six-high stand is fitted throughout with state-of-the art rolling mill technology.



Copper strip is rare and expensive. Its production places highest demands on rolling technology.

Economic rolling

In China the material copper is much in demand at present. To roll the precious material with high yield, SMS group supplies the required high-quality cold rolling mills.

Another Chinese customer has awarded SMS group an order to supply a cold rolling mill for high-quality strips of copper and copper alloys. The new reversing cold mill (RCM) will be of six-high design and be established at the customer's site on the Chinese east coast.

The RCM will roll a wide material range comprising copper, brass and bronze as well as copper alloys of first-class quality. The minimum strip width will be 400 millimeters, the maximum 650 millimeters. The thickness of the rolled strips will range from three millimeters entry thickness to 0.3 millimeters final thickness. Production capacity is planned to be approx. 20,000 tons.

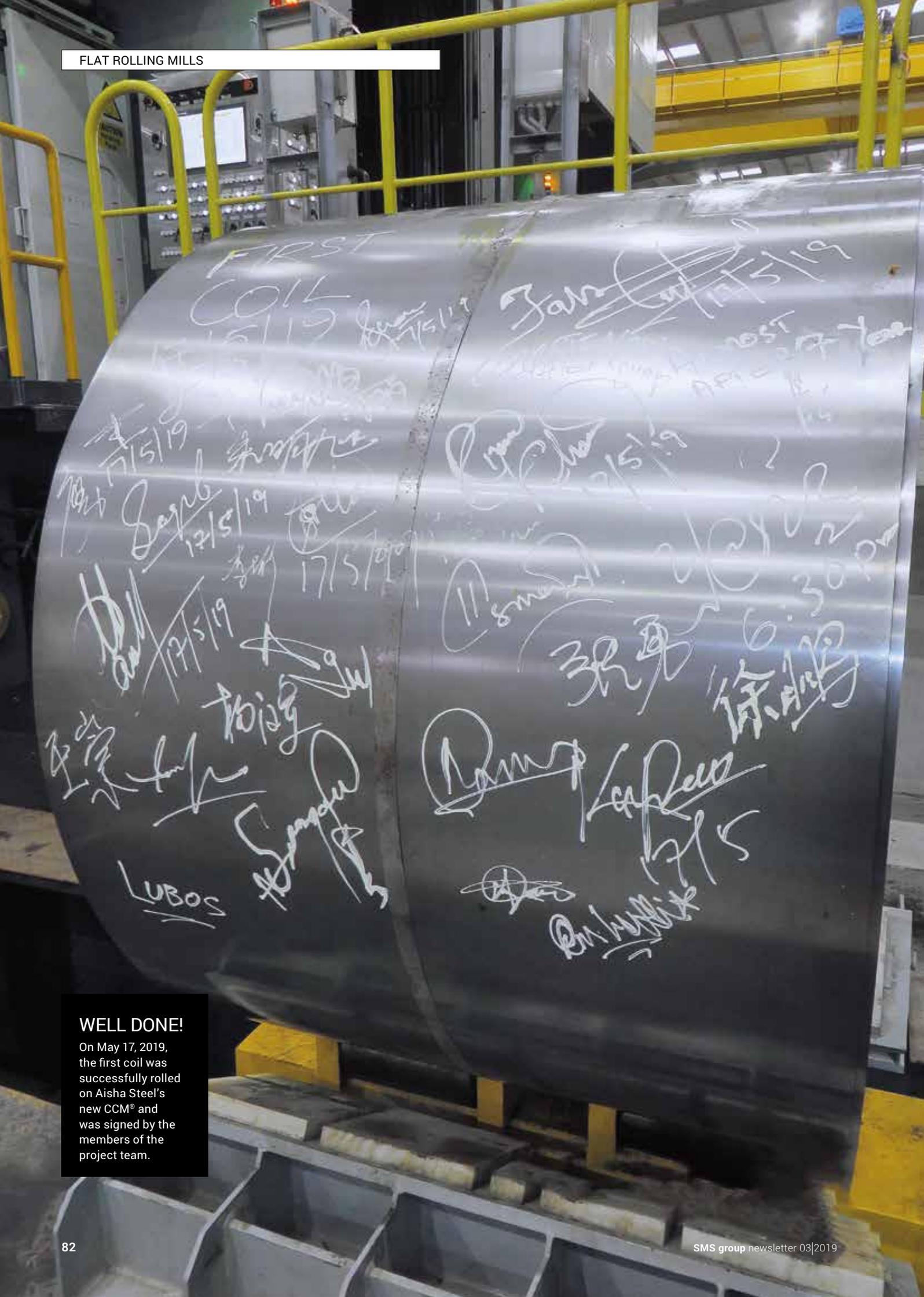
High-class components make sure that current as well as future market demands on strip quality will reliably be met. CVC®plus (Continuously Variable Crown) technology for roll shifting, for instance, combined with work and intermediate roll bending, provides a big technological advantage in terms of precision and flexibility. For the precious copper materials, the continuous monitoring of strip thickness and flatness tolerances as well as the prevention of inferior quality and residual lengths is of particular importance.

Therefore, all core components that determine the product quality will be manufactured in Germany. To protect the sensitive strip surface, semi-automatic paper coilers will be installed at the entry and exit sides of the mill. State-of-the-art equipment for work and intermediate roll changes and sleeve handling will help achieve high plant output.

Also integrated in the plant will be an efficient and environment-friendly rolling oil cleaning system together with a multi-plate® filter from SMS group. This filter is able to clean up to 3,100 liters of rolling oil per minute.

The lead management of the order is with SMS Siemag Technology (Beijing) Co., Ltd. – Wuhan Branch, a company of SMS group. The recent project adds up to the number of facilities built in China over the past years. Commissioning of the new cold rolling mill is scheduled for September 2020.

 **Christoph Andrycz**
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WELL DONE!

On May 17, 2019, the first coil was successfully rolled on Aisha Steel's new CCM® and was signed by the members of the project team.

PAKISTAN

THIRD CCM[®] INSTALLATION IN PAKISTAN

SMS group successfully commissioned the new compact cold mill at Aisha Steel Mills Limited. The CCM[®] is rated for ASML to supply the domestic market with high-quality cold strip products.

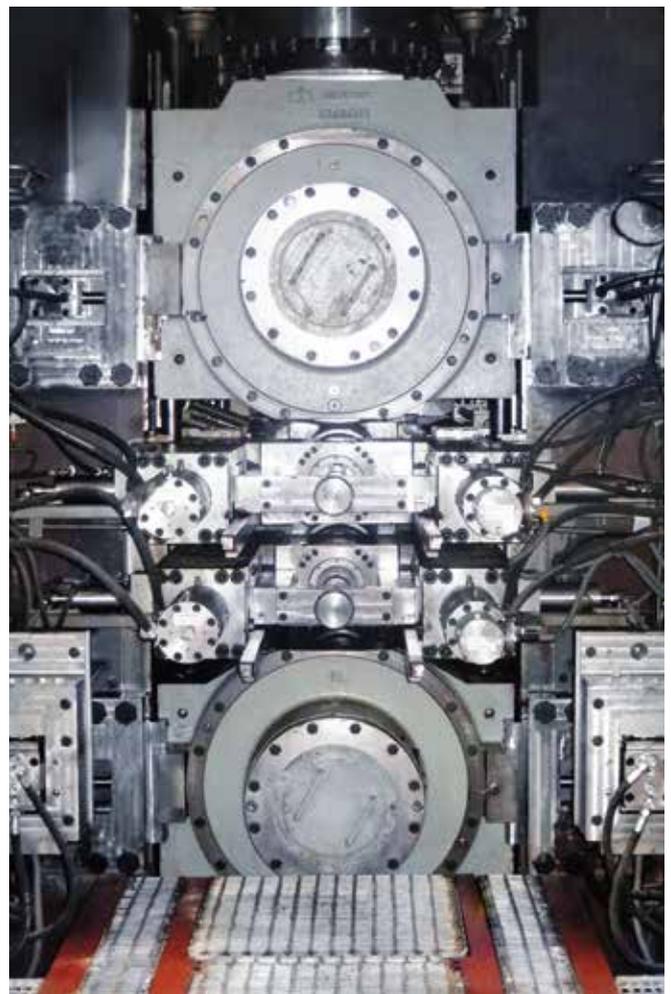
By rolling the first coil on May 17, 2019, SMS group has successfully put into operation the new Compact Cold Mill (CCM[®]) of Aisha Steel Mills Limited (ASML) in Karachi, Pakistan. This has already been the third successful installation of the two-stand type of cold rolling mill by SMS group in Pakistan.

The CCM[®] is designed for an annual cold strip production capacity of 500,000 tons and enables ASML to supply the local market with high-grade cold strip according to international standards. In addition, it helps the company to make its contribution to reducing the country's dependency on high-quality cold strip imports. The products rolled on the CCM[®] are up to 1,250 millimeters wide and down to 0.15 millimeters thin.

The CCM[®] features two mill stands in four-high design with the proven roll shifting technology CVC[®]plus (Continuously Variable Crown) by SMS group. CVC[®]plus is supplemented by further actuators to infinitely adjust the roll gap, for example positive and negative work roll bending. The quality-determining technical highlights of the plant include two X-Shape flatness measurement rolls, installed at the entry and exit sides, together with multi-zone cooling system and automatic flatness control.

The highly productive CCM[®] is equipped with the holistic X-Pact[®] electrical and automation system from SMS group. SMS group supplied the complete plant with all auxiliary equipment, such as modern technological instrumentation, emulsion plant, high- and low-pressure hydraulics as well as the fume exhaust system.

With this CCM[®] from SMS group, ASML operates a high-quality and modern plant technology suited to meet present and future requirements. ♦



One of the two mill stands in CVC[®]plus four-high design.



Torsten Seeger

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STRIP PROCESSING LINES

The new lines focus on the production of demanding cold strip grades for the automotive industry.

SMS group  DREVER INTERNATIONAL

PrOBO_X®

CHINA

GREENFIELD PROJECT FOR THE PRODUCTION OF AUTOMOTIVE GRADES

Shandong Rizhao granted FACs for cold strip production facilities.

Shandong Iron and Steel Rizhao, China, has granted SMS group the final acceptance certificates for its pickling line/tandem cold mill, the hot-dip galvanizing line and a continuous annealing line. The lines focus on the production of demanding cold strip grades for the automotive industry and are part of the new flat steel complex SMS group established in the province of Shandong on China's east coast. The complex also comprises a hot wide-strip mill and a further annealing line. All lines were supplied including X-Pact® electrical and automation systems.

The pickling line/tandem cold mill has an annual capacity of two million tons and stands out due to several highlights such as the efficient turbulence pickling system as well as the five-stand tandem cold mill with new, combined CVC®plus/ESS technology for flexible roll gap optimization.

POWERFUL DREVER RADIANT TUBE FURNACES

The hot-dip galvanizing line is rated to process 400,000 tons of cold strip per year and the annealing line for 650,000 tons. A second annealing line with a capacity of 950,000 tons is in the commissioning phase and will soon reach the final acceptance certificate level. The lines feature powerful Drever radiant tube furnaces with ultra-fast cooling system to ensure the high cooling rates needed for achieving the high-strength grades demanded by the automotive industry. Integrated in the hot-dip galvanizing line is a FOEN air



The lines are part of the new flat steel complex SMS group established in the province of Shandong on China's east coast.

knife system to meet the extremely high surface demands placed by the automotive industry.

The next step will be the commissioning of the Steckel/plate mill which was supplied by SMS group, too, and is rated for an annual capacity of 1.3 million tons. ♦

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Radiant tubes heat the furnace to maximum 850 degrees Celsius.



In the entry section, the coil stacks are continuously fed to the furnace.

CHINA

NEW WIRE COIL HEAT TREATMENT LINE IN OPERATION

Since spring this year, Henan Jiyuan has been operating a new line to produce heat-treated wire for bearings, springs, bolts and high-strength components.

Chinese company Henan Jiyuan commissioned a new continuous heat treatment line for wire coils. The line was supplied to Henan Jiyuan Iron & Steel Co., Ltd. by ARES, a subsidiary of SMS group, for its Jiyuan location in Henan Province, China, and has been in operation since March 2019 with good results. The designed capacity is 4,100 kilograms per hour for soft annealing and tempering and up to 3,500 kilograms per hour for spheroidizing annealing. Bearings,



The furnace has a total length of 80 meters.

springs, bolts and high-strength components are the products made from this heat-treated wire with diameters ranging from 5.5 to 42 millimeters.

Heart of the plant is the roller hearth furnace which operates under nitrogen protective atmosphere. Radiant tubes heat the furnace indirectly with natural gas up to a temperature of maximum 850 degrees Celsius. Heat cycles, such as spheroidizing annealing, soft annealing and high-temperature tempering can all be realized in the furnace that has a total length of 80 meters.

The wire coils handled in the line are transported on trays in continuous mode. The average weight of the coil stacks is approximately two tons, however, a maximum stack weight of 2.6 tons can be handled, too. The line is equipped with automatic charging respectively discharging units in the entry and exit sections. A conveyor car is installed for automatic transfer of the coil tray from the exit back to the entry side along the furnace. ♦



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SPAIN

SIDENOR BASAURI EXPANDS LEADERSHIP POSITION

Increase of bloom reheating capacity for SBQ production from 85 to 130 tons per hour.

Sidenor Basauri, Spain, trusts in SMS group also for the stage-2 upgrade of its walking beam furnace, which will increase the furnace's capacity from currently 85 tons per hour to 130 tons per hour. Supplied by SMS group in 2016, the furnace was originally designed with the provision for a future capacity increase. In the design phase, the SMS engineers had already taken into consideration all civil and mechanical modifications required for the future capacity boost in order to guarantee a short plant shut down and a fast restart. The second start-up after the upgrade is scheduled for the second half of 2020.

technology will ensure low levels of fuel consumption, scale formation and decarburization also after the modification, helping Sidenor to consolidate its benchmark position in SBQ production.

SMS group's range of supply for the upgrade will include new steel structures with a set of SMS ZeroFlame extra-low NOx burners, which had already been included in stage 1 providing pollutant emissions of less than 100 mg/Nm³ at 1,250 °C, meeting the most stringent of European guidelines. Since 1997, SMS group has installed 90 reheating furnaces for billets, blooms, slabs and pipes. ♦

ECO-FRIENDLY TECHNOLOGY

The furnace can reheat special steel blooms in sections between 185 and 240 millimeters square. Its state-of-the-art



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SMS group will increase the capacity of the walking beam furnace at Sidenor Basauri from 85 to 130 tons per hour.



Hot slab on furnace exit roller table.

DENMARK

INNOVATIONS IN THE PLATE MILL

For NLMK DanSteel's existing plate mill SMS group is to supply a new 100-ton-per-hour furnace.

On March 6, 2019, SMS group signed an order covering the supply of a new 100-ton-per-hour walking beam furnace to be installed in the existing plate mill, which was supplied by SMS group too, of NLMK DanSteel A/S located in Frederiksvaerk near Copenhagen. The new furnace will include a broad range of innovations with the combination of SMS DigiMod combustion management system, SMS Zero-Flame burners and SMS GeniusCM system for predictive maintenance ensuring very good results in terms of low fuel consumption, reduced scale formation and pollutant emission that comes with NO_x values lower than 100 mg/Nm³. The new walking beam furnace will be able to reheat a wide spectrum of slabs in the weight range from 3.1 up to 62 tons for use in structural, shipbuilding, boiler and pressure vessel applications. In terms of material weights handled, this furnace will hence be the largest one ever built by SMS group. Plant commissioning and start-up are scheduled for the beginning of 2021.

The scope of supply includes roller tables for slabs handling. The modern water treatment plant features an energy recovery system which uses the energy from the furnace for internal and external heating purposes. Further included in the project are the integration of a level-2 automation system, turnkey supply and extensive pre-assembling in order to facilitate installation and supervision activities.



Signing ceremony, from left to right: Thierry Markey, Category Manager, NLMK Europe; Garg Brijesh, Director Procurement, NLMK Europe; Riccardo De Michielis, Sales Manager, SMS group, RHF technologies; Simone Zussino, Vice President, SMS group, RHF technologies; Igor Sarkits, CEO, NLMK DanSteel; Yuriy Bokachev, Technical Director, NLMK DanSteel; Allan Thomasen, Project Manager, NLMK DanSteel.

NLMK DanSteel is a private company 100 percent owned by NLMK International B.V., The Netherlands, and was established in 2002 on the basis of the former Danish Steel Works Ltd. which was founded in 1940. Since then, it has expanded and developed continuously. Now, it is part of the Russian NLMK Group. ♦



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GERMANY

HIGH-STRENGTH AUTOMOTIVE GRADES AT THE SALZGITTER SITE

Salzgitter AG selects SMS group to supply new hot-dip galvanizing line.

Salzgitter Flachstahl GmbH (SZFG), a subsidiary of Salzgitter AG, has launched its “Hot-Dip Galvanizing 3” project (FV3) and one of its largest single investments of the last decade at the Salzgitter location. For plant engineering, the company selected SMS group as project partner. In addition to supplying all main components, SMS will also be responsible for erection and commissioning.

QUALITY INCREASE AT THE SALZGITTER SITE

The new production facility, with an annual capacity of 500,000 tons, supplements SZFG’s two already existing hot-dip galvanizing lines. “This project is a key component in the strategy of Salzgitter Group that focuses on qualitative growth in the steel strip business and will help us strengthen our market position as a producer of premium products for national and international customers in the automotive industry,” explains Prof. Dr.-Ing. Heinz Jörg Fuhrmann, Chief Executive Officer of Salzgitter AG.

LIGHTWEIGHT AUTOMOTIVE CONSTRUCTION AND SAFETY

FV3 is scheduled to start operation in 2022 and will then process third-generation AHSS (Advanced High-Strength Steel) grades for chassis and body applications which play an important part in lightweight automotive construction and in vehicle safety.

Ulrich Grethe, member of the Group Management Board and CEO of SZFG’s Management Board says: “At the same time, FV3 is an essential factor in securing the future viability of Salzgitter as a steel location and the jobs there,

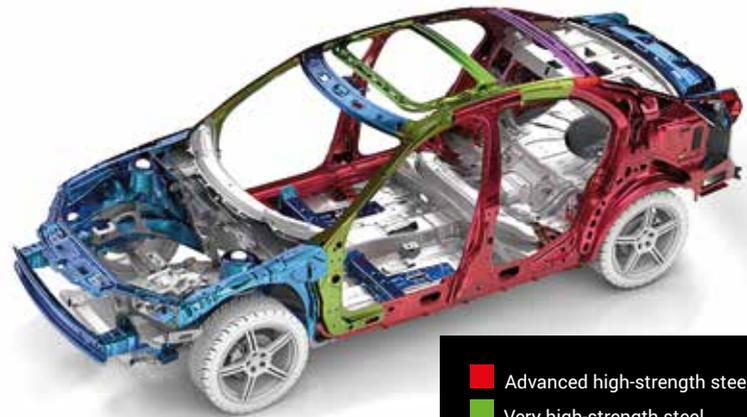


This galvanized DP1000 steel coil presented at METEC in Düsseldorf was made available to SMS group by Salzgitter AG.

as this investment will enable us to further optimize our already high-quality product portfolio." The new facilities to be supplied by SMS group will produce hot-dip galvanized sheets with thicknesses of between 0.7 and 2.5 millimeters and widths from 900 to 1,700 millimeters. The strip is wound to coils that will have a maximum weight of 32 tons.

ADVANCED FURNACE TECHNOLOGY FOR NEW STEEL GRADES

The production of high-strength and ultra-high-strength steel grades will be ensured by the integration of a high-performance furnace from Drever International, a member of SMS group, which achieves very high cooling rates with the innovative UFCplus rapid gas cooling system and features an oxidation/reduction process thanks to ProBOX® technology. The range of materials will cover ultra-high-strength dual-phase steels through to complex-phase steels," explains Dr.-Ing. Michael Brühl, Managing Director of cold-rolled flat products at Salzgitter Flachstahl GmbH. The configuration of the facilities as a whole offers the structural and technical prerequisites for implementing further innovative materials concepts. A DUMA-BANDZINK JetPro air knife system with

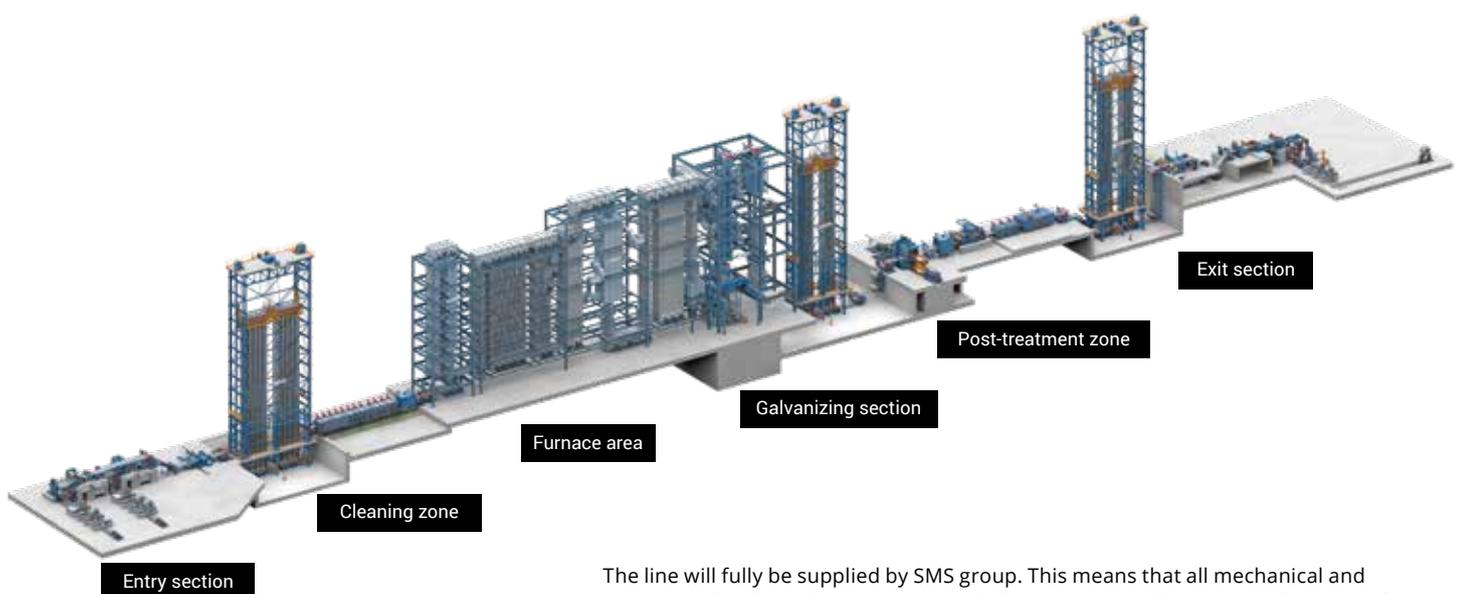


■ Advanced high-strength steel
■ Very high-strength steel
■ High strength steel

The new hot-dip galvanizing line for Salzgitter AG will be designed to process third-generation advanced high-strength steel (AHSS) grades for chassis and body applications which play an important part in lightweight automotive construction and in vehicle safety.

integrated eMASS® strip stabilization will be used to precisely adjust the zinc coat thickness. For post-treatment, the line will be equipped with a four-high skin pass mill stand, a tension leveler, spray passivation and an oiling machine. ♦

 **Contact**
strip.processing@sms-group.com



The line will fully be supplied by SMS group. This means that all mechanical and process technological components, including furnace, air knives as well as X-Pact® electrical and automation systems will be supplied from one source. In addition, the supply scope comprises erection and commissioning services.

Since 1997, SMS group has installed 90 reheating furnaces for billets, blooms, slabs and pipes.



PORTUGAL

TURNKEY WALKING BEAM FURNACE WITH COMPREHENSIVE TECHNOLOGY PACKAGE

MEGASA GROUP chooses SMS group reheating technology for its Portuguese bar mill.

SMS group has been chosen by MEGASA GROUP for the supply of a new walking beam furnace to be installed in the existing bar mill of SN Seixal Siderurgia Nacional S.A. in Aldeia de Paio Pires, Portugal. The new furnace, rated at 160 tons per hour cold charged and 210 tons per hour hot charged, will include latest technological packages developed by SMS group. Start-up is scheduled for the end of summer 2020.

In particular, MEGASA banks on the SMS Prometheus Level 2 system, the SMS DigiMod combustion management system and SMS ZeroFlame burners. The combination of these three features installed on the sturdy and reliable structure of the SMS furnace will ensure outstanding performance in terms of reductions in fuel consumption, scale formation and pollutant emissions. ZeroFlame, DigiMod and SMS Prometheus will provide reduced NO_x emissions down to 90 mg/Nm³, less scale formation down to 0.4 percent, and

a decrease in fuel consumption down to less than 27 Nm³ per ton. With this investment, MEGASA will consolidate its leading position in the market of construction steel.

SMS group's sales and technical teams have found the right technical solution for the wide product range and the requirements of the customer. The furnace will be able to reheat billets starting from as slender as 120 millimeters up to 160 millimeters in various lengths up to 14.5 meters. SMS group will supply the furnace on a turnkey basis, including erection and supervision to commissioning. ♦



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INDIA

X-CAP SELECTED FOR AWARD

The innovative furnace control system X-CAP was selected for the prestigious Tata InnoVista Award.

SMS group is proud to announce it has been selected as one of the finalists for the prestigious Tata InnoVista Award in Mumbai, India, from more than 8,600 teams from over 55 Tata companies. The prize is offered throughout the Tata group and aimed at honoring the “most innovative partners” of Tata’s companies. Jean-Pierre Crutzen, Managing Director of Drever International, and Horst Krauthäuser, Division Manager R&D from IMS Messsysteme GmbH, introduced the joint project run at the hot-dip galvanizing line of SEGAL, a subsidiary of Tata Steel, on occasion of the grand closing in Mumbai, India. X-CAP (X-ray Controlled Annealing Process) is SMS group’s latest innovation relating to the closed-loop control of AHSS annealing processes in continuous annealing and galvanizing lines. The system was developed by SMS group in cooperation with Drever International and IMS Messsysteme GmbH.

RELIABLE MATERIAL QUALITY

With X-CAP, a system is now available for the real-time quantification of the austenite content during the annealing process by means of X-ray diffraction. The austenite content in the furnace is continuously measured by a closed-loop system and allows to directly compensate process deviations or changes in the properties of the incoming material, which otherwise would lead to variations in product quality and material deterioration.

The practical benefit of the X-CAP system could be proven in numerous tests in Tata Steel’s hot-dip galvanizing line at SEGAL, Belgium. The tests also showed that X-CAP can save coils from degrading, which even experienced operators were unable to do. What’s more, a reliable material quality control will



Jean-Pierre Crutzen (left), Managing Director of Drever International, and Horst Krauthäuser, IMS Messsysteme GmbH, on occasion of the final presentation in Mumbai.

permit several further process optimizations to be implemented. X-CAP allows for the optimization of process parameters with quality kept at the same high level. Thanks to the material thickness control it is possible to adjust other parameters in order to increase production, save energy, avoid problems in surface quality and so on. If, for instance, the holding temperature is lowered, all other parameters are adapted accordingly to ensure the final strength will remain unchanged. ♦

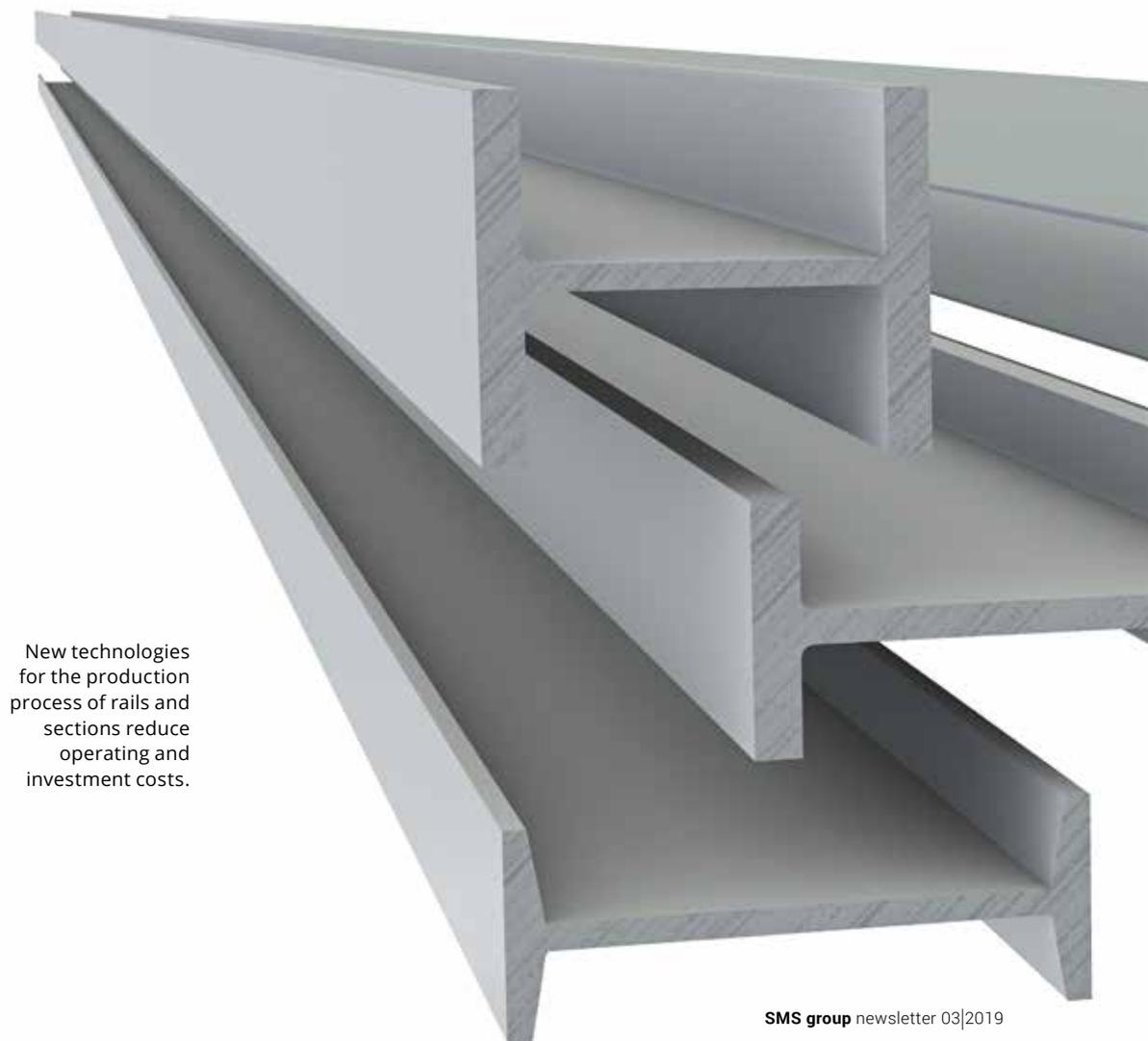


Contact
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WORLDWIDE

NEW TECHNOLOGIES FOR IMPROVED QUALITY

Cutting-edge technologies for the production
of beams, sections, and rails.



New technologies
for the production
process of rails and
sections reduce
operating and
investment costs.

- **The whole manufacturing process** for rails and sections is benefiting from new developments and technologies that improve the quality of the finished products and reduce operating and investment costs.
- **Technologies such as rail head hardening, thermomechanical rolling, QST quench and tempering process and the CRS® roller straightener** are already in use and are indispensable when it comes to new investments or facility revamps.

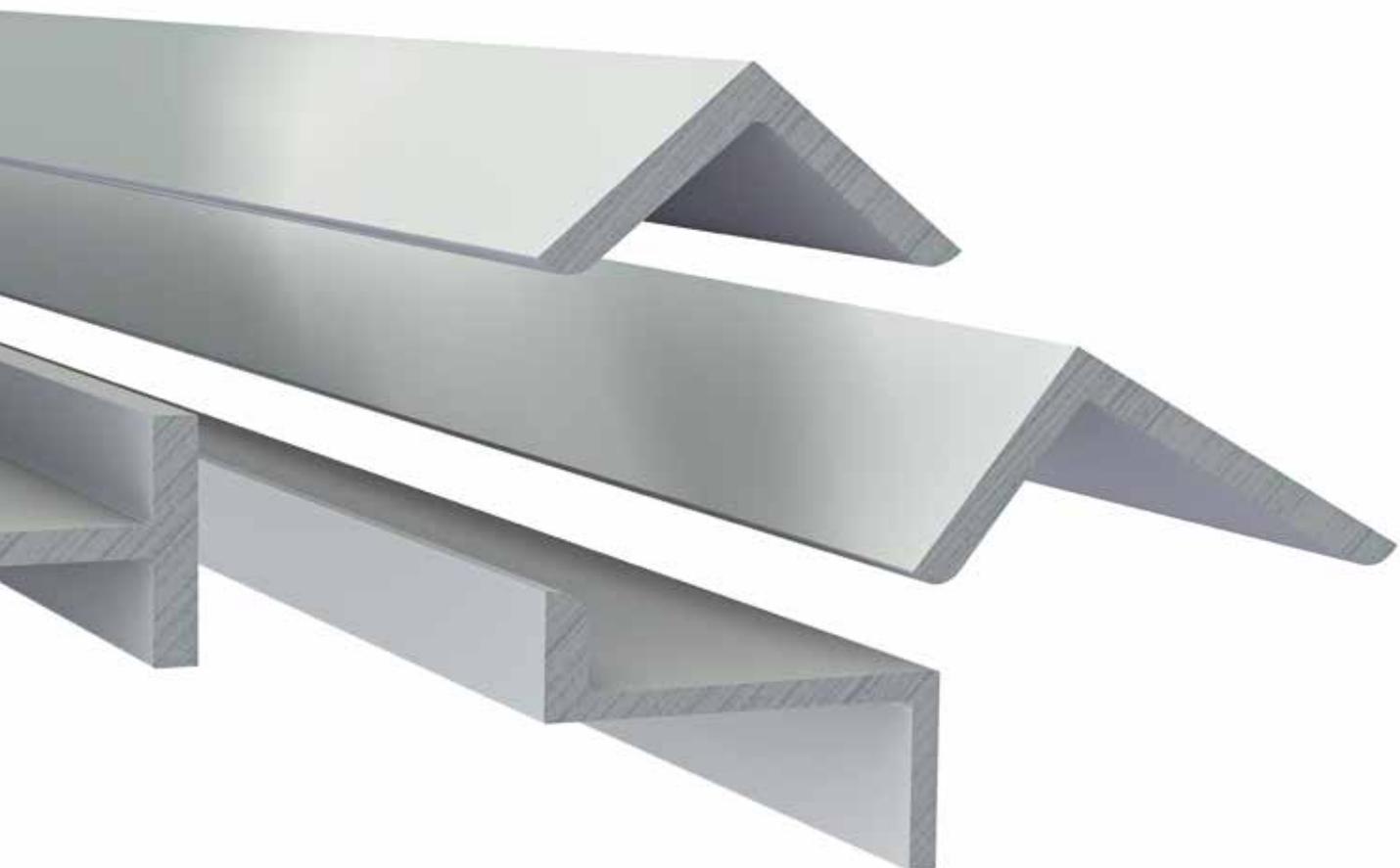
RAIL HEAD HARDENING

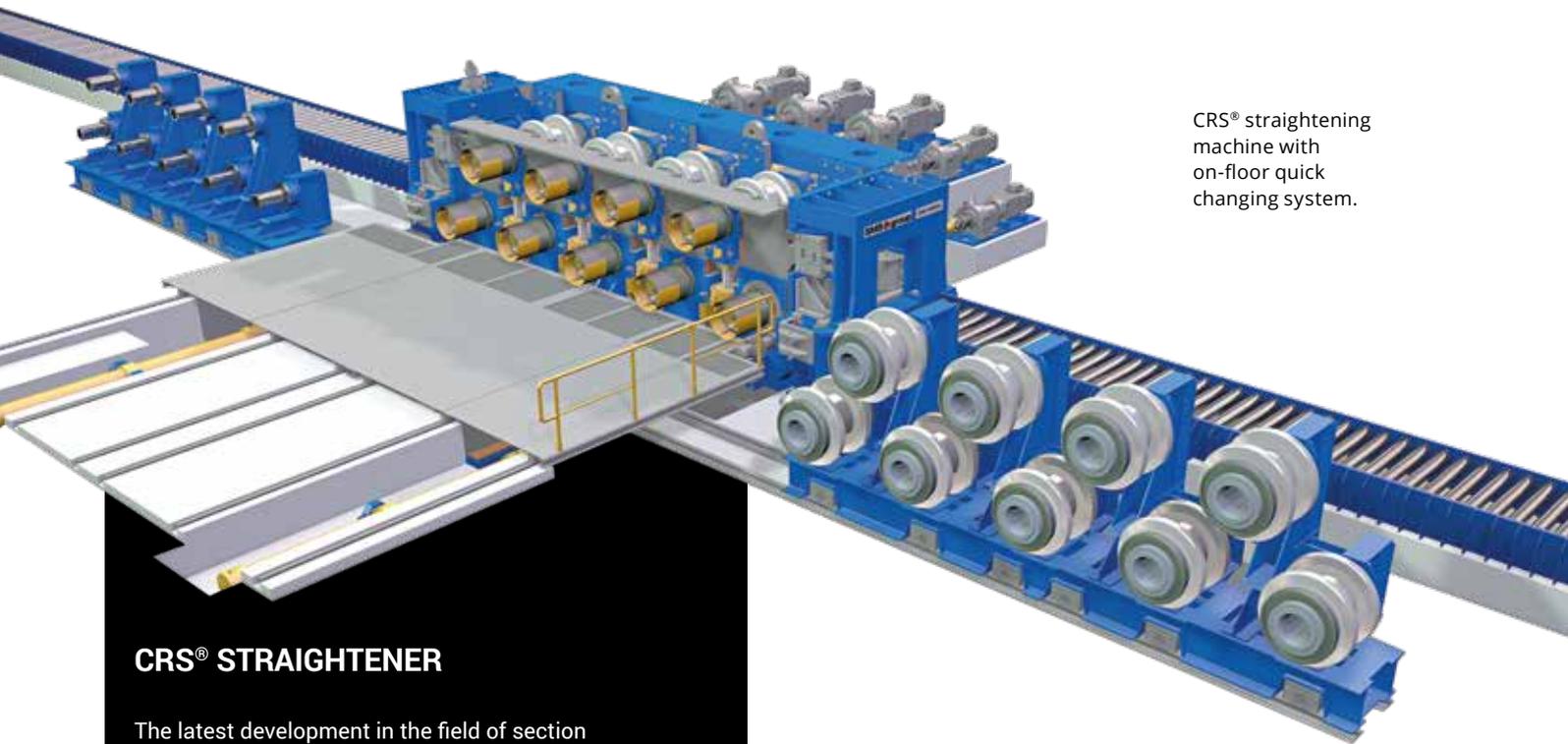
Rail head hardening is now a common requirement in the production of rails. Head hardened rails are distinguished by higher wear resistance of the rail head and a longer service life, particularly when used for heavy axle loads.

There are different rail head hardening methods available on the market. SMS group has developed, designed, and commissioned an inline, pass-through process, which uses water spray as coolant. The water mist is applied by

two-component nozzles (water/air). Given the importance of uniform heat treatment over the entire rail length, which can be up to 130 meters, an induction heater is used to homogenize the rail temperature from front end up to tail end of the rail. The induction heater ensures that the controlled cooling process starts with the same ingoing temperature over the entire rail length.

SMS group is intensively engaged in the study and development of a stationary system for inline hardening of the rail head to counteract the disadvantage of the required long layout length of the pass-through system, which requires space for turning the rails from the rolling position into an upright rail position, for induction heating, the cooling line, and for free runout. With this stationary system we use air with added water as coolant. The addition of water increases the minimum required cooling rate per second, while the application of air ensures a consistent and reliable heat treatment process at the same time. The main advantages of such a stationary inline rail head hardening process are the reduced space requirement, in particular the length, and the elimination of the need for ▶





CRS® straightening machine with on-floor quick changing system.

CRS® STRAIGHTENER

The latest development in the field of section straightening machines is the introduction of double-supported straightening machines offering hydraulically adjusted straightening rollers and automatic quick program changes. CRS® straighteners, as they are known, are used as horizontal straighteners for both rails and sections. Key features include:

- Improved product quality and lower residual stresses
- Symmetrical application of the straightening force with the rollers supported on both sides
- Automatic straightening roller changes within 20 minutes
- Fixed straightening roller pitch for a wider product range
- Automated straightening roller changes involving less personnel

The sandwich-type straightening rollers are supported by bearings on both sides. All nine straightening rollers are individually driven, while the hydraulic cylinders allow the rollers to be adjusted under load. The CRS® roller straightening machine is characterized by the following features:

- Overload protection
- Backlash-free mounting of straightening rollers
- Maximum concentricity of straightening rollers
- Automated setting of all adjustment mechanisms and drives according to the straightening data set-up
- Position transducers for reproducible recording of all setting values

an induction heater. With this method the whole rail is heat treated during the same cycle times, so that there is no apparent temperature difference between front and tail end.

This sophisticated, sensitive heat treatment process enables a fine-perlite microstructure to be achieved and bainitic or martensitic spots to be avoided. It means that the cooling rate must be controlled according to the phase transformation behavior of the treated steel grade throughout the entire cooling process. This process ensures that rails can be produced which comply with all international standards for rail head hardened rails, such as EU standards, GOST standards, Indian Standard, Australian Standard, AREMA Standard, Chinese Standard etc.

THERMOMECHANICAL ROLLING OF SECTIONS

The thermomechanical rolling process for sections is distinguished by two key aspects and is mainly applied for beams with flange thicknesses of up to 25 millimeters:

- Rolling in reversing tandem mills with reduced rolling temperature (≤ 800 °C) at reductions of approx. 30 percent
- Immediate inline quenching of finish-rolled material below 550 °C (depending on the steel grade)

The temperature of rolled stock during the finish-rolling process is reduced by the selective application of water on the

surface of the sections, primarily in the flange-web joint area of beams. This water application is controlled by an automation system, which ensures proper temperature control and homogeneous temperature distribution over the cross-section and length.

Selective cooling is performed upstream and downstream of the reversing tandem mills. For each product the Beam-Cool® computer generates recipes that consider the starting temperature, target rolling temperature, steel grade, and roll pass schedule, including rolling speeds.

After finish-rolling at reduced rolling temperatures the section is quenched as quickly as possible with a high volume of water to a surface temperature level of under 550 °C, however, not below martensitic transformation.

This process of thermomechanical rolling using selective cooling during rolling and quenching after finish-rolling, aimed at limiting the final coarse grain growth after the finishing pass, guarantees products with a finer ferritic microstructure, resulting in higher tensile/yield strength and better elongation. The process enables the reduced use of microalloying elements, such as Mn, V, Nb and Ti, resulting in a low carbon equivalent and thus good weldability, better ductility and impact properties at low temperatures. What's more, the selective cooling process provides better straightness and lower residual stresses due to the homogenous temperature distribution over the cross-section.

QST FOR HEAVY BEAMS

The quenching and self-tempering process (QST) for beams was developed by the former ProfilArbed in Differdange (Luxembourg) with the aim of increasing the mechanical properties of finish-rolled beams by intensive cooling of the entire beam surface. For this purpose, the beam is cooled down in water cooling zones behind the finishing stand until a martensitic surface zone is formed. After the beam is run out of the cooling section, it is self-tempered by the transmission of heat from the core to the surface, whereby the martensitic structure formed is tempered during natural cooling. The recovery and self-tempering temperature at the surface shall be about 600 °C. This results in a microstructure which is ferritic-perlitic in the core and has a tempered martensitic structure in the surface zone.

The QST process considerably improves the yield point, tensile strength, and toughness at low temperatures and at low carbon equivalent, which is beneficial for the weldability of the beams. The QST process is usually combined with a selective cooling process during rolling and realized by intensive water quenching after the final pass.

The SMS group quenching modules are characterized by their flexibility when the entire range of beams to be



quenched and self-tempered is covered. Each cooling zone has its own pressure control system, so that the cooling rate for the whole area of the beam can be precisely adjusted for a homogenous temperature distribution over the beam. The QST process is suitable for beams with a minimum thickness of 25 millimeters. ♦



WORLDWIDE

RETHINKING PROVEN TECHNOLOGIES

Peak performances for billet and large bar mills.



Continuous rolling mill with CS stands.

- **Equipped with up-to-date technology** heavy-duty billet mills and large bar mills regain competitiveness.
- **Producers benefit from** close tolerances, reliable mill stands and high production output.
- **SMS group benefits** from planning and focusing on its decades of experience with these plant types.

Although billet production is one of the oldest rolling technologies, the requirements of the 21st century have led to a certain renaissance of the associated equipment, with significant investments being made by steel producers around the world.

Today, semi-finished products such as blooms, billets or even large rounds and squares are produced on billet mills and large bar mills. These applications require the strongest and most reliable equipment. With its design SMS group has contributed to this development, combining the “good old” heavy-duty design with the latest state-of-the-art technology.

SEMI-CONTINUOUS BILLET MILLS

Billet mills represent the oldest mill types in the rolling industry and go way back to a time when continuous casting had not yet been invented. Cast ingots were converted into square billets required for wire rod or bar production. This process changed dramatically with the refinement of continuous billet casting machines. Almost all major steel grades can be cast as billets; however, rolled billets have been used less and less in recent decades as producers aim to minimize conversion costs. Exceptions were found in Asia, where the main market players still prefer the conventional production route, the amount and the size of internal defects minimizing by plastic deformation.

Thanks to the increasing demand for SBQ (Special Bar Quality) products and new green- and brownfield projects in Asia, this technology is undergoing something of a renaissance. Billet mills such as these are aimed at high capacities of up to two million tons or more per year and hence require the strongest and most reliable equipment available on the market.

SMS group has therefore reinvented one of its product lines that had already enjoyed success decades before. A good example of a new billet mill can be found at Formosa Ha Tinh Steel Corp. in Vietnam, which combines the solidity of 20th century equipment with the latest automation and technology available. With the ultra-rigid, closed-type compact mill stands (CS stands) and a new generation of crank shears, the Formosa Ha Tinh billet mill will now be the benchmark for decades to come. ▶

The main reason Formosa Group chose to place this order with SMS group was the outstanding number of reference mills installed by SMS group. No other supplier has ever designed billet mills with a higher capacity. As the new billet mill for Formosa Ha Tinh Steel Corporation was intended to produce one million tons per year in the first phase and up to two million tons per year in a second expansion stage, SMS group's experience was the convincing factor.

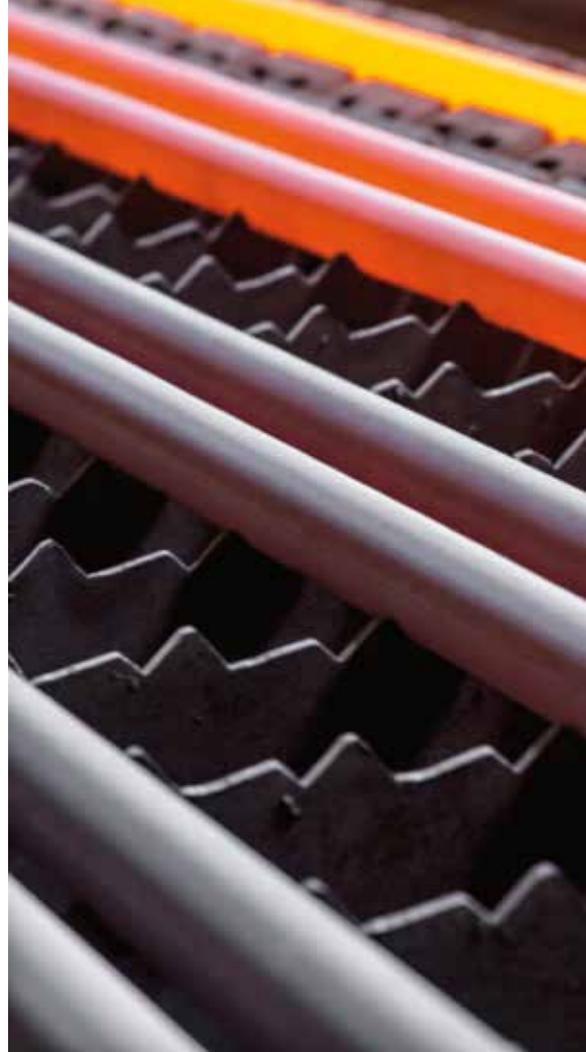
LARGE BAR MILLS

Another trend is the growing demand for large bars with diameters ranging from 60 to 350 millimeters. While for some years this trend was covered by the introduction of rotary forging presses, growing demand led to a push for a new generation of rolling mills that offer higher capacities than forging machines and lower operational costs. The beginning of the new century saw the first new large bar mills to appear for a long time, and these were mainly upsized bar mills. If it comes to meeting the tolerance requirements of the market, the established housingless stands are no longer the right solution.

Compared with billet mills, large bar mills require not only extremely rigid mill equipment but also tight tolerances. SMS group therefore combined the newly developed CS stands with its Hydraulic Gap Control (HGC) and Hydraulic Size Control (HSC) systems. The result is an extremely rigid, solid and reliable continuous mill stand capable of rolling large bars at a tolerance of 1/4 DIN: these revolutionary HCS® stands (Hydraulic Compact Stand) were first introduced at Xining Special Steel in China. Xining Special Steel is one of China's major producers of highly specialized steels. Their products range from different alloy steels to high-speed steels and other tool steels.

A wide range of stainless steels is also produced on the new bar mill. As the costs associated with such steel grades are high, optimizing the overall yield is particularly important. Xining thus aimed at minimizing the allowances for turning and peeling operations, which required a technology that was able to offer extremely tight tolerances. The HCS® stands with hydraulic screwdown in combination with an advanced laser measuring gage enable automatic size control. The results are 1/4 DIN tolerances for the entire product range of Ø 80-280 millimeters.

Large high-quality bars with large diameter – so-called “large bars” – are applied both in the automotive and aviation industry and in plant and mechanical engineering.



HIGH-PERFORMANCE SBQ ROUGHING MILLS

Nowadays, the equipment applied for billet and large bar mills is also used for classical SBQ mills. Many bar mills of the older generation operate with two- and three-high reversing stands, whereby the billet cross-section is reduced before entering the continuous mill. Nevertheless, the billet sizes are increasing due to the rising demand of the automotive industry. In the past, the conventional billet sizes such as 150, 160, and 180 millimeters square were sufficient. An enhanced quality standard for automotive applications requires larger billets within 200 to 240 millimeters square. In addition to that, steel producers are subject to ever increasing competitive pressures when it comes to boosting efficiency and productivity in order to survive in the market.

Therefore, some steel producers like Saarstahl AG in Nauweiler (Germany) or Sidenor Basauri in Bilbao (Spain) have replaced their existing reversing roughing mills with continuous roughing mills. SMS group supplied the CS stands for both these projects. ♦



Dr. Thomas Maßmann
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Reversible two-high blooming stand.

The new orders strengthen the relationship between Gerdau and SMS group.



U.S.A.

STRATEGIC PARTNERSHIP

For rolling mill upgrades in Petersburg and Cartersville, Gerdau decided in favor of SMS group.

Gerdau AmeriSteel Corp. has selected SMS group for the supply of rolling mill stands to upgrade the heavy section mill in Petersburg, Virginia, U.S.A. and the medium section mill in Cartersville, Georgia U.S.A.

"This important investment will enable Gerdau to make full use of the synergy effects of the two rolling mills in Petersburg, Virginia and Cartersville, Georgia, allowing us to increase efficiencies and maintain our position as one of the leading suppliers of structural steel in the market," says Kevin Jilbert, Procurement Manager at Gerdau AmeriSteel Corp. "Fully in line with our corporate culture and policy strategy according to the motto "The Gerdau We are Creating", we are committed to the implementation of digital innovation and to the use of technology in order to improve our operations and customer service."

For the Petersburg location, SMS group will supply two Compact Cartridge Stands (CCS®) downstream of the breakdown mill group with the aim of increasing productivity, improving performance and section control and allowing for future product portfolio expansion. The CCS® stands, developed by SMS group, are the industry standard in structural steel rolling and are adopted by the majority of producers worldwide. Gerdau Petersburg has been operating these stands already since startup of the plant in 1998.

Gerdau Cartersville will be upgraded with the addition of three CS type stands downstream of the breakdown mill and

upstream of the continuous finishing mill. In addition, a new cold saw will be added to the finishing mill. Thanks to optimized roll pass design and improved section control, the upgrade will allow the mill to increase productivity. The high-performance CS compact stands are the ideal choice for demanding applications due to their superior rigidity and allowance for higher loads, especially in universal configuration.

"These important orders from Gerdau reaffirm SMS group leadership in the supply of medium and heavy section mill equipment. The Petersburg mill was the first mill worldwide where CCS® stands were installed. The new order affirms customers' satisfaction with these CCS® stands and the projects strengthen the relationship between both companies testifying to the reliability of our equipment," says Thomas Maßmann, Executive Vice President Long Products, SMS group.

Both projects are slated for installation during short downtimes to ensure that production is only affected to a minimum level. The upgrades are expected to be completed by the end of 2020. ♦



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CHINA

SECTION MILL EXTENDS PRODUCT RANGE

Fujian Luoyuan Minguang Iron and Steel orders section mill from SMS group.

Contract signing ceremony (from left): Elmar Krieg, Head of Sales Section & Billet Mills, SMS group, Hu Yuyan, Section Chief of Equipment Department, Fujian Luoyuan Minguang Iron and Steel Co., Ltd. and Wang Guoshun, General Manager, SMS group China Long Product Division.



Fujian Luoyuan Minguang Iron and Steel Co., Ltd., located in Luoyuan County, China, a member of the Sangang Group, has placed an order with SMS group GmbH for the supply of a new section mill for parallel flange beams up to a web height of 750 millimeters. The new section mill will enable Fujian Luoyuan Minguang Iron and Steel to broaden its product portfolio and to respond to the high demand for beams in China and in the region.

The rolling mill will be designed for an annual capacity of 1.3 million tons and equipped with a state-of-the-art breakdown stand and the latest-generation CCS® universal mill stands in reversing tandem arrangement, featuring hydraulic adjustment systems and automatic quick program change. The new CRS® roller straightening machine also equipped with hydraulic adjustment systems ensures minimal program changing times and minimal residual stress levels of the finished products.

Furthermore, SMS group's scope of supply includes the technology and engineering for the entire rolling mill, hot and cold saws, the PROGAUGE inline profile measuring system with surface defect detection (SurfTec) and other mechanical key components. The supply will be complemented by the

basic automation for the rolling mill as well as electrical main and auxiliary drives.

INSTALLATION, COMMISSIONING AND STAFF TRAINING BY SMS GROUP

SMS group is also responsible for supervision of erection and commissioning as well as commissioning of the electrical equipment and automation. Theoretical training of customer's personnel will be held in SMS group's training center in Mönchengladbach and practical training will be provided at site by SMS group during erection and commissioning.

The technological know-how, the proven top equipment and the commissioning expertise were decisive factors for the customer to select SMS group as partner for this strategic project. Hot commissioning is scheduled for the second half of 2020. ♦



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CCS® tandem group of a comparable plant.

SOUTH KOREA

HIGHER ROLLING SPEEDS AND IMPROVED TOLERANCES

SMS group upgrades heavy section mill at Hyundai Steel.

After successful commissioning of its new horizontal straightening machine, Hyundai Steel has placed a follow-up order with SMS group for the modernization of the heavy beam mill at its Incheon site.

With this upgrade Hyundai Steel pursues the goal of rolling in future larger sections with webs of up to 1,100 millimeters and sheet piles up to a system height of 800 millimeters. SMS group takes up this challenge as the leader of a consortium with Hyundai Rotem, a subsidiary of Hyundai Motor Group.

As part of the project, various new functions will be added to the existing two-high breakdown mill stand and a new sideguard manipulator will be supplied.

The rolling line downstream of the breakdown stand will be replaced by a new CCS® (Compact Cartridge Stand) tandem group and one additional CCS® finishing stand. The

stands will feature nominal rolling forces of 12,000 kN for the horizontal rolls and 8,000 kN for the vertical rolls.

The CCS® stands will also reduce the maintenance effort, and enable a shorter roll changing time and higher rolling speeds, while achieving better tolerances.

24 MILLION TONS OF CRUDE OIL PER YEAR

With an annual crude steel production of 24 million tons, Hyundai Steel is one of the ten largest steel producers worldwide, supplying its products predominantly to the automotive, shipbuilding and general construction industries. ♦



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U.S.A.

EXPANDED MARKET OPPORTUNITIES

Zekelman Industries commissioned SMS group to supply the largest continuous ERW tube welding mill in the world.

Zekelman Industries selected SMS group as partner and main supplier for a new 28" ERW tube welding line (Electric Resistance Welding) to be installed at its "Atlas Tube" structural tube division.

With the new 28-inch continuous ERW tube welding line, Zekelman Industries will be installing the biggest continuous line in the world, capable to produce more than 400,000 tons per year and thus extending its product range.

The new line will allow Zekelman Industries to produce structural and piling products with diameters ranging from 10 ¾ up to 28 inches (273 to 710 millimeters) and wall thickness of up to 1 inch (25.4 millimeters). Furthermore square and rectangular hollows in dimensions from 8 x 8 inches (203 x 203 millimeters) up to 22 x 22 inches (559 x 559 millimeters) or 34 x 10 inches (863 x 254 millimeters) will be produced. All products are mainly intended for demands of the construction and building sector.

HIGH PRODUCTION SPEED AND GREAT VARIABILITY

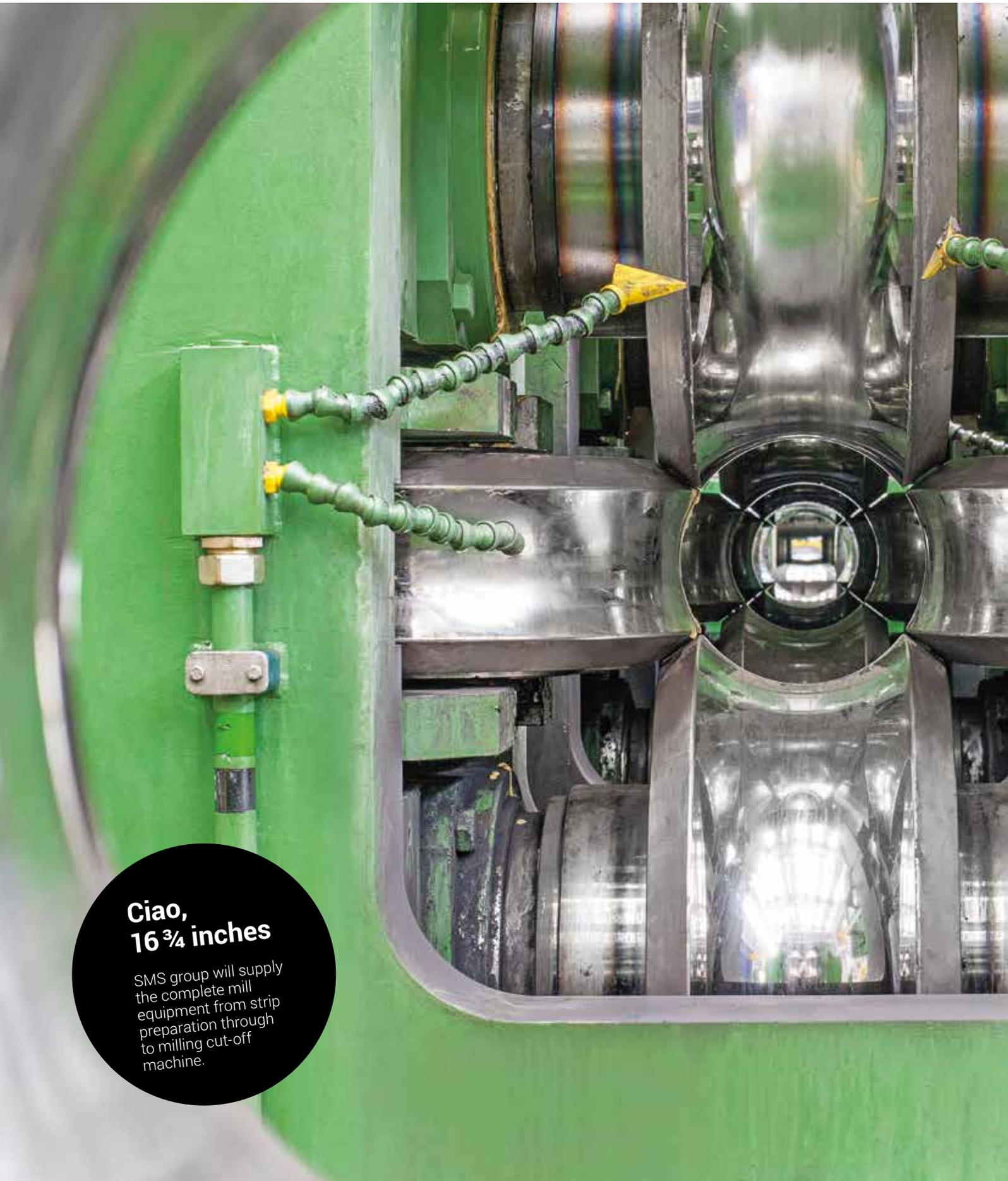
Design and layout of the new line meet the highest requirements as regards product quality and throughput. The computer-controlled SMS group CSS Quicksetting® system ensures that the rolls can be adjusted automatically to their new working positions after the size change. Further to an operational speed reaching 35 meters per minute, the line also offers superior variability in the ratio of tube diameter and wall thickness which, along with a quick product changeover time, results in great flexibility for different products.

Zekelman Industries and its structural tube division, Atlas Tube, have been relying for years on SMS group's tube welding technology. The company has placed several orders with SMS group for the expansion and improvement of the product spectrum of the tube welding lines installed in Harrow, Canada and Blytheville, U.S.A. This latest order marks the next step in a successful cooperation between both companies. ♦



With the new 28" ERW tube welding line Zekelman Industries is going to expand its product range.

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**Ciao,
16 ¾ inches**

SMS group will supply the complete mill equipment from strip preparation through to milling cut-off machine.

ITALY

FLEXIBLE AND EFFICIENT

Padana Tubi places an order with SMS group for new 16 ¾-inch ERW tube welding line.

Padana Tubi & Profilati Acciaio, the Italian manufacturer of welded tubes is once again relying on the tube welding technology from SMS group and ordered a new 16 ¾-inch tube welding line to be installed at Padana's Guastalla plant in 2020. At the same location a 14-inch tube welding line from SMS group is already in operation producing high-quality products.

With the new line Padana Tubi will significantly increase its product portfolio for round tubes with a diameter of up to 406 millimeters (16 inches), as well as for square sections with edge lengths up to 350 x 350 millimeters and rectangular sections up to 500 x 200 millimeters. Besides heavy wall thicknesses up to 18 millimeters, the mill will be specially designed to produce high grades up to 700 N/mm². The products are mainly intended to satisfy the demand of the construction industry.

COMPLETE PLANT EQUIPMENT FROM A SINGLE SOURCE

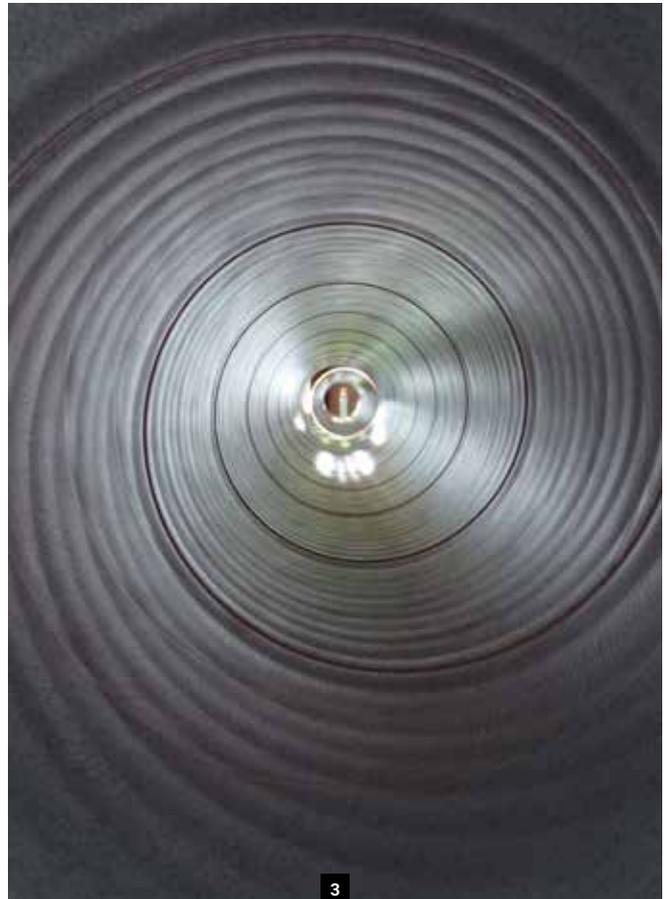
SMS group is the single-source supplier of the complete mill equipment from strip preparation through to the milling cut-off machine, including strip preparation, transverse welding unit, horizontal spiral strip accumulator, strip edge miller, forming, welding and sizing section, and a travelling milling cut-off machine.

The line will be equipped with URD® (Uniform Rigid Design) stands providing an automatic quick-change system of the rolls. Roll positioning and quick-changing of the rolls are controlled by the X-Pact® Quicksetting system, which sustainably improves the product quality by database-assisted plant settings. The technical features combined with a maximum mill speed of 45 meters per minute will allow Padana Tubi to achieve a high output and very flexible and efficient production. ♦



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1
The new spiral pipe mill is scheduled to start production in 2020.

2
PERFECT arc® technology from SMS group enables energy savings of up to 30 percent.

3
The spiral pipe line will be designed for producing pipes with a length of more than 16 meters and outside diameters ranging from 610 to 3,658 millimeters.

U.S.A.

RESSOURCE-EFFICIENT SPIRAL PIPE PRODUCTION

SMS group to supply new spiral pipe mill to AMERICAN SpiralWeld Pipe.

AMERICAN SpiralWeld Pipe Company LLC. has awarded an order to SMS group for the supply of a new online spiral pipe mill, to be installed in a new plant ("Plant 3") in Paris, Texas, U.S.A.

SMS group will be responsible for the engineering, supply and supervision of erection and commissioning of a coil preparation stand and a spiral pipe machine with submerged-arc welding (PERFECT arc®). SMS group's PERFECT arc® technology enables energy savings of up to 30 percent compared to plants of other suppliers.

EXPANSION OF PRODUCT RANGE

The new spiral-pipe production facility is scheduled to start producing in 2020. Material grades up to X-70 can be processed. The pipes will mainly be produced as water pipes according to AWWA (American Water Works Association) standards. The new line will be designed to make pipes of more than 16 meters (55 feet) length with an outside diameter ranging from 610 to 3,658 millimeters (24 to 144 inches). The maximum wall thickness will be 25.4 millimeters (1.0 inch).

The mill will operate in the so-called one-step ("online") process with submerged-arc welding from the inside and outside taking place directly after spiral pipe forming.

Often the productivity of spiral pipe welding systems is restricted by the welding speeds of submerged arc welding. PERFECT arc® power sources allow an increase in productivity of up to 20 percent, while process stability remains constant. The systems operate with IGBT (Insulated-Gate Bipolar Transistor) power electronics with fully digital welding current control. No



The teams of AMERICAN SpiralWeld Pipe and SMS group after contract signing.

transformers are required. As a result, the welding machines can attain an efficiency rate of over 90 percent. Compared to older welding techniques, significant energy savings (up to 30 percent) are possible, depending on the operating point.

This new plant will enable AMERICAN SpiralWeld Pipe to expand its production by a very high tonnage of spiral-welded steel pipes for the municipal water and wastewater transmission markets, industrial, hydroelectric and power markets including large-diameter fabrication for sewage treatment plants and pump stations. ♦



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The MEERdrive[®]PLUS wire rolling block in operation at Caleotto works.



WORLDWIDE

TOP PERFORMANCE IN PRODUCTION

For an increased output Caleotto relies on the new MEERdrive^{®PLUS} wire rod block and the multiline loop concept from SMS group.

- **The new plant design** enables the production of 300,000 tons of wire rod per year.
- **Through the MEERdrive^{®PLUS} wire rolling block** changing times can be significantly reduced and utilization times improved.

Two of the market leaders in the steel industry and a common goal: the rebirth of a wire rod mill. "We intend to meet the highest standards in terms of products, processes, services, and technical assistance. This is why we increase our presence abroad in order to better utilize the opportunities available on the international market and continue to keep the manufacturing tradition of steel in the region alive and competitive. This can only be attained through constant innovations and environmental, economical and social sustainability," explained Domenico Campanella, CEO of Duferco and Lorenzo Angelini, CEO of Caleotto S.p.A.

NO SOONER SAID THAN DONE!

Caleotto and SMS group have joined forces to bring the production back at peak output. Therefore a new MEERdrive^{®PLUS} rolling block, a multiline loop concept and a MEERgauge[®] measuring system have been integrated in the existing wire rod line.

The original plant design was capable of producing quality wire rod with diameters ranging from 5.5 to 17 millimeters, starting with billets from 140 and 160 millimeters, a length of 9,500 millimeters and weighing up to 1,850 kilograms. 170-millimeter billets with a weight of 2,300 kilograms could also be rolled to obtain heavier coils. Steel grades ranged from low, medium to high carbon steel for all applications, case hardening, cold heading, quenching & tempering, spring, boron steel and welding wire at rates of 70 tons per hour. With the upgraded mill Caleotto will now be able to produce 300,000 tons of wire rod from special steel. Finished products (in some grades and diameters) can also be produced thanks to the thermomechanical rolling process at temperatures between 750 °C and 800 °C.

TIGHT TOLERANCES AND OVALITY

SMS group has been a pioneer in blocks with individually driven stands and combined the market's demand for a four-pass wire rod block with a MEERdrive[®] block. The result is the MEERdrive^{®PLUS}, a four-pass wire rod block that is capable of finish-rolling wire rod within the 4.5 millimeter to 26 millimeter range. With this sizing block, it will be possible to achieve tolerances up to 0.05 millimeters and an exceptional ovality thanks to the ORRR (oval round round round) pass sequence. ▶



ITALIAN JOINT VENTURE

In 2015, Duferco and Feralpi established a new joint venture company called Caleotto. The production in the Lecco rolling mill with strong links to the surrounding area was maintained, and the choice was made to preserve the historical names of Caleotto and Arlenico, both of which are highly regarded and acknowledged by the customers.

The Feralpi group which was founded in 1968 is one of the leading steelmakers in Europe and specializes in the production of steel for both the construction field and for special applications.

The Duferco Group, founded in 1979, is an international company with an integrated and diversified industrial system for applications in the shipbuilding, energy, steel and trading sectors. The Caleotto Group has now taken different roads with the aim of becoming a proactive stakeholder in this sector and reviving a great tradition.

A typical application of MEERdrive^{®PLUS} is to install it after an 8- or 10-pass traditional finishing block as featured in the Caleotto rolling mill. The technological distances and the water boxes required up- and downstream of the sizing block depend on the relevant steel grades and their end use.

All sizes are finish-rolled on the MEERdrive^{®PLUS} rolling block using the eight-stand rolling block as a feeder of small sizes from 4.5 to 12.5 millimeters and the intermediate mill for the remaining sizes up to 26 millimeters. With this solution, changing times are reduced considerably and the mill

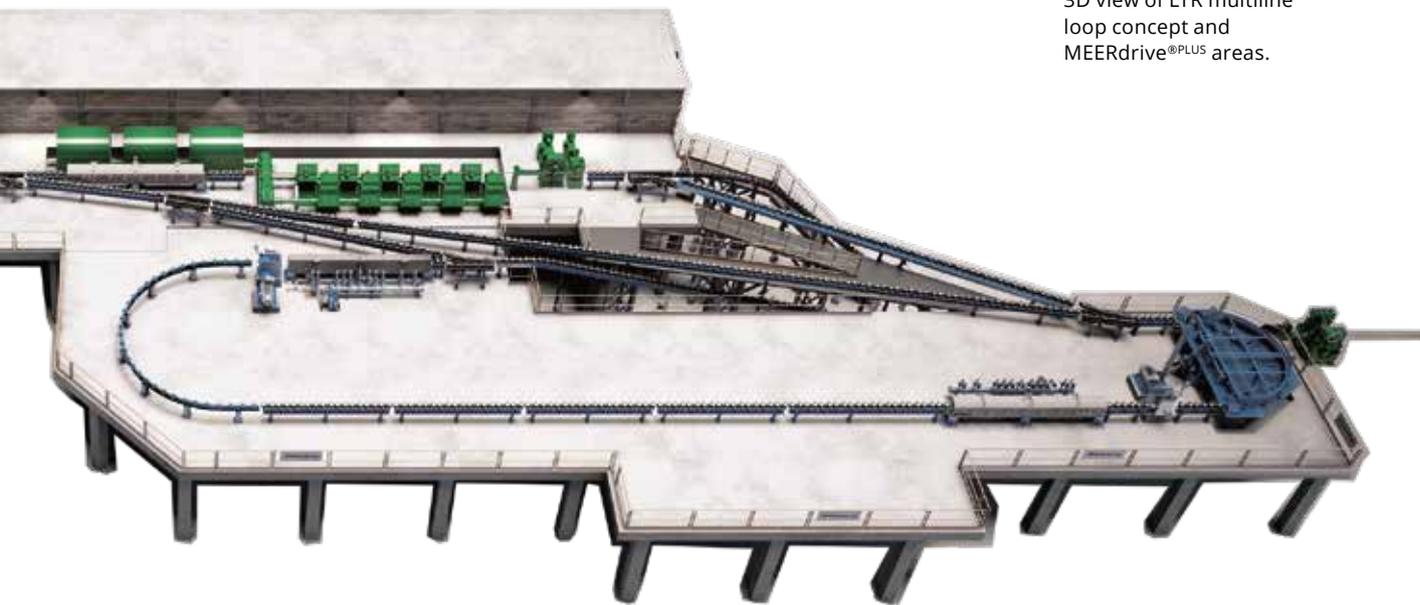
utilization time is significantly improved. If the produced mix of sizes is specifically extended a quick-changing device for changing all four stands simultaneously is also possible.

The inline MEERgauge[®] measuring system which is based on laser light-section technology installed downstream of the MEERdrive^{®PLUS} rolling block can measure up to 99 percent of the bar surface (depending on the speed). The system uses four sensors and has a scanning rate of up to 15,000 scans per second. A true-shape cross-section is created from up to 400 synchronous measuring points in a shared coordinate system, and is then displayed with maximum precision. Unlike with conventional systems, the true shape of the contour can be represented precisely. With no moving or oscillating parts, the system requires almost no maintenance.

MULTILINE LOOP CONCEPT IN A MODERN WIRE ROD MILL

All fields of steel production share the goal of attaining the best possible mill availability even with changing market conditions. With mills producing quality steel in particular, small lot sizes are required. This in turn necessitates frequent mill changes with the associated increase in downtimes. In view of this, SMS group has developed the multiline loop concept that enables together with a four-pass sizing block a mill utilization rate in excess of 90 percent for the production of quality wire rod with small lot sizes. Mill owners can therefore respond quickly to market needs and inventories can be reduced.

By using the eight-stand wire rod block and the four-stand MEERdrive^{®PLUS} wire rod block in the finishing part of the mill, single-family rolling is utilized from stand one up to the block exit. The complete finished product size range from 4.5 to 26 millimeters is rolled on the MEERdrive^{®PLUS}. Quick



3D view of LTR multiline loop concept and MEERdrive^{®PLUS} areas.

changing facilities are available in two different options. The most economical solution is a quick roll change that allows a complete size change within 15 to 20 minutes. The other possibility would be to change the entire four-stand MEERdrive^{®PLUS} within five minutes requiring the installation of an additional unit. Tolerances are within ± 0.1 millimeters for the complete size range. The design speed is 120 meters per second with new dressed rolls. In addition to the above, there is the multiline loop in combination with the eight-stand rolling block and the four-stand MEERdrive^{®PLUS} block offering advantages that cannot be achieved with any other mill concept.

COMPACT COILS

Installed at the end of the existing loop cooling conveyor is a curve element accommodating a most modern Ring Distribution System (RDS), the task of which is to distribute the windings properly to ensure that a compact coil formation is achieved. The RDS is followed by a coil lowering station, which smoothly lowers the compact coils onto a vertical pallet system. Finally, the pallets hand over the coils to the installed C-hook system for subsequent trimming and compacting procedure. It is designed to offer special protection to the finished wire rod material and is also adapted to the high-quality finished product.

EXCELLENT WIRE ROD IN TERMS OF DIMENSIONAL TOLERANCES AND SURFACE QUALITY

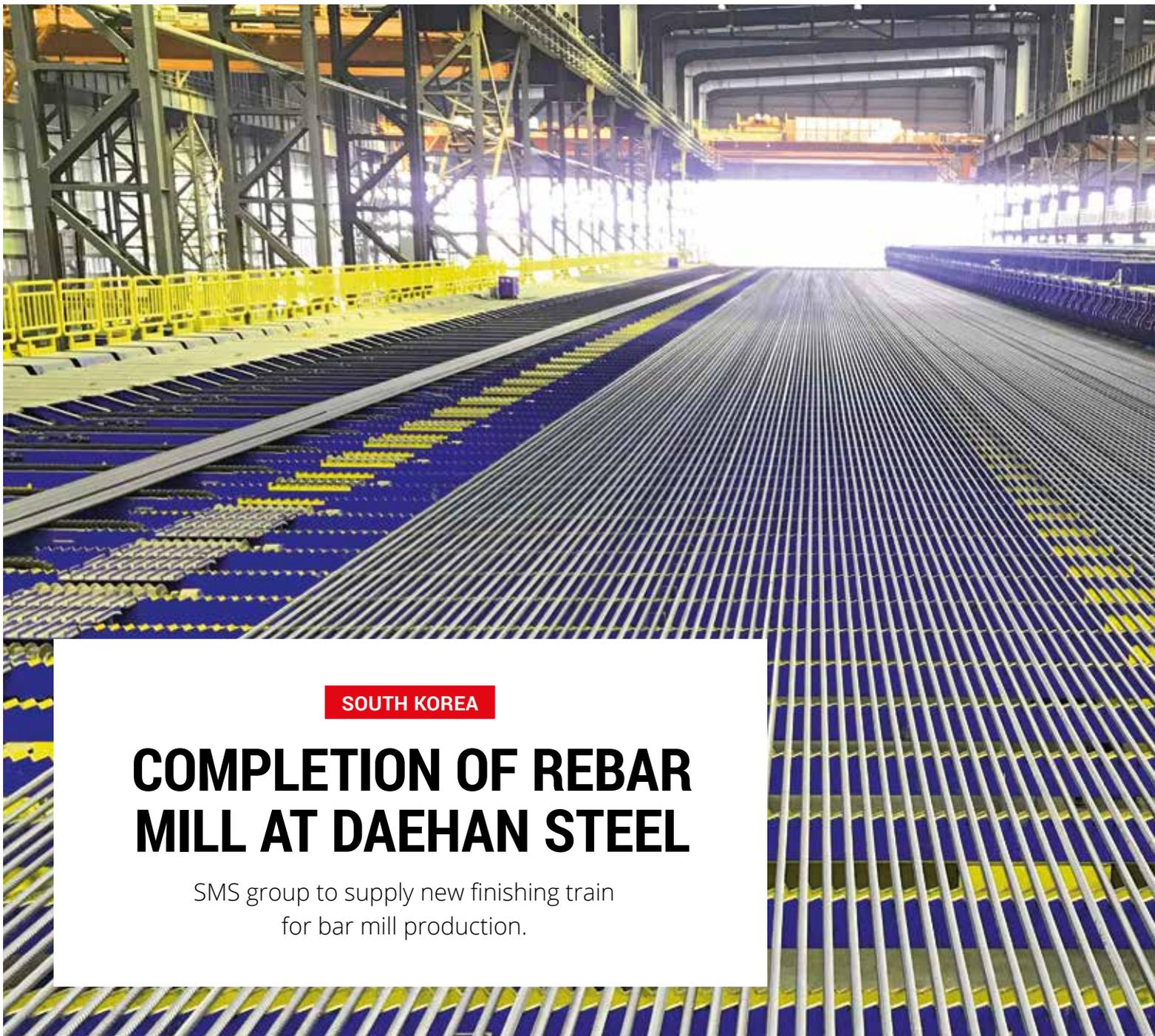
The MEERdrive^{®PLUS} rolling block offers plant owners a solid opportunity of producing supreme wire rod in terms of dimensional tolerances and surface quality, but it is not only the machine alone that does the "right job". It is a combination of equipment that provides Caleotto with a wide range of new possibilities, from the rebirth of its mill up to the consolidation of its position in the market.

Finished products manufactured at the Caleotto plant are becoming much more attractive for drawing line operators and forging producers, reducing to zero spread cold heading operation. End users prefer products with better surfaces and dimensional tolerances, with the aim of avoiding stoppages in the drawing lines due to emerging material defects, which results in an immediate payback from the market, where only selected products are bought. ♦



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SOUTH KOREA

COMPLETION OF REBAR MILL AT DAEHAN STEEL

SMS group to supply new finishing train
for bar mill production.

South Korean company Daehan Steel Co., Ltd. has awarded an order to SMS group for the completion of the rebar rolling mill at its Pyeongtaek plant.

The new equipment will allow Daehan to bundle rebars in both small and large packages. Starting material will be billets 130 and/or 150 millimeters square with a length of 12 meters in low and medium carbon grades. The throughput rate will be 70 tons per hour. The rebars having a diameter range from 10 to 32 millimeters will be bundled to packages of commercial lengths from six to 12 meters and will have a weight between 1.5 to 2.5 tons. For products D10 to D19, small heavy packages of 400 kilograms are bundled.

The rolling mill features an EBROS billet welding system, 14 HL (housingless) mill stands and an eight-pass finishing

block with VCC® (Vertical Compact Coiler) to produce five-ton coils of the rebar product sizes mentioned above.

The scope of supply includes a new crop and dividing shear, a new cooling bed fitted with HSD® (High-Speed Delivery) system, a newly designed cold-cutting system operating on the basis of counting stations and equipment for bundling and tying small and large packages to ensure the packages will have a stable shape. The finishing train will feature latest SMS group technology for high-speed bar mills and tying equipment, such as

→ HSD® (High-Speed Delivery) system which stands for increased productivity and maximum yield at high speeds of up to 35 meters per second.



One of the recently installed HSD® systems.

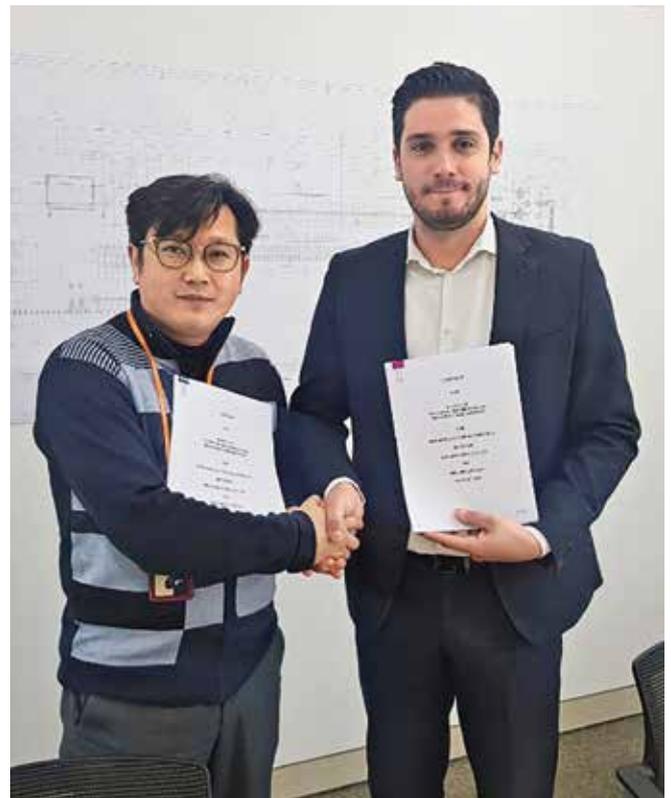
Commissioning of the finishing train is scheduled for mid-2020. As one of the most advanced and productive plants, it will be trendsetting on the market in terms of technology, quality, efficiency and low operational costs. ♦

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→ Fully automated tying machines with energy consumption reduced by about 50 percent compared to the old machines.

Established in 1954 as Daehan Trading, the company was mainly active as a wire rod producer and in the 1970s it started to produce steel bars due to a rapid growth of the Korean economy.

Over the years, the company became a specialized steel producer. In 1992, it changed its name to Daehan Steel and emerged as one of the most important steel producers in the Far Eastern countries. With the present investment Daehan Steel will strengthen its competitive position on the local market and in the neighboring countries.



Contract signing ceremony with Byoung-Do Kim, Deputy General Manager Daehan Steel (left), and David Maurizio, Area Sales Manager SMS group.



CHINA

VALUABLE CONTRIBUTION TO ACHIEVING PROGRESS

Expansion of capacity at titanium producer
Western Superconducting Technologies (WST).



The new 63/80 MN high-speed open-die forging press in operation at WST.

Western Superconducting Technologies, Co. Ltd. (WST), headquartered in Xian, in Shaanxi Province, China, has successfully put a 63/80 MN two-column high-speed push-down open-die forging press supplied by group including two integrated railbound 25-ton manipulators and a mobile eight-ton loading and unloading manipulator into service.

The Chinese company is now able to flexibly manufacture various high-quality products e.g. of the aerospace industry for its customers. With a maximum press force of 63 MN and an upsetting force of 80 MN the new high-speed press forges precisely and reliably. Thanks to the advanced hydraulic and control

systems installed, the supplied open-die forging press is capable to forge demanding and temperature-sensitive materials such as titanium and titanium alloys in a technically accurate manner. The two integrated railbound forging manipulators are handling the forgings up to a weight of 25 tons accurately to the millimeter and fully synchronously to the press stroke, even at very high stroke numbers. ♦

 **Dr. Serdar Tuncel**
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“The new open-die forging press delivers excellent products enabling our company to make a valuable contribution to the Chinese aerospace industry.”

Cheng Peng, Deputy Managing Director of Western Superconducting Technologies



JAPAN

FAST, PRECISE AND PRODUCTIVE

Hitachi Metals grants FAC to
SMS group for 90/108 MN open-die
forging press.

Hitachi Metals, Yasugi, Japan, has granted SMS group the FAC (Final Acceptance Certificate) following the successful commissioning of its 90/108 MN open-die forging press. It is the largest four-column open-die forging press in push-down design that SMS group has built in the last 25 years. The plant operates with a forging force of up to 90 MN and an upsetting force of 108 MN. It forges flat and round bars from ingots quickly and precisely at a maximum starting material weight of 30 tons. Two rail-bound manipulators position the forgings with millimeter precision and move them fully in sync with the press stroke. Hitachi intends to use the new open-die forging press to process temperature-sensitive materials, such as titanium alloys, tool steels, high-speed steels, and nickel-based alloys. Forging sophisticated materials is a highly technological process which requires the specified parameters to be precisely maintained. The engineers at SMS group have designed and built an open-die forging press that fully meets the high customer demands.

SMS group has devised a highly efficient, space-saving hydraulic system concept for the four-column, push-down press. High-speed forging is possible thanks to the 18 high-performance hydraulic pumps installed in the

90/108 MN open-die forging press in operation at the Yasugi Works.

press. The twin pump arrangement, i.e. two pumps operated by one motor, makes the hydraulic system require distinctly less space.

FAST TOOL CHANGES

The customer had specifically requested the option of performing fast tool changes on the press. So, SMS group developed a tool changing system for this very purpose. With this new concept only the die track needs to be replaced. The entire tool changing process is performed fully automatically. The scope of supply for the press also included a table shifting device, a die shifting device, and a die magazine.

The customer uses the ForgeBase® control software for optimized, reproducible forging results. A variety of forged parts can be produced precisely and cost-efficiently based on predetermined pass schedules. The press operator is able to switch from fully automatic to semi-automatic or manual mode as and when required.

In order to minimize the vibrations emitted into the ground, the open-die forging press was erected on a vibration-isolating foundation, consisting of an intermediate foundation and several vibration dampers. As a result, the residual vibration measured at the reference point meets the customer's strict specifications. What's more, the horizontal stoppers installed on the sides give the solid press design extra stability in case of earthquakes.

Another special technical feature is the three-dimensional laser measuring system. It measures the surface temperature and the geometry of the forging in real time, and optimizes the pass schedule for homogeneous forging of the core zone. ◆



The new extrusion line including HybrEx®25.

BULGARIA

HYBRID TECHNOLOGY REDUCES ENERGY CONSUMPTION

Alcomet AD, based in Shumen, Bulgaria, is proud to present the inauguration of its new HybrEx®25 from SMS group as one of a new generation of extrusion presses featuring an innovative drive concept. Compared to conventional extrusion presses, the hybrid drive technology used at Alcomet significantly reduces energy consumption. Fikret Ince, Chairman of the Supervisory Board, was impressed by the shorter dead cycle times of the press. The HybrEx®25 also fulfills the requirements of an ecoplants solution and fits in perfectly with Alcomet's long-term strategy.

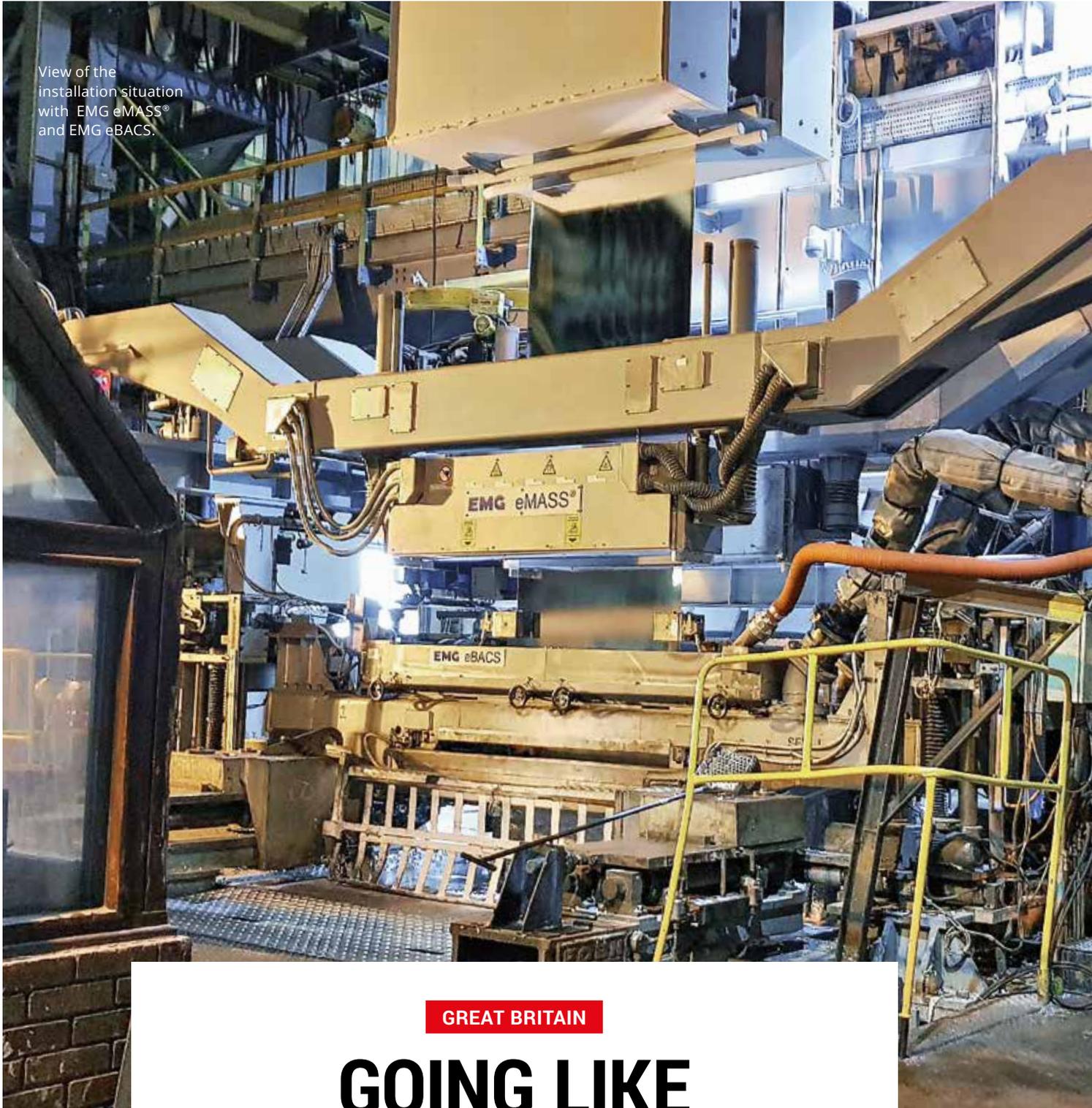
"The Alcomet and SMS group teams managed to set up the press in record time and were commended for their very professional approach and execution. A fruitful and lasting partnership between both project teams has now emerged," remarked Joachim Schmidt, Head of Project Management, SMS group. Alcomet AD produces complex, top-quality precision profiles for a wide range of applications in numerous industrial fields. The HybrEx®, with its deflection-resistant, three-part triple-layer counter beam and the patented precision guide for the container and moving crosshead, provides the perfect conditions to achieve this.

The HybrEx®25 is part of an overall order placed with OMAV, Italy, for the delivery of an integrated extrusion line. ◆

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View of the
installation situation
with EMG eMASS®
and EMG eBACS.



GREAT BRITAIN

GOING LIKE CLOCKWORK

EMG eMASS® Strip Stabilising System at Tata Steel
Shotton generates substantial savings.



In November 2018 the projects and hot dip galvanizing (HDG) team at Tata Steel's Shotton site and EMG successfully completed the installation of an electromagnetic strip stabilisation system EMG eMASS® at the HDG #6 line.

Shotton Works is located in Deeside, North Wales, in the UK and manufactures approximately 500,000 tons of metallic and pre-finished steel per year for building envelope, domestic and consumer applications.

CLOSE COOPERATION FOR OPTIMUM RESULTS

The proven eMASS® system, in this installation equipped with 6 pairs of individual moveable magnets – a recent technical development - was installed above an air knife already in production use for a longer time. The installation situation above an existing air knife is always somewhat difficult, above all because of the crane paths to be kept free for removing the pot roll. The solution here consists of a combination of movable system supports and height-adjustable magnet housings, which ensure accessibility of the nozzle system for maintenance purposes without removal of the eMASS structure itself. Due to the excellent teamwork between the engineering and projects department at Tata Steel and EMG as well as with external con-

EMG AUTOMATION GMBH

EMG Automation GmbH, a company of the exelis group, belongs to the leading suppliers, due to its technological competence in the core area of regulation systems as well as quality assurance in automated manufacturing processes. Fields of application are fast running continuous production processes in the metal and especially in the steel industry. The product portfolio includes, besides quality assurance systems, strip running regulators. The EMG group runs its own factories as well as sales and service offices.

tractors the commissioning went like clockwork. From approval to successful commissioning, the project had a duration of one year.

The combination of EMG eMASS® and the additional EMG eBACS system for contact free lateral strip edge detection and baffle blade control ensures highest coating quality at full throughput. This investment reflects Tata Steel's commitment to developing high end products for customers and sustainable production. ♦



Steffen Dombrowski

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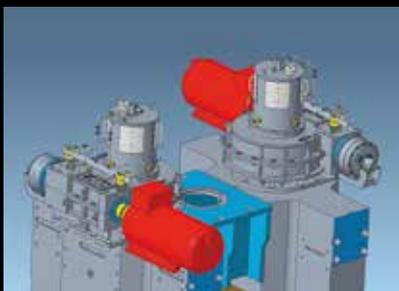
„The primary purpose of the strip stabiliser is to hold the strip flat as it passes through the air knives. Once fully optimized, the new device will not only control the amount of zinc deposited onto the strip and improve the coating consistency, it will also reduce how much is used and lead to substantial savings – depending on the price of zinc and the product being produced.“

Simon McCormick, Site Development Projects Manager

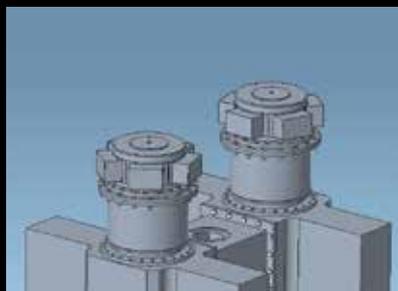
WORLDWIDE

DIRECT DRIVE: TWO IN ONE

Innovative, mechatronic solution provides numerous advantages in terms of efficiency, maintenance and spare parts management.



Classical design.



Integrated mechatronic design.

- Unlike the classical solution with worm gears, the new drive unit is much more compact and maintenance-free.
- The efficiency is improved as a result of the adjustment screw being an integrated part of the direct drive (rotor). The benefits: lower energy consumption, fewer moved masses, better dynamics and improved control efficiency.

In classical applications, machines are often propelled via a gearbox driven by asynchronous motors. A drive train, consisting of an asynchronous motor, couplings, gears, possibly universal joint shafts and the driven machine, is made up of many more individual components than a direct torque motor drive. Torque motors are permanently excited multi-pole synchronous motors. Our customers benefit in many respects from the fact that a directly driven machine requires much less components:

- fewer parts subject to wear
- fewer spare parts
- less installation space required
- less maintenance
- no gear oil
- higher efficiency
- less energy consumption
- fewer moving parts
- better control dynamics

The customers reap these benefits not only while the plants are running, but also while installing them or when they have to be repaired because much less adjustment and assembling work is required.

MECHATRONIC SOLUTION FOR ROLLING STANDS

In Newsletter 01/2019, we presented the mechatronic design for a scrap coiler in operation at the customer MMPZ-group, based in Miory, Belarus. Now we are going to describe the design of a mechatronic solution for the mechanical screwdown systems in rolling stands. The asynchronous motor (highlighted in red) in the classical design drives – via a worm gear – a multi-spline hub accommodating an adjustment screw. This system, mounted on top of both mill housings, sets the rough positions of the roll sets by increasing or decreasing the roll gap. In state-of-the-art roll stands, the exact positioning is performed by a hydraulic gap control system.

The innovative integrated mechatronic design dispenses with the asynchronous motor and the worm gear. All required is a housing with a mounted-on braking device consisting of a multi-pole permanently excited synchronous motor - a torque motor – with integrated multi-spline hub and adjustment screw. The moving part, the multi-spline sleeve, is equipped with a strong permanent magnet. The stationary part consists of a stator of similar design as the stators in asynchronous motors. The stator is fed by a frequency converter, e.g. SMS group's X-Pact® Drive. Highly compact designs are possible as the equipment is water-cooled.

The compactness of the drive system provides the mill stand engineer much more design flexibility. Without a worm gear, the mechanical efficiency of the system is much more efficient. As a result, energy consumption decreases and only half of the usual power rating is required. Moreover, there are fewer moving masses. This reduces mass inertia while improving the dynamics and control efficiency. The “active” components required for generating the torques, such as the permanent magnet and the magnetic yokes with the windings (stator), are integrated into the housing with bearings – mechanical components that are indispensable anyhow. Unlike conventional solutions, the drive equipment proper is maintenance-free. What is more, also the otherwise common maintenance activities on the worm gears (wear, gear lubricants, backlash, etc.) are a thing of the past.

TWO COMPONENTS COMBINED INTO ONE INTEGRATED SYSTEM

In the above described design, an electric motor has been combined with mechanical components into a mechatronic system. As already implemented in process technology, also here two components have been successfully integrated into one common system, while providing the user numerous important benefits. This drive concept is a key element of the portfolio of SMS group as a plant engineering company but also as a systems and solutions provider. Together with X-Pact® Drive, the design forms a perfectly harmonized drive concept built on in-house competence.

As well as newly built plants, existing rolling mills can be equipped with an electromechanical adjustment system using an integrated torque motor. The adjustment screw can be retained or may just have to be overhauled. The multi-spline hub with magnets and the stator with the integrated brakes accommodated in a housing will take the place of the old system. While making for a more compact design, this solution also includes a new adjustment system that provides a number of advantages.

Permanently excited synchronous motors have been in use in certain industries for many years. Also SMS group has already implemented torque motor-based applications, and their number is constantly growing because they become increasingly established in the industry due to their distinct advantages. ♦



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Impressions of the preassembly phase and comments by the project managers.



GERMANY

TIGHTLY TIMED WHEELWORK

Preassembly of aluminium hot rolling mill stand completed and milestone reached on the way towards a running plant.

- **In the phase of preassembly** a complex, meticulously planned and tightly timed wheelwork is interacting.
- **For this crucial milestone** on the way towards a running plant it is essential to know and also master the entire process of manufacturing and assembly.

At the end of May 2019, the preassembly of several hot rolling mill stands for aluminium, dedicated to one of our long-standing customers, was completed. This was an essential milestone being achieved in the Hilchenbach workshop and the basis for smooth commissioning was established.

SMS group newsletter takes the opportunity of the pre-assembled mill stands to have a close look on this essential milestone on the path towards a running mill. Because until that happens, a complex and tightly timed clockwork is running. Sebastian Böcking and Ingo Meier explain in the interview, what matters. ▶

Jonas Langenbach (left) and Torsten Marburger (right) from the large component assembly department dismantle the work roll change guides.



“A neat shop floor and quality data collection is indispensable in the digital age.”

Ingo Meier, Head of Large Component Assembly in the Hilchenbach workshop.



“Also part of the technical highlights of the finishing mill are the much elaborated roll cooling system and the strip cooling system.”

Sebastian Böcking, Project Manager of Aluminium Hot Rolling Mills at the Hilchenbach location.

Sebastian Böcking is project manager in the aluminium hot rolling mills department located in Hilchenbach, where the mechanical design of the finishing mill was also created and where the core components of the plan have been manufactured. The latter include mill stands, hydraulic adjustment systems, CVC®plus systems for roll shifting, drive systems, mill stand platforms provided with machinery piping and hydraulic controls.

Sebastian Böcking explains: “Profile and flatness control are the two technology packages to be highlighted, providing a significant influence on the strip quality. In the profile and flatness control CVC®plus, work roll bending and work roll cooling interact, while the thickness control is affected by the hydraulic adjustment systems. Also part of the technical highlights of the finishing mill are the much elaborated roll cooling system and the strip cooling system, extending over wide areas of the plant. The strip cooling system comprises the transfer bar cooling as well as cooling equipment being integrated in the interstand areas.”

Ingo Meier is head of the department large component assembly in the workshop in Hilchenbach. He says: “Because of the high requirements on the final products to be produced on our plants it is very important to know and to master the entire manufacturing process. Only through this it is possible to secure the tight tolerance requirements of our products for the mostly close appointments. Likewise a

clean shop floor and quality data collection is indispensable in the digital age. Considering that in recent years we have sensitized our employees.”

After the mill stands have been assembled and the quality and functional tests have been successfully completed, they will be demounted to competent size in order to be packed, loaded and shipped after a surface treatment. Because the Hilchenbach workshop is provided with a factory-owned railway siding, the mill stands will be directly loaded by an overhead crane on a heavy duty wagon and will be carried to the harbor. At the site final assembly and commissioning will take place. In the spring of 2020, production is scheduled to commence. ♦

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The new design of the mill stand platform allows an even better total ergonomics of the entire mill stand platform area.



Preassembly of the aluminium-hot rolling stands. Pre-assemblies of several hundred tons total weight are possible in the workshop in Hilchenbach.

HIGH-PERFORMANCE ALUMINIUM FINISHING MILL

The new finishing mill consists of several mill stands and will expand the existing hot rolling mill of our customer. Each of the new stands will be provided with the CVC® plus technology. By this the flexibility required is ensured in order to produce a demanding range of high-grade products. The aluminium hot strip is dedicated to manifold industrial applications, among them there are also applications for automotive and shipbuilding industries. To ensure the required top strip quality, in addition to the excellent mechanical equipment there is also the highly developed X-Pact® automation available. Because commissioning of the automation system should work out efficiently on site, in parallel to the shipment preparations of the rolling stands, the Plug & Work integration test is being prepared in the test field in Hilchenbach.



GERMANY

EXPERT KNOWLEDGE SEAMLESSLY MESHED

New manufacturing method of SMS group for herringbone gears.

- **With a new manufacturing process SMS group ensures** that herringbone gears can be manufactured.
- **Standard tools** which are quickly available and cost-effective are exclusively used.
- **In the development phase,** experts from different SMS group departments have cooperated intensely.

SMS group has developed an efficient machining process for special gears. This now enables the plant manufacturer to manufacture enclosed herringbone gears in an economical and highly precise manner. Gears of this type form the basis for building more compact and more efficient gear units for specific applications in the future. The new manufacturing method has proved to be successful in the course of an order for two gear rack pinions.

The two pinions feature a diameter of 754 millimeters and a weight of about 2,400 kilograms. The special feature is the gear converging in an arrow-shape way – hence also the name for this special component: herringbone gear. Olaf Thamke, Head of QA: “When we

were given the order the aim was to find an alternative to planing the gears. On the one hand, these machines are not part of the machine pool of SMS group and on the other hand, they almost disappeared from the market. And we could not even manufacture the component with our conventional methods such as gear hobbing. We therefore had to find a new approach, in fact in a very short period of time.

EFFICIENT COOPERATION

Olaf Thamke has assembled an expert team which has worked together in close cooperation to find a solution. This included tool planning, machine operators, NC programmers and quality control. “From the beginning, I have been aware that we had to pool our know-how using short and direct communication and that we had to cooperate efficiently,” Olaf Thamke explained. The team then jointly developed a new method for free-form processing of enclosed herringbone gears. The starting point was initially NC programming. The two programmers Andreas Schelle and Kevin Schmelzer pointed out: “We have ex- ▶



Gear rack pinion during measurement on gear tooth measuring machine in Hilchenbach.

cellently cooperated with the Drive Gear Designing Dept. which provided the appropriate data.

CROSS-DEPARTMENTAL EXCHANGE

Based on this, we were able to implement the NC programming of our five-axis machining center with our new software product and our CAM system. At the same time, we agreed at an early stage with our Tool Planning Dept. on the requirements regarding the tool life and with our Quality Assurance Dept. on the optimum measuring strategy."

For the new machining processes the Tool Planning Dept. has provided proper tools. For the main machining steps roughing and finishing tools are applied with special coatings which are characterized by extremely long lifetimes. Timm Ludolf, from Tool Planning Dept., said: "We have previously designed the tools in close cooperation with the manufacturer in order to ensure that they withstand extremely high stresses in practice. During milling you

cannot just simply interrupt the process because a tool is worn. It must hold on under any circumstances."

When the tools were available machining could start directly after it. Alexander Fitz, Second Foreman MW, and Maik Ludolf, Cutting Machine Operator: "At the machine everything comes together. We are virtually the focus of a joint development." During the development stage several challenges had to be mastered which could be jointly solved as a team, thus optimizing the new manufacturing process. The measurement results of Quality Control confirmed the success. Oliver Bald, Quality Inspector Internal Production: "We were proud when we received the measuring results for the component. The given tolerances were in the range of a few micrometers. And we were able to maintain the required tolerances or to even partially fall below the minimum tolerance values."



NC programmers Andreas Schelle (right) and Kevin Schmelzer at their workplace.



The team for herringbone gears.

What is so special about the new machining process? This is how Timm Ludolf from Tool Planning describes it: "Standard gears are manufactured with special tools since the expensive tools only pay off with large quantities. Special gears – like our herringbone gear – are on the other hand manufactured in the most effective manner with standard tools. These tools have low investment costs and are quickly available." The new manufacturing process for herringbone gears provides new opportunities to the Drive Gear Designing Dept. to engineer and offer more compact future gear units. ♦

 **Olaf Thamke**
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WORLDWIDE

WASTEWATER-FREE AND CLEAN

New innovation process for water treatment plants.

The ongoing SMS group commitment to develop environmentally friendly products allows the implementation of a Zero Solid Discharge concept.

Zero Solid Discharge is an innovative process for wastewater-free treatment of plant water, for improving environmental protection and for optimizing steel production.

The injection of examined and selected biocultures into existing water treatment plants makes an increased biological process possible, while achieving a significant reduction of organic sludge production.

Zero Solid Discharge is based on bioaugmentation, which is the method of increasingly examined and selected biocultures, which are daily inserted on a specific point into the existing water treatment plant.



ZERO SOLID DISCHARGE

Solely with the injection of selected biocultures into the existing water treatment plants the volume of organic sludge can be sustainably reduced.

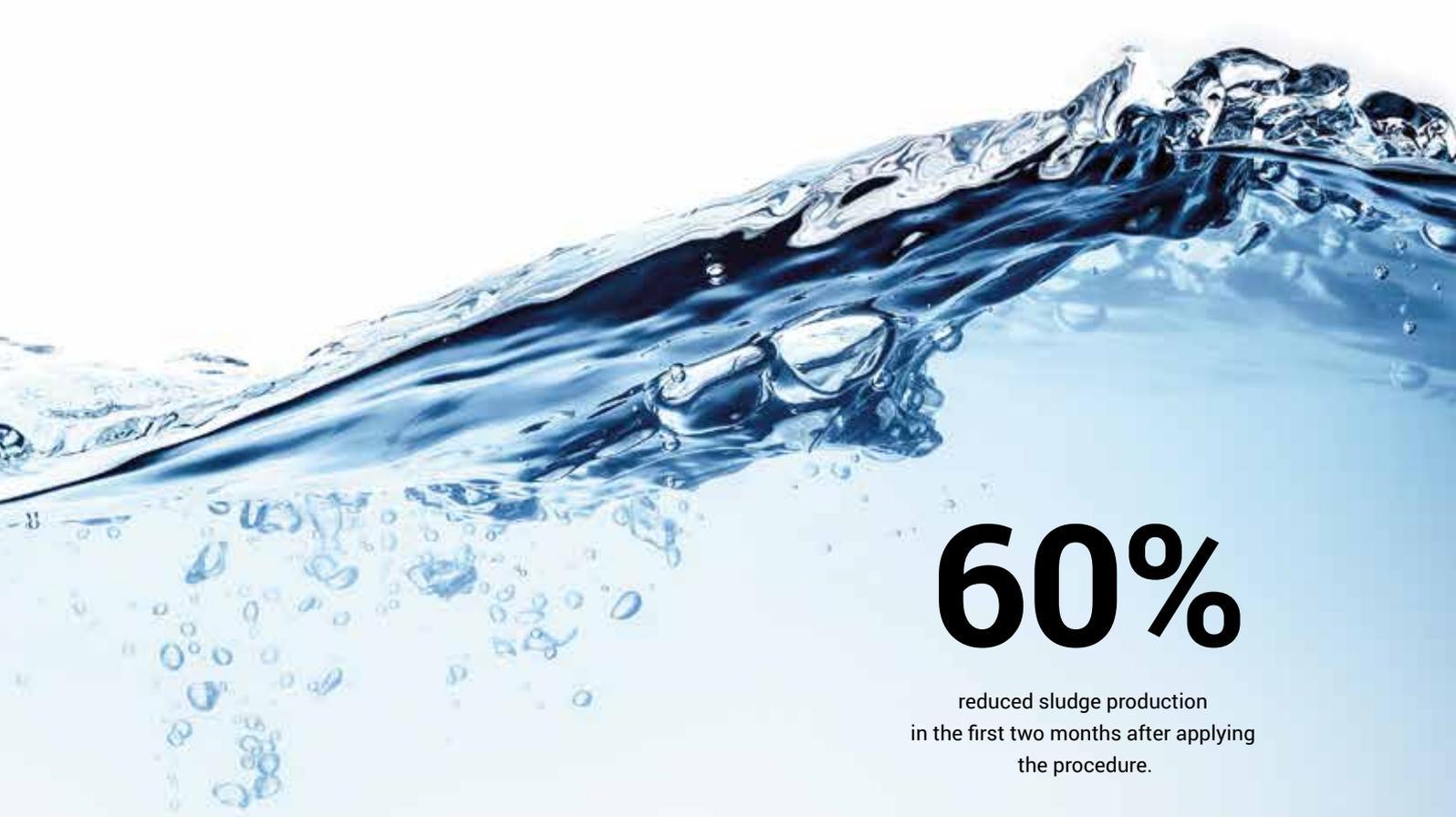
This process will accelerate the biological process in water, allowing a significant reduction in sludge production compared to conventional systems.

One of the outstanding advantages by Zero Solid Discharge proposed exclusively by SMS group Italy is ZERO CAPEX. Another major advantage is to use Zero Solid Discharge technology directly on the existing plant, without any modification and additional mechanical components. ♦



Matteo Ricci

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60%

reduced sludge production
in the first two months after applying
the procedure.

80%

reduced sludge production
in operating condition.

PROCEDURAL ADVANTAGES:

Zero Solid Discharge can be applied not only in industrial plants but also in water treatment plants, municipal sewage plants and in animal waste-disposal companies:

- No structural modifications to the plant are needed
- It can be applied with various design features, therefore with considerable application flexibility
- Plant operating costs significantly reduced
- Clean water circuits by removing calcium carbonate
- Process acceleration for the degradation of the organic load in water
- Improved water quality in terms of BOD, COD, SS, TN, TP, etc.
- Mill scale "oil-free"
- No odors
- Reduction of polyelectrolyte consumption for sewage sludge dewatering
- No chemicals for phosphorous precipitation
- Reduction of corrosion inhibitors up to 50 %
- No need for biocides
- Reduction of sludge production

 **ZSD technology up to ZERO CAPEX**

 **Improved environmental impact**

 **Reduced operating costs**

 **Significantly reduced waste disposal costs**

FINLAND

OPTIMIZED CONTROL BOOSTS PRODUCTIVITY

SMS group provides regular servicing on facilities at Purso Oy. ▶

BENEFITS

With hydraulic and electrical extrusion press optimization

- Pressure peaks are eliminated.
- Output quantity is increased.
- Non-productive times are reduced.
- Wear and tear is decreased.
- Plant failures are minimized.



The demands on extrusion presses are high. Plant operators expect optimum production results and at the same time the machinery is continuously subjected to stress. Due to frequent load cycles wear and tear on the hydraulic system is unavoidable which changes the operating conditions. This may result in an extended non-productive time or in pressure peaks. These pressure peaks cause damage to seals, valves, pipes and many other components entailing loss of production in the worst case.

With control optimization from SMS group negative plant changes are recognized in good time, evaluated and eliminated. The advantage: longer service life of many plant components, fewer plant shutdowns and increased productivity by reduced non-productive times.

For executing the service SMS group delegates a PLC programming and a hydraulic expert. The expert team optimizes the control system in four steps.

Actual state inventory: at first, the actual state of the complete press cycle is taken up with special equipment ensuring a real-time measurement of the individual operations. At the same time, various examinations of the components are performed.

Evaluation: thereafter, an analysis is carried out evaluating the findings from the previously performed actual recording. Finally, action plans are determined. The measures are coordinated with the customer in advance.

Optimization: during optimization the action plans are implemented and adjustments are carried out. To make sure that the best possible result is achieved the process is permanently accompanied by measurements.

Documentation: after the measures have been completed a comprehensive report is prepared including the complete results of the assignment and of all measures taken. Previous and current non-productive times are also

“Productivity is becoming more and more important in international competition. Together with the Technical Service from SMS group we regularly perform a control optimization of the extrusion press to make sure that the risk of plant failures is minimized.”

Toni Rantanen, Technical Manager of Purso Oy

PURSO OY

As product and process development partner of their customers Purso Oy offers aluminium solutions which are designed and built with the highest finish quality and professional expertise.

documented and other measures for maintaining or improving the plant are shown.

“Optimizations performed e.g. on a 25 MN extrusion press demonstrate the effectiveness: through reducing the non-productive times by two seconds billet charging with a 25/27 MN extrusion press can be increased by 19,000 kilograms per month. That is what our service makes so interesting. Our service experts not only have specialized knowledge of the individual components but are familiar with the

procedures and detailed processes. This makes the difference,” says Ben Zander, Head of Modernizations and Maintenance Services Hydraulic Presses at SMS group. ♦



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THE NETHERLANDS

ENERGY-EFFICIENT OPERATION OF AN EXTRUSION PRESS THANKS TO ECODRAULIC

Upgraded extrusion press at Nedal Aluminium saves energy and reduces CO₂ emissions.



Nedal Aluminium B.V., headquartered in Utrecht, the Netherlands, relies on the Technical Service of SMS group when it comes to maintenance and upgrading of its three extrusion press lines.

An important milestone in modernization measures was implemented last year when an ecoDraulic system for saving energy was installed on a 55 MN extrusion press of the Glecim type by SMS group. With its smart automatic start-stop, the system turns off the hydraulic pumps not used during the pressing operation. Consequently, energy is saved during production and CO₂ emissions are reduced. The energy saved is displayed and recorded on the visual surface of the press control system so that monitoring of energy savings is made possible.

“We are proud to have substantially contributed to an even more efficient and environmentally friendly operation of our long-time partner Nedal. The system is functioning properly and the previously calculated savings could be achieved”, said Ben Zander, Head of Modernizations and Maintenance Extrusion Presses at SMS group.

HIGH STANDARD OF SUSTAINABILITY

With more than 80 years of expertise, Nedal Aluminium develops, produces and sells top-quality aluminium profiles for the most varied applications and Nedal is the leading manufacturer of high-quality and innovative lamp posts. By employing sustainable and reusable raw materials, Nedal continuously reduces its own CO₂ emissions and energy consumption and is also actively involved in global climate protection projects, whereby compensating its CO₂ footprint completely.

Rob van der Meij, Director Technology at Nedal, expresses his satisfaction with the ecoDraulic system as follows: “We always set ourselves the standard of acting in an efficient, sustainable and eco-friendly manner. In the first place, also a permanent optimization of our processes is helpful in addition to using sustainable raw materials. With the ecoDraulic system of SMS group we exactly achieved this result. After several months of operation we have already ascertained that more than ten percent of energy is saved in the area of the main drives. As a result, we are able to further contribute to saving energy and CO₂ emissions.” ♦

 **Ben Zander**
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Heavy plate mill of
NLMK DanSteel A/S in
Frederiksvaerk, Denmark.



DENMARK

EFFECTIVE MAINTENANCE PLANNING

DanSteel A/S receives an efficient tool for planning and organizing maintenance and servicing measures of its heavy plate mill.



Together with SMS group, NLMK DanSteel A/S, Denmark, realizes a comprehensive extension and modernization of its heavy plate mill in Frederiksværk. With these measures, NLMK DanSteel A/S intends to further extend its product range regarding grades and dimensions.

In detail, it includes the integration of a laminar cooling system with water management, the assembly of a new heavy plate cooling bed and the modernization of the cold-plate straightener.

Based on positive experiences acquired in the introduction of the IMMS® (Integrated Maintenance Management System) data package into the existing SAP-PM module for the main facility in 2017, NLMK DanSteel A/S has placed an order with SMS group to implement another IMMS® data package.

This provides DanSteel A/S with an efficient tool that enables plant servicing and maintenance to be completely planned and organized.

Through this data package the planning department is able to generate maintenance schedules automatically including the required documentation, and receives information on the duration of individual measures and necessary resources such as manpower and spare parts.

The local maintenance crews execute these plans giving feedback to the system. This ensures a comprehensive history of the entire servicing process including historical outages and relevant costs. Based on these data, an effective KPI controlling system can be established with the IMMS® data package. There is the possibility that purely technical KPIs such as Overall Equipment Effectiveness (OEE), MTTR, MTF etc., as well as cost-related evaluations are implemented. This makes sure that the

plant management from DanSteel A/S is in the position to start a CIP (Continuous Improvement Process) and to improve the efficiency from a technical and commercial point of view from one planning period to another.

PREVENTIVE MAINTENANCE

IMMS® supports the expansion of an effective servicing planning with the aim to optimize preventive maintenance ensuring plant availability and the quality of the end product in the long term. For that reason, a maintenance data package is supplied by SMS group. IMMS® is a combination of maintenance software (CMMS) and valuable information based on experience in servicing for many decades. Here, the material flow of the complete plant is displayed except the functional locations and all technical parameters are incorporated to establish a reliable basis for effective servicing planning and organization. Each component to be maintained is clearly identified and coded in the plant tree and thus assures target- and purpose-oriented servicing ensuring an economical management of the complete plant. ♦

 **Lars Scheuermann**
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The Arkansas Northeastern College is one of the few colleges in the U.S.A. offering courses in the field of steel technology.

ARKANSAS STEELMAKING ACADEMY

U.S.A.

TRAINING CENTER FOR STEEL TECHNOLOGY OPENED

SMS TECademy offers its expertise as cooperation partner at the Arkansas Steelmaking Academy.

Since the startup of Big River Steel, the northeast of Arkansas has become the region with the densest network of steel producing facilities in the U.S.A. This fact caused Arkansas Northeastern College (ANC) and SMS group last year to found the Arkansas Steelmaking Academy (ASA). The Blytheville based ANC is one of the few colleges in the United States offering courses in the field of steel technology and the only one in the state of Arkansas.

POSITIVE FEEDBACK ABOUT FIRST COURSE

The Arkansas Steelmaking Academy is housed in the College's new Center for Allied Technology. The new complex has a footprint of about 8,500 square meters. The seminar classrooms feature latest technology, and there is excellent laboratory equipment available for hands-on training. In June this year, the first class was conducted within the partnership scope of ANC and SMS group. Entitled "SMS group Hydraulic Systems", the course was attended by seven persons from different companies throughout the steel business. They all were very positive about the training in the Arkansas Steelmaking Academy. Further courses will follow still this year. ♦



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WORLDWIDE

START

Logistics, safety, efficiency - AMOVA moves great things.



MOVING

- **With more than 60 years of experience** in the field of intralogistics, AMOVA specializes in big parts and heavy loads up to 50 tons.
- **AMOVA is active** in the steel and aluminium industry, the air cargo sector and in port logistics.
- **From planning through design** up to implementation, AMOVA tailors the logistics concept to the respective customer requirements.

“Start moving” is AMOVA’s slogan and this applies to both the pioneering spirit and the core business of the company. Also known from history under the company names SMS Logistiksysteme or SIEMAG Transplan, AMOVA is part of SMS group and employs about 100 persons. The special characteristics: AMOVA has more than 60 years of experience in the field of intralogistics and specializes in big parts and heavy loads up to 50 tons.

AMOVA KEEPS THE WORLD MOVING

When it comes to automated processes and highly-developed systems for transporting, storing and packaging a wide variety of products, AMOVA offers a unique range of services. The portfolio comprises solutions from A like Automatic Coil Transporter to W like Warehouse Management Systems. AMOVA is active in the steel and aluminium industry, the air cargo sector and in port logistics, and in all of these fields is considered an experienced and reliable partner for innovative systems solutions.

Bernd Klein, CEO of AMOVA, says: “We are broadening our base in different trades to be able to respond to market requirements more flexibly. In the logistics sector such a fact meets with great acceptance since knowledge transfer across trades is highly appreciated there. We are benefitting, for example, from our logistics expertise in the steel and aluminium industry and can translate it to port logistics or for the planning of air cargo terminals. Customers welcome these cross-connections as they are accompanied by fresh impetus and innovations. This makes us stand out from our competitors who are often working with blinkers.”

STRONG SMS GROUP FOR INTERNATIONAL HEAVYWEIGHTS

AMOVA’s commitment to think out of the box and to discover new trades and markets is now paying off. Under the brand name ACUNIS – a cooperation with Unitechnik Systems based in Wiehl, Germany – AMOVA has established Africa’s largest air cargo terminal in Ethiopia, and in the field of container logistics for large ports, the experts further developed a trendsetting high-bay system that saves about 75 percent storage area and speeds up the times needed for unloading the huge container freight vessels by up to 20 percent.

„For such large projects and plans, it is a great advantage to be part of SMS group. Customers want a strong partner competent in the settlement of turnkey and large-scale projects, but also a strong service provider who can ▶

AMOVA’S RANGE OF SOLUTIONS

- Air cargo handling
- Port logistics
- High-bay warehouse systems
- Conveying systems
- Crane systems
- Packaging lines
- AGV (Automated Guided Vehicles) systems
- Automation
- Warehouse Management Systems (WMS)
- Manufacturing Execution Systems (MES)





AMOVA supplies cutting-edge systems for the transport, storage and packaging of a great variety of products.



Customers benefit from the reliability and quality of the solutions provided and from ongoing activities in research and development.

offer financing options or develop operator models. So, we have a clear competitive edge in the market,” explains Christoph Roth, CFO at AMOVA. Being close to the customers all over the world he calls another advantage of AMOVA. This means that, among others, the intralogistics specialists use the global network of SMS group. “We consider it important to be present not only at the hubs of metallurgical plant operators, but also at locations with sea-ports or airports as we see promising future markets there as well.”

THE CENTERPIECE: INTRALOGISTICS FOR ALUMINIUM AND STEEL PLANTS

AMOVA's basic business is the aluminium, steel and NF-metals industry, and it meets the complex and diverse requirements of modern production plants with advanced intralogistics solutions. Combining different technologies from its



“We use our logistics expertise in the steel and aluminium industry and apply it to port logistics or for the planning of air cargo terminals.”

Bernd Klein, CEO of AMOVA



product portfolio, AMOVA is able to perfectly tailor the logistics concept to the respective customer requirements from planning through design up to implementation, including all automation systems. AMOVA's portfolio of supplies and services covers the complete range of transporting, storing and packaging logistics. Customers benefit from the high level of reliability and quality of the solutions provided and from ongoing activities in research and development.

Thanks to a pallet conveyor system specially developed for hot strip coils, AMOVA was able to set new benchmarks for coil transport in hot rolling mills and between individual processing lines, already years ago. The modular system ensures the safe and extremely careful material transport as, up to their destination, the coils are not moved any further after they have been deposited on the pallet. Due to the high number of standardized components and drives, small and light-weight assembly units as well as considerably reduced hydraulic piping, the effort for erection, commissioning and maintenance is substantially reduced.

Another highlight of AMOVA's portfolio is the fully automatic sampling station for high-

strength and ultra-high-strength steel grades helping producers boost their production thanks to shorter cycle times. The high-performance sample shear is a horizontal toggle lever shear with adjustable knife gap covering a plate thickness range from 1.5 to 28.3 millimeters. The coils rest on asymmetrically formed deposits with wide support span specially designed for high-strength steels to ensure safe handling during transport and processing. Hence, the system not only permits a high throughput to be achieved, but satisfies stringent work safety standards.

In line with its slogan "Start moving", AMOVA creates movement not only in the field of advancing important technologies. "Digitalization, too, is a strong trend at AMOVA," says Bernd Klein. "However, it is not unknown territory. Our systems for material tracking have already reached a highly advanced level. All data is carried along and automatically reported to higher-level systems. So, logistics played a pioneering part here, but development goes on, of course. At present, we concentrate on Augmented Reality supporting users in their work by 3D representations and showing them, ▶



AMOVA high-speed car.

Fuxin Special Steel orders coil transport system

Fuxin Special Steel Co., Ltd., a stainless steel producer based in Zhangzhou in the southeastern province of Fujian, China, and part of Formosa Plastics Corporation, is going to expand its production facilities by a new hot rolling mill as well as several cold rolling mills. AMOVA's logistics concept covers all coil transport facilities from the hot rolling mill exit end via several coil preparation stations and three cold rolling mills to the continuous annealing line, further via finishing lines up to the high-bay store for shipment. Connection of the hot rolling area to the cold rolling hall will be accomplished through a tunnel 120 meters in length. In the cold rolling area, the hot-rolled stainless steel coils with a maximum weight of 28 tons will be distributed by high-speed cars designed for automatic coil picking and placing. Commissioning of the complete plant is scheduled for mid-2021.

for example, all information related to a stored coil. Another field is our solutions for predictive maintenance which help increase the availability and lifetime of our plants and, at the same time, reduce the costs for our customers."

A CONCEPT OFFERING GREAT POTENTIAL: PORT LOGISTICS

Bernd Klein: „When we started delving into the topic of port logistics we noticed many parallels to our intralogistics solutions in aluminium and steel plants. Based on our wealth of experience that we expanded in discussions with numerous experts we were able to develop a really groundbreaking solution."

Background: In a typical port, container vessels berth, cranes and special vehicles pick up the containers and pile them on top of each other. Problem: The maximum height is usually restricted to four containers, and it is not possible to seize the bottom containers, if so required, without removing the top ones. Even more serious is the limited capacity during unloading the huge freight vessels. A modern freight vessel can receive up to 20,000 containers. The most modern ports are able of unloading 160 containers per hour while the average is about 100 containers per hour. Such a long stay in port causes extremely high costs for the shipping company, and the area required to store the containers in the port involves high expenses for the port operators.

HIGHER CRANE PERFORMANCE AND UP TO 75 PERCENT SMALLER STORAGE AREA

"We thought that modern vessels are wider and deeper and therefore need a suitable infrastructure. Just like modern wide-body jets at the airport," explains Bernd Klein. "The cranes available are rated for the required loading and unloading capacity, but the logistics behind does not keep up with them. This was the reason why we developed a new pallet-based conveying system with associated high-bay store that can be used from both sea side and land side. This equipment permits 500 containers to be unloaded per hour. In addition, we can stack up to 11 containers on top of each other and even provide them with power



"Customers want a strong partner and service provider competent in the settlement of turnkey and large-scale projects."

Christoph Roth, CFO of AMOVA

supply and constant monitoring for reefer containers."

According to Bernd Klein many specialists have tried for years to overcome this bottleneck in container ports, but up to now all attempts failed as the equipment was either too heavy or too slow. The new solution by AMOVA, however, convinced all experts. The first facility is under construction jointly with one of the largest port operators worldwide (DP World) and will be completed in October 2020 on occasion of the Dubai Expo (please refer to the following report). "This is a great success for us as newcomer in this trade. We discussed our concept with experts from all around the globe and found that we had been able to solve the problems of the past." ♦

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BOOM IN LOGISTICS

→ New era in port logistics

Container ports worldwide are facing numerous challenges: Ultra-large container vessels demand new, efficient concepts for faster clearance. Larger handling volumes call for a significantly higher storage capacity and hence a larger terminal area. Productivity and cost efficiency of all operations are important indicators in global competition. AMOVA developed an integrated overall solution for the automated handling of ISO containers. The system comprises an automatic high-bay store with direct connections to seaside and landside loading. The storage system provides a maximum area efficiency of up to 3,700 standard containers per hectare including all advantages of fully automated operation, for instance energy savings and occupational safety. The direct connection of waterside container bridges permits up to 500 container movements per hour. At the same time, up to 300 containers can be moved at the

land side using existing connections to intermodal transport such as train or truck.

→ Africa's largest air cargo terminal

Airports, too, are concerned about the question of how an intelligent intralogistics can help transport and store big and heavy parts. Under the brand name ACUNIS, AMOVA and its cooperation partner Unitechnik Systems have realized the complete intralogistics system including pallet conveyor, roller tables, transport technology and high-bay store as well as cooling chambers for the cargo terminal of Ethiopian Airlines in Addis Ababa. The annual capacity is 600,000 tons and can be expanded to 1.2 million tons in a second phase. The project is of great strategic and economic importance for Ethiopia. The prime minister opened the airport which is now considered Africa's exemplary hub in air freight traffic and has already attracted big companies like DHL, UPS and GE.

→ Holistic concept

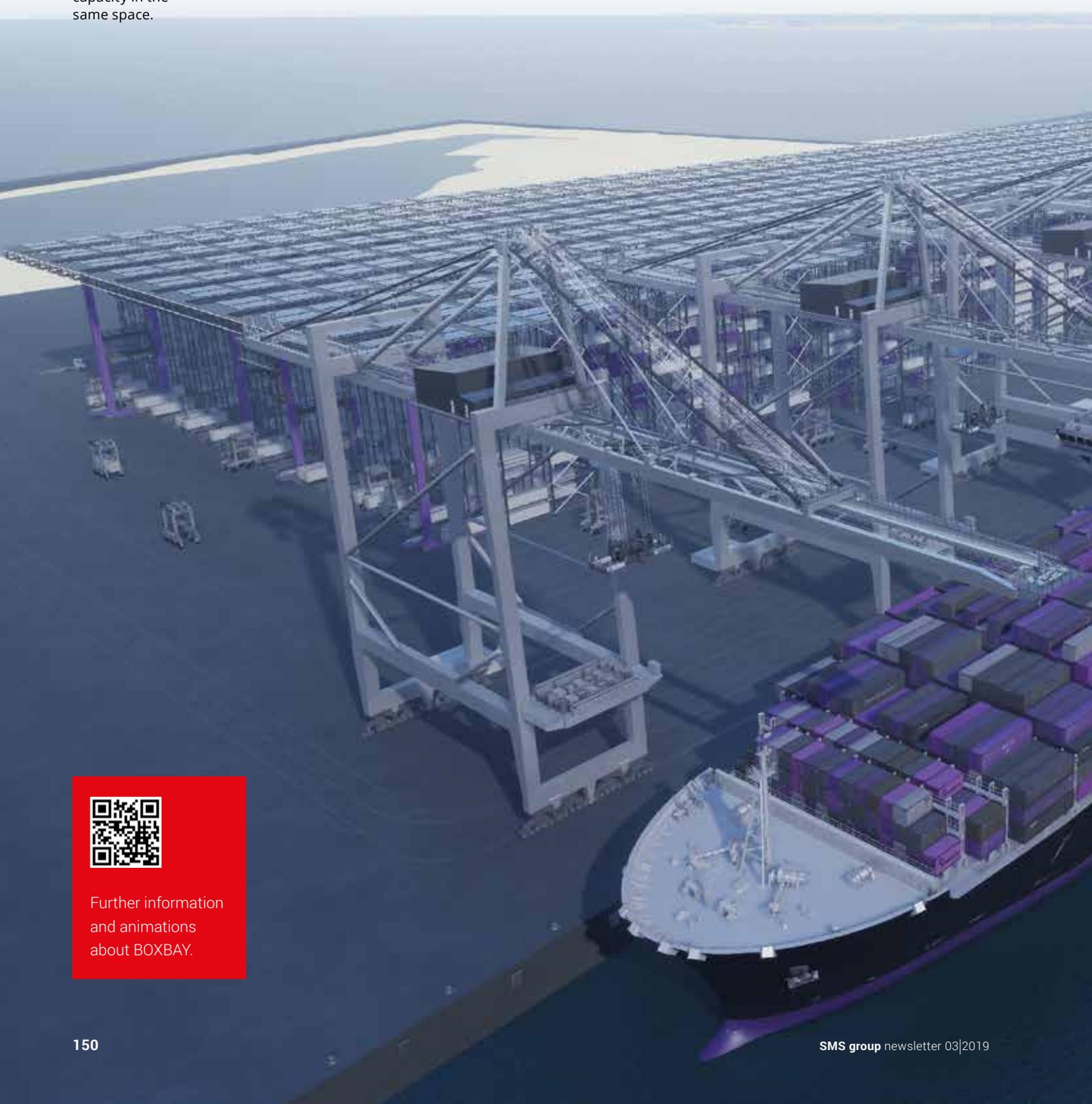
"The project in Ethiopia is an excellent reference for our company," says Christoph Roth. "Immediately thereafter, we were awarded a follow-up order from Kenya. The crucial factors for this deci-

sion were not only our technical knowledge and smart automation solution, but also our range of services. It included an attractive financing concept that we developed jointly with the experts from SMS group. This again demonstrates that we are more than just a plant supplier. We offer solutions and that is highly appreciated in the market."

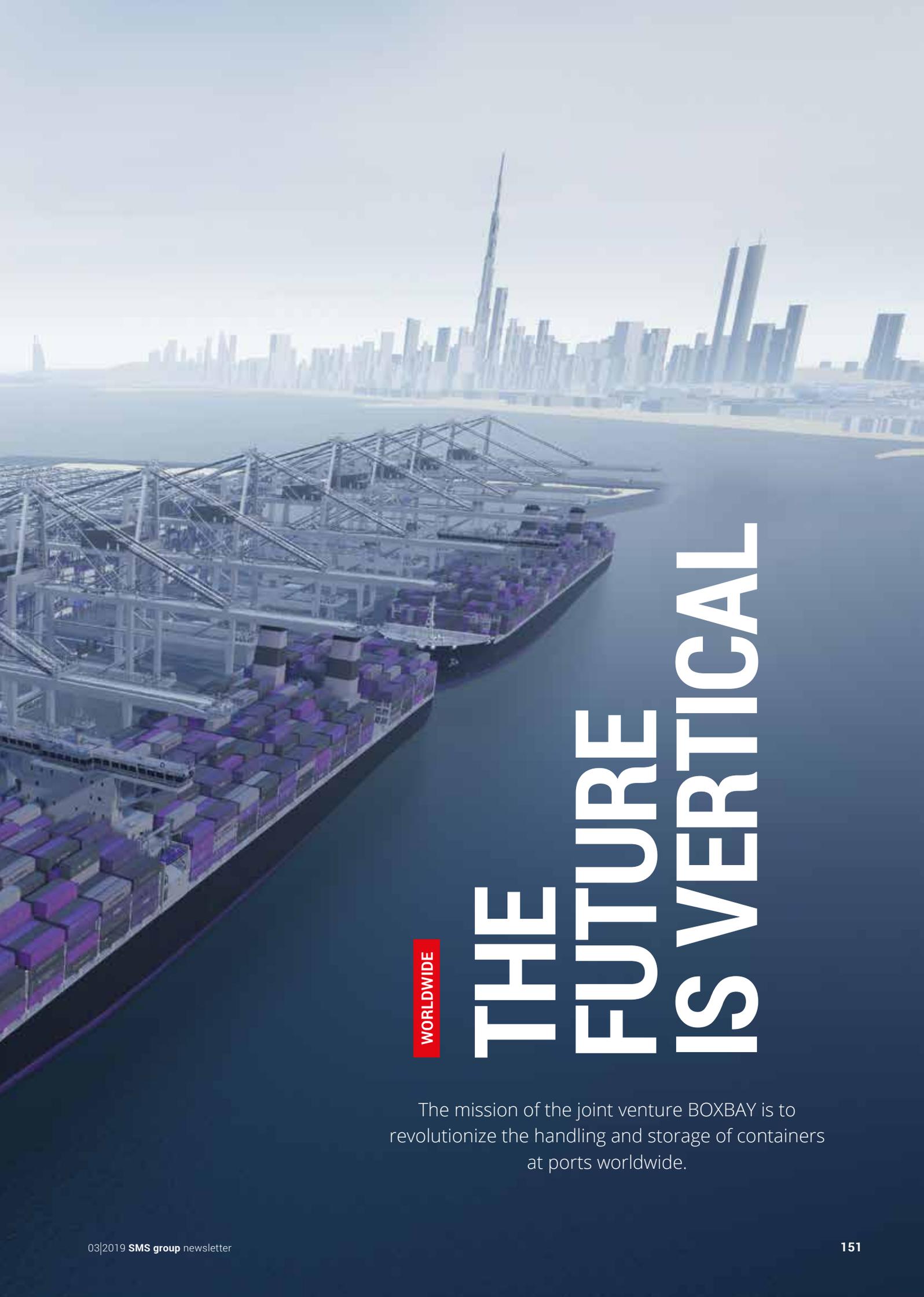
→ Big and intelligent

Christoph Roth sees great future potential for AMOVA: "The worldwide web and the changed purchasing and ordering behavior of customers comes along with a boom in logistics which is accompanied, of course, by larger trading units. And that is where we come in. In addition to our main markets in steel and aluminium plants, I see excellent prospects for us in the port and air cargo sectors. Customers expect shorter cycles. That means reduced production times and faster as well as more flexible handling of goods. We are able to present the solutions for these modern times with our know-how, technology, innovative automation and digitalization systems and, above all, with our efficient range of services."

The new concept for container terminals offers more than three times the storage capacity in the same space.



Further information and animations about BOXBAY.



WORLDWIDE

THE FUTURE IS VERTICAL

The mission of the joint venture BOXBAY is to revolutionize the handling and storage of containers at ports worldwide.

The future is vertical – based upon these few words, the newly established joint venture BOXBAY is heading for high goals: To revolutionize the handling and storage of containers at ports worldwide.

BOXBAY, which is a joint venture between global port operator DP World and industrial engineering firm SMS Group/AMOVA, will install a pilot HBS (high-bay storage) system at Jebel Ali Terminal 4 by October next year, in time for the Dubai Expo 2020. The full extension will then begin after the end of the World Expo. AMOVA GmbH, an affiliate of German SMS group, successfully transferred their know-how of fully automated high-bay storage systems for heavy loads into the application of container terminals. The proven technology has been available for decades for the storage of steel and aluminium coils, the same weight class as containers. About 80 HBS systems for coils have already been erected at different places around the world. But the decisive step away from drawings and simulations into the rough reality of the world outside in the harbor would not have been possible without the establishment of BOXBAY. This unique joint venture, the first ever between a manufacturer and an operator of container handling systems, was created by combining forces of SMS group with its subsidiary AMOVA and DP World. DP World is one of the largest terminal operators world-



„Our system offers more than three times the storage capacity in the same space. This is really a revolution.“

Dr. Mathias Dobner, CEO of BOXBAY

TOC EUROPE

is one of the world's leading exhibitions for port & terminal technology and operations. It is the meeting place for manufacturers and providers of the full line of products and services for operators of port and terminal facilities, showcasing latest trends and technologies.



wide, and their input finally helped to develop the blueprint for a completely new concept to operate container terminals. The first construction phase of the new terminal in Jebel Ali based on high-bay warehouse technology will be commissioned during summer 2020, and finally on display for the World Expo hosted in Dubai, starting October 2020.

HUGE BENEFITS COMPARED TO CONVENTIONAL SOLUTIONS

TOC Europe, staged in Rotterdam, was the perfect platform to officially announce the start of the Joint Venture as well as the pioneering order for Jebel Ali Terminal 4. These two facts enabled the audience to distinct the BOXBAY approach from previous attempts for high-bay storages for container handling. This approach offers a variety of huge benefits, especially compared to conventional solutions.

The booth of BOXBAY was well attended every single day, and technical lectures including Q&A sessions bolstered the solid impression left on every visitor's face – the future is vertical! Dr. Mathias Dobner, CEO of BOXBAY, said: "The great interest is understandable, as we have launched the first truly new operating concept for container terminals since the introduction of auto-



For its container terminals, BOXBAY applies proven technology that has been available for several decades for the storage of steel and aluminium coils.



The BOXBAY booth was well attended by visitors curious to get first-hand information on the new concept for container terminals.

mated stacking cranes (ASC) and automated guided vehicles (AGV). Since then, the handling systems have actually only been continuously improved incrementally. Now we offer a system that does not offer 10 or 15 percent more storage capacity in the same space, but more than three times. This really is a revolution."

BOXBAY sees above all great market opportunities in the modernization of long-standing brownfield sites, which no longer have growth prospects due to the lack

TOC EUROPE, STAGED IN ROTTERDAM, WAS THE PERFECT PLATFORM TO OFFICIALLY ANNOUNCE THE START OF THE JOINT VENTURE.

of expansion space. Dobner said: "Some operators see little chance of expanding their port due to land costs or no land at all, environmental concerns or spatial constraints due to nearby urban areas. In these scenarios BOXBAY is the ideal solution." ♦

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GERMANY

LOOKING AHEAD

At METEC, SMS group introduced essential innovations to be experienced by means of impressing exhibits and interactive presentations.

Around 72,500 visitors from 118 countries were welcomed in the Düsseldorf fair halls during the trade fair's five-day run in June. This fortified METEC's international leading position as the world's most important trade fair platform for metallurgy and casting technology. The conclusion drawn by Burkhard Dahmen, President of METEC and Chairman of the Managing Board of SMS group, was hence positive: "This year's METEC indicated a clear statement and trend for the future of our trade. Exhibitors presented solution concepts primarily reflecting the future highlight topics in our business: additive manufacturing, sustainability and digitalization. We now have to take this spirit and act accordingly to create a successful future." The next METEC will be held in June 2023. ◆ ▶



METEC

The trade fair sent a clear signal for the future of metallurgy and steel production.

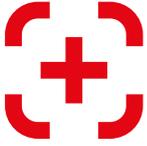


OPEN YOUR MIND

Digital products and services as well as platform solutions lift plants and machines up and into the world of Industrie 4.0.



Impressions from SMS group at the trade show are available here.



To Dr. Markus Reifferscheid (left) and Bernhard Steenken (right) METEC provides the best platform to meet experts from all areas and disciplines in one place.



Register at www.sms-group.com/connect for exclusive access to the Leading Partner Talks in "SMS group Connect".

INTERVIEW

DIGITALIZATION AND NEW-HORIZON TOPICS IN THE SPOTLIGHT

Dr. Markus Reifferscheid and Bernhard Steenken, both Managing Directors of SMS digital GmbH, looking back to SMS group's presence at the METEC trade fair.

Dr. Reifferscheid, how satisfied is SMS group with this year's METEC?

Markus Reifferscheid: SMS group as a whole is very satisfied with this year's METEC. To me the trade fair is the best place to meet technical experts from all areas and disciplines. At METEC, we had the occasion to showcase, among others, the importance of digitalization in our business.

Mr. Steenken, how did you give visitors an understanding of the chances of digitalization?

Bernhard Steenken: Digitalization was our main topic. At our booth, visitors had the opportunity to experience the full

range of our digitalization strategy from smart applications to big picture and to our vision of the self-learning, autonomous steelworks. With the aid of selected value cases we demonstrated the tangible added value that digitalization offers to our customers. At our Digital Campus outside the fair hall we provided consulting services to our customers and conducted workshops. This was added by lectures on the subjects of artificial intelligence, machine learning and cloud computing as well as by expert meetings.

Markus Reifferscheid: In terms of digitalization, SMS group is certainly a step ahead of other companies. A good proof thereof is the Big River Steel project. The most advanced

steelworks in North America was designed and implemented as learning steelworks and reflects the success of digitalization throughout the entire value chain from liquid steel to the final product. David Stickler, CEO of Big River Steel, confirmed this in one of our Leading Partner Talks and on other occasions.

Can you name further highlights of the Leading Partner Talks held at the SMS booth?

Bernhard Steenken: In addition to the interview with David Stickler from Big River Steel, who was accompanied by our CEO Burkhard Dahmen, I particularly remember the talk with Carl Berninghausen from Sunfire and Thomas Hansmann from Paul Wurth. Jointly they introduced the technology for a hydrogen-based pig iron production process and presented the roadmap up to “green” slabs. Another interesting presentation, from the technological point of view, was held by CEO Aliaksei Kavalionak who introduced MMPZ’s new tinplate facility that is under construction in Belarus. But all the other interviews, for example with Deutsche Gießdraht, International Steels Ltd. from Pakistan or NLMK DanSteel, also showed how multi-faceted our industry is and how different the challenges are.

Apart from digitalization, SMS group focused on New-Horizon topics. Which thereof were presented at the booth?

Markus Reifferscheid: The New-Horizon topics include the complete field of additive manufacturing where SMS group meanwhile covers the entire process chain. From powder metallurgy to function-optimized design and up to the 3D printed part for service on demand, at the trade fair we showed the entire process sequence.

Bernhard Steenken: SMS group is working on new products and developments in a future-oriented way and aiming at sustainable business strategies, to efficiently extract metals from hitherto lean and secondary sources, as for example the recycling of metals from electronic waste.

Markus Reifferscheid: Moreover, Paul Wurth in cooperation with Sunfire presented new methods for CO₂-free steel production which will help the steel industry clearly improve its environmental balance. Under the brand name BOXBAY a new high-bay solution for container logistics was shown at METEC, too. The system is made to revolutionize the handling of containers in sea ports. Due to the accelerated handling and a three-times increased storage capacity at the same footprint, the high-bay storage system offers crowded and high-price port areas massive benefits in efficiency. ◆



RECYCLING

Metal recycling from electronic waste is gaining importance.



ADDITIVE MANUFACTURING

The process sequence was shown from powder metallurgy to the 3D printed part.



CONTAINER LOGISTICS

BOXBAY, the new high-bay solution in container logistics, was also introduced at the trade show.



Further information

www.sms-group.com/connect

SOUTH KOREA

PRODUCTIVE EXCHANGE WITH HYUNDAI STEEL

Technological solutions for hot rolling mills in demand in South Korea.

May 2019 Hyundai Steel Company (HSC) invited representatives of SMS group to attend its second Hyundai Steel Tech Forum Hot Rolling in Dangjin, South Korea. The exchange of ideas and information on new concepts and technological solutions for hot rolling mills and CSP® plants was hailed by both companies as highly productive.

Against the backdrop of a turbulent economic environment in steel markets, which is being affected among other things by the current disputes between the U.S. and China, Hyundai Steel is making efforts to systematically develop and enhance its own hot rolling mill technology in order to fully meet all requirements. In doing so, Hyundai Steel is relying on the expertise of SMS group.

This is already the second time experts from both companies have met for a fruitful, in-depth discussion of current topics surrounding hot rolling mill technology. The Hyundai Steel Tech Forum Hot Rolling took place May 14 and 15 at the Hyundai Steel Research Center in Dangjin in South Korea, and was attended by almost 30 participants. SMS group sent 5 representatives from its German and South Korean locations. The superbly well prepared and organized event was expertly facilitated by Vice President Ph.D. Hyeong-Jin Kim from the „Rolling Technology Development Team“ at HSC (Hyundai Steel Company).

Mr. Heiko Reichel, Head of Technical Sales Hot Rolling Mills at SMS group, gave an informative presentation on advanced hot rolling mill technologies and discussed modernization con-

cepts for hot strip mills with the participants. Alongside the conventional hot strip mill, another key subject area was CSP® technology and modernization concepts for CSP® plants, represented by Markus Gross from Sales / Project Management CSP® at SMS group.

The third range of topics focused on solutions from the Electrics/Automation and Technical Service divisions. In addition to Heiko Reichel, the other speakers here were Mr. Thomas Rübsamen, Head of Sales EA Hot Rolling Mills, and Mr. Patrick Oppermann, Managing Director SMS, Korea Branch.

In summarizing, Heiko Reichel explains: „Over the course of both days we discussed a variety of challenging topics with HSC and were able to provide a good overview of selected innovations and new developments. In particular, our convection cooling solutions for work rolls, the use of HSS (high-speed steel) rolls, our edge masking system, new strip guidance concepts, and the subject of coiling temperature tolerances were met by HSC with great interest. Some individual technological modules may even be employed in new concepts for a hot-strip mill that has been earmarked for an upgrade. We are pleased that we will be able to offer concept engineering in the form of a production study for this modernization project as a result of the forum.“ ♦

 **Heiko Reichel**
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Representatives of SMS group and Hyundai Steel enjoyed an intensive exchange of ideas and information at the Hyundai Steel Tech Forum Hot Rolling, held in May 2019 in South Korea.



MEXICO

CONTIROD® USER MEETING IN MEXICO

More than 100 participants from 16 different nations met for an exchange of experiences.

Copper wire rod for the manufacture of electrical conductors is produced on CONTIROD®* plants from SMS group. The development and the associated success story of the production process go back to 1972.

COOPERATIVE RELATIONSHIPS

With the support of SMS group and the casting machine manufacturer Hazelett, the operators of CONTIROD® plants are traditionally invited by the respective CONTIROD® host operator to a user meeting every two to three years. This year, the CONTIROD® operators came together in May in Guanajuato, Mexico, for a user meeting already for the 19th time. The invitation was accepted by more than 100 participants from 16 different nations. The three-day meeting served to exchange experiences with the CONTIROD® plants and to improve networking among the users and SMS group as well as its cooperation partner Hazelett from the U.S.A.

At the workshops, there were lively and frank discussions and a common spirit of the CONTIROD® user family was fostered. SMS group and Hazelett as system suppliers are gaining feedback on the latest developments and are informed at first-hand on trends and challenges for the future. The cooperative relationship between supplier and customer is maintained and extended by means of this regularly performed event. During the initial phase of copper wire rod production it is particularly important in new markets to provide technological support besides reliable technology and thus help customers to be successful in the long term. ♦

*CONTIROD® is a registered trademark of Aurubis Belgium.

 **Thomas Schatz**
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This year, the CONTIROD® user meeting took place at plant operator Conticon.

PREVIEW

OUR NEXT NEWSLETTER ISSUE ...

... will focus on the Tube & wire trade fair in Düsseldorf from March 30 to April 3, 2020. For this reason the issue will be dedicated, in the first place, to our plants and technologies for the production of wire and bars, welded and seamless tubes as well as to the services related to these facilities.

At its booth, SMS group will draw the attention of the visitors to the life cycle of a production plant and show how modernizations, the use of new components, digital solutions and targeted maintenance activities can increase product quality, productivity, availability or the efficiency of the plant. In addition, we will present innovative plant concepts and machines suited to meet the future market requirements.



At the previous Tube & wire, trade fair visitors had the opportunity to experience the MEERgauge® laser measuring system.



Imprint

SMS group newsletter
Issue 03 / 2019

Publisher

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Printing

Druckhaus Kay GmbH
Hagener Straße 121
57223 Kreuztal, Germany

Published in October 2019

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Circulation: German 4,000, English 8,000,
Chinese 1,000, Russian 1,000

The information provided in this magazine contains a general description of the performance characteristics of the products concerned. The actual products may not always have the characteristics described and, in particular, these may change as a result of further developments of the products. The provision of this information is not intended to have, and will not have, legal effect. An obligation to deliver products having particular characteristics shall only exist if expressly agreed in the terms of the contract.

WELDED TUBE AND PIPE PLANTS

SAVE-THE-DATE

TUBE & WIRE 2020
March 30 – April 3, 2020,
Dusseldorf

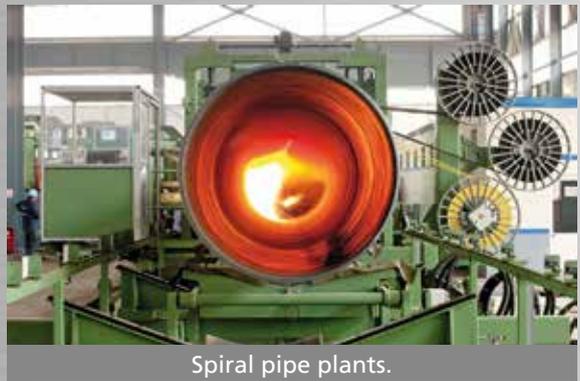
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LSAW - large-diameter pipe plants.



ERW - welded tube plants.



Spiral pipe plants.

THE RIGHT PROCESS TO MEET EVERY REQUIREMENT

Even better quality, more flexible and more cost-effective processes, more challenging dimensions and closer pipe tolerances - these are your goals. And we are your partner!

... in all processes for welded tube and pipe production – no matter whether high-frequency (HF) or submerged arc welded, longitudinally or spirally welded.

As a result, you benefit from high cost-effectiveness, narrow product tolerances, and a broad field of application. Even more: all this substantially boosts your competitive edge. Let's add value along the entire value chain, together.

Leading partner in the world of metals



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