



High efficiency in production

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On the way to the future

Dear friends of SMS group,

How is the future of the tube and wire industry going to look like? What new trends and technologies will become prevalent and which ones will prove profitable? In which way will your company and the production plants you operate benefit from digitalization? We accompany you along the way to the future.

In this issue of the SMS group Newsletter, we are outlining our portfolio of integrated solutions, special innovations and digital highlights as a full-line systems supplier and turnkey partner for the tube and wire industry.

These include, for example, our SMS-Metrics tool, which captures and stores machine and process data inline, i.e. during running production. You can view the collected data in a clearly structured form on your smartphone, tablet or PC. The possibility of tracking the product data in real time and from virtually any place enables operators and members of the management to optimize the efficiency of their operations and the quality of their products.

Efficiency and quality optimization is also what our X-Pact® Quicksetting system, the new core element of our ad-

vanced automation concept for high-frequency ERW tube welding lines, has been designed for. X-Pact® Quicksetting assures that – after a dimension change – the rolls are automatically adjusted to their new positions. This data-based system accelerates line resetting in case of dimension changes.

Innovations for tube and pipe producers

Whether for oil, gas or drinking water – piping systems and pipelines are the lifelines of our world. They must be able to withstand extreme conditions. Our PERFECT spray® coating process significantly enhances corrosion protection of tubes. The combination of kinetic electric arc spraying and our digital current-voltage source maximizes the durability of tube coatings as it improves their resilience to various wear types and to corrosion.

With ThreadView, our newly developed thread measuring system, you can assure that the tube threads you produce will be able to cope with the extreme stresses encountered in the field. ThreadView performs the necessary measurements more reliably and faster than possible in the past, while assuring high-precision quality inspection of the threads and consistent documentation of the measured results.

New technology for wire producers

We are also featuring our compacROD® technology, a new, space-saving production line for copper rod. Being

a modular plant concept, this technology is the perfect starting solution for producers wishing to take up the production of ETP- or FRHC-grade copper rod. This integrated production process is characterized by extremely low process costs and outstanding flexibility.

These are just a few examples of our wide range of products and services featured in this issue of the SMS group Newsletter. We also show extraordinary new-plants projects, remarkable revamps and entirely new plant concepts, such as our high-performance drawing lines and the technology of thermo-mechanical rolling to produce fine-grained rebars with reduced manganese content.

The trip around the world continues

In the last issue of our Newsletter we started a “trip around the world” featuring the international SMS group locations and the services they provide. We are continuing our trip in this issue with a stop in China.

Our way to the future

We, ourselves, are also on the way to the future – with the construction of the new SMS Campus in Mönchengladbach. From 2023, our Düsseldorf and Mönchengladbach teams will be located in one joint office complex of latest design – from which, last but not least, our customers will benefit. Thanks to shorter distances, digital technologies, agile working practices, interdisciplinary project groups and the immediate vicinity to our manufacturing facilities,



we can work even better, faster and more efficiently. When you flip over this page, you will get a first impression of the inviting and transparent architecture, which also represents our open-mindedness as SMS group.

Yours,

Burkhard Dahmen

Chairman of the Managing Board of SMS group



Looking into the future:
The SMS Campus in Mönchengladbach.



Workplace of the future

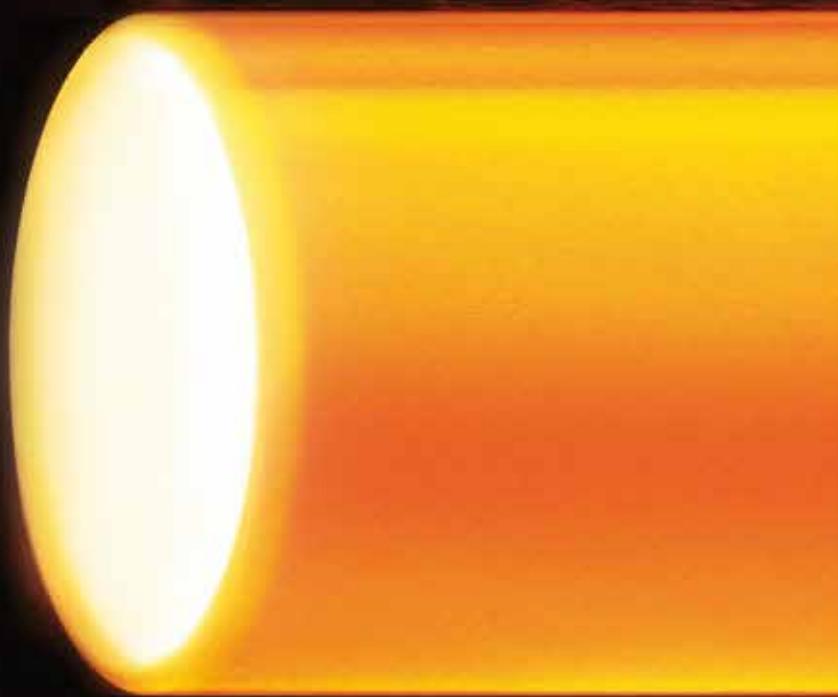
On its own premises in Mönchengladbach, SMS group will set up a new office complex which is scheduled to be completed in 2023. Under one roof it will unite all employees of SMS group now working at the Mönchengladbach and Düsseldorf locations. With its state-of-the-art equipment, the SMS Campus will provide all the conditions needed to ensure the company's position as Leading Partner in the World of Metals in the future.

 **Further information**
www.sms-group.com

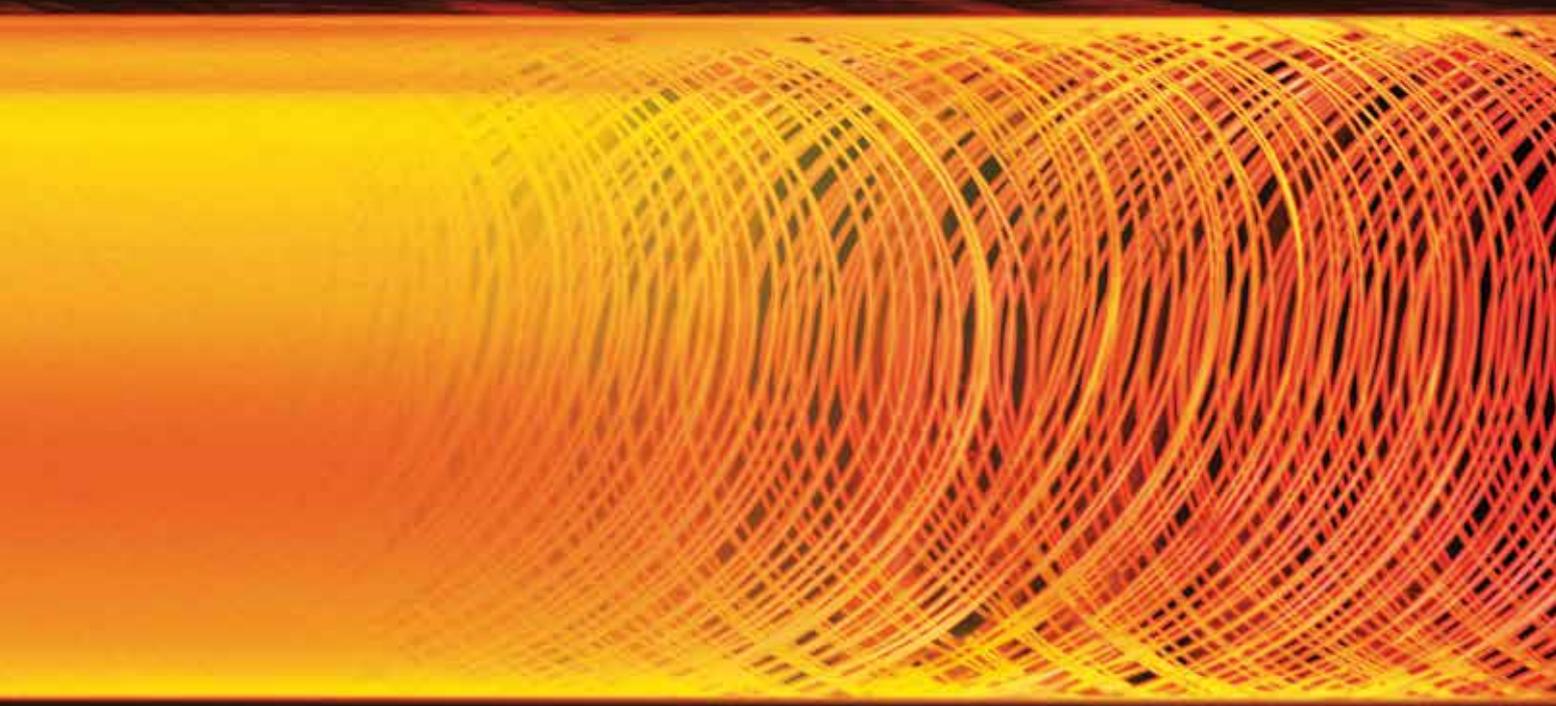
VALUE-ADDING PRODUCTS AND PROJECTS

WORLDWIDE

Learn about SMS group's latest projects in the tube and wire industry on the following pages, such as the world's biggest ERW tube welding line built in the U.S.A., and our successful revamping projects, such as the one implemented at Deutsche Giessdraht. And, get first-hand information about new SMS group technologies, such as PERFECT spray®, about our smart automation solutions, trendsetting sensor and measuring systems, such as ThreadView, and our groundbreaking, value-adding digitalization solutions.



Further information
www.sms-group.com



Record size on order

U.S.A.

In view of the planned installation of the world's largest continuous ERW tube welding line, Zekelman Industries has decided in favor of SMS group as partner and main supplier.



Using the ERW process, the tube welding line is going to produce tubes up to 28 inches and wall thicknesses of 1 inch for the first time.

The new 28-inch line featuring a capacity of more than 400,000 tons per year is going to complement the Atlas Tube Division of Zekelman Industries. With more than 150 million USD – the largest private investment of the American steel industry over the past decade – the project is a clear sign of confidence in the market and the American steel industry. The highly automated ERW tube welding line has been ordered in April 2019 and is scheduled to go on stream already in mid-2021. It will create a total of 75 new jobs at Zekelman Industries.

“In our company, we will continue with our long-standing goal of creating and not waiting for the future,” said Barry Zekelman, CEO of Zekelman Industries.

The new welding line enables the North American company to extend its product range: in future, structural and piling tubes can be manufactured with diameters ranging from 10 3/4 inches to 28 inches (273 to 710 millimeters) and wall thicknesses of up to 1 inch (25.4 millimeters). In addition to that, it is possible to produce square and rectangular hollow sections with dimensions of eight inches x eight inches up to 22 inches x 22 inches or 34 inches x 10 inches.

For the North American market it means not only a more diverse product range for HSS products (Hollow Structural Sections): the new line enables Zekelman Industries for the first time to domestically manufacture products larger than 20 inches on an ERW tube welding line.



Increasing demand for HSS sections

“Over the past few years, we have seen the increasing need for larger, domestically produced HSS in the bridge, transportation and building markets,” said Tom Muth, president of Atlas Tube. “Also, HSS with thicker walls that meet the more stringent width-to-thickness ratio requirements of the AISC Seismic Provisions are in greater demand for lateral bracing systems.”

Design and configuration of the new welding line meet the strictest requirements regarding product quality and throughput. The intelligent X-Pact® Quicksetting system from SMS group provides for an automatic adjustment of the rolls to their new working position after a size change. Thanks to a data-based approach for system adjustments, changeover and setting times in the line are minimized, productivity is increased and a continuous improvement of product quality is guaranteed. Besides a production speed of up to 35 m/min the line offers a very wide size/wall thickness ratio providing excellent flexibility together with very short changeover times when different products are manufactured.

For optimizing the transverse welding process and for realizing transverse weld seams up to a wall thickness of 25.4 millimeters the PERFECT arc® welding process developed and patented by SMS group is employed. In this case, the current sources do not require any transformers and operate with IGBT power electronics (Insulated-Gate Bipolar Transistor) while the welding current is controlled fully digitally. Consequently, the welding machines achieve an efficiency level of more than 90 percent. Depending on the operating point, the energy saving compared to older welding techniques is thus up to 30 percent which ensures process reliability and productivity particularly for thick walls.

Information on new line

Capacity	400,000 tons per year
Production speed	35 m/min
Product range	Structural and piling tubes, rectangular hollow sections
Tube diameter	10 ¾ – 28 inches (273 – 710 mm)
Wall thickness	up to 1 inch (25.4 mm)

Cooperation with tradition

For several years already, Zekelman Industries and its Structural Atlas Tube Division have been relying on the tube welding technology of SMS group. For the 16-inch tube welding line transferred to Blytheville, Arkansas in 2006, which had already been largely upgraded and expanded by SMS with the relocation, SMS group received several follow-up orders in 2017.

To extend the product range and to improve product quality the welding line has most recently been equipped with a complete new sizing section. By using URD® stands (Uniform Rigidity Design) in the sizing section the changeover times could be greatly reduced for size changes.

With the modernization measures Zekelman Industries was at that time already able to roll structurals, i.e. round tubes with external diameters up to 18 inches, as well as square and rectangular sections. The size range for hollow sections was: 14 inches x 14 inches square and up to 18 inches x 10 inches rectangular with a maximum wall thickness of 17.3 millimeters.

Owing to these modernization measures, Zekelman Industries further expanded its North American position in manufacturing structural tubes. In the meantime, this has led to a long-term partnership between Zekelman Industries and SMS group. The most recent order for the world's largest continuous ERW tube welding line is the next step in the successful cooperation between the two companies. ♦



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Highly flexible production

WORLDWIDE

SMS group's smart roll-adjustment system – X-Pact® Quicksetting – assures highly flexible production.



Adjustment of the rolls in an HF tube welding line.



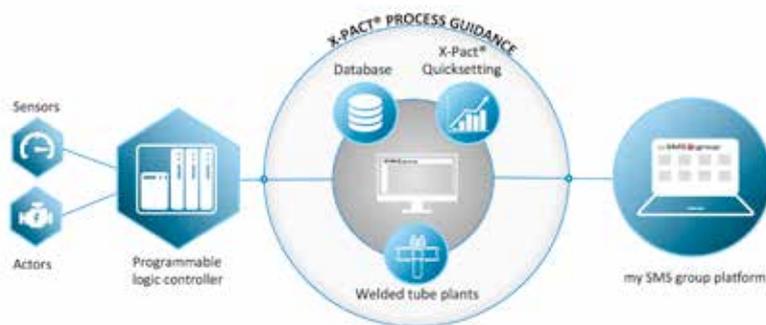
Welded tube production by means of high-frequency electric resistance welding (ERW) requires constant adjustment to the specifics of the individual product. The trend towards increasingly smaller batch sizes and ever more extensive product mixes is today the biggest challenge for this production process. This holds equally true for welded tubes produced for the automotive industry, the oil and gas sector and for the construction industry. Just as essential as these factors are innovative automation systems and advanced digitalization solutions in order for our customers to remain competitive in the market.

SMS group has developed an innovative integrated concept for HF tube welding lines. Customers using this concept are impressed with the extremely short set-up times and the quick-change system for the rolls. SMS group's highly flexible lines are designed to manufacture tubes with diameters from 10 to 710 millimeters and variable wall thicknesses.

As the core element of this concept, X-Pact® Quicksetting assures that – after a dimension change – the rolls are automatically adjusted to their new positions. Thanks to this data-based roll adjustment process, the times needed to set up the line or reset it for a dimension change are minimized. Moreover, line productivity increases and continuous improvement of the product quality is assured. The high production speed of up to 35 meters per minute, together with the extraordinarily wide range of possible diameter/wall thickness ratios and the extremely short change-over times, provides the lines their exceptionally high flexibility to produce such a great variety of tubes.

A new standard in plant automation

By integrating the automation system with a database software, X-Pact® Quicksetting forms a connecting link between the plant, the engineering, the technological know-how and the production process. The new, intuitive Web-linked HMI – in SMS group's X-Pact® Vision design – makes it possible from now on to access the system via a web browser from virtually any



X-Pact® Quicksetting as an integrated module of X-Pact® Process Guidance.



Here you get more information about our X-Pact® Process Guidance platform.



Scan this QR code for more information about the new, intuitive Web-linked HMI of the plant automation system.

computer device at any point of the plant-wide network. The operator may, for example, enter pre-production and set-up data and receive data about the current production run either at his workplace, or he may operate the system and view all relevant information directly at the line. The system assures smart connectivity and systematic networking of knowledge and data exchange, setting a new standard in plant automation.

Being a module of X-Pact® Process Guidance, X-Pact® Quicksetting is all set for future upscaling by additional modules and applications. The X-Pact® Process Guidance platform is unique in that it provides all it takes to advance the degree of plant and process automation and get the best out of a plant by a maximum of transparency of all plant data and dialogs specifically tailored to different user categories. The system can be used just as efficiently for plant upgrades. ♦

 **Markus Fritz**
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Innovative coating solutions

WORLDWIDE

Future-proof coating with PERFECT spray®: Innovative coating solutions of SMS group are suited for functionalizing metallic and non-metallic surfaces.



More than
20 years of cor-
rosion protection – even
in the event of
heavy seawater
weathering.

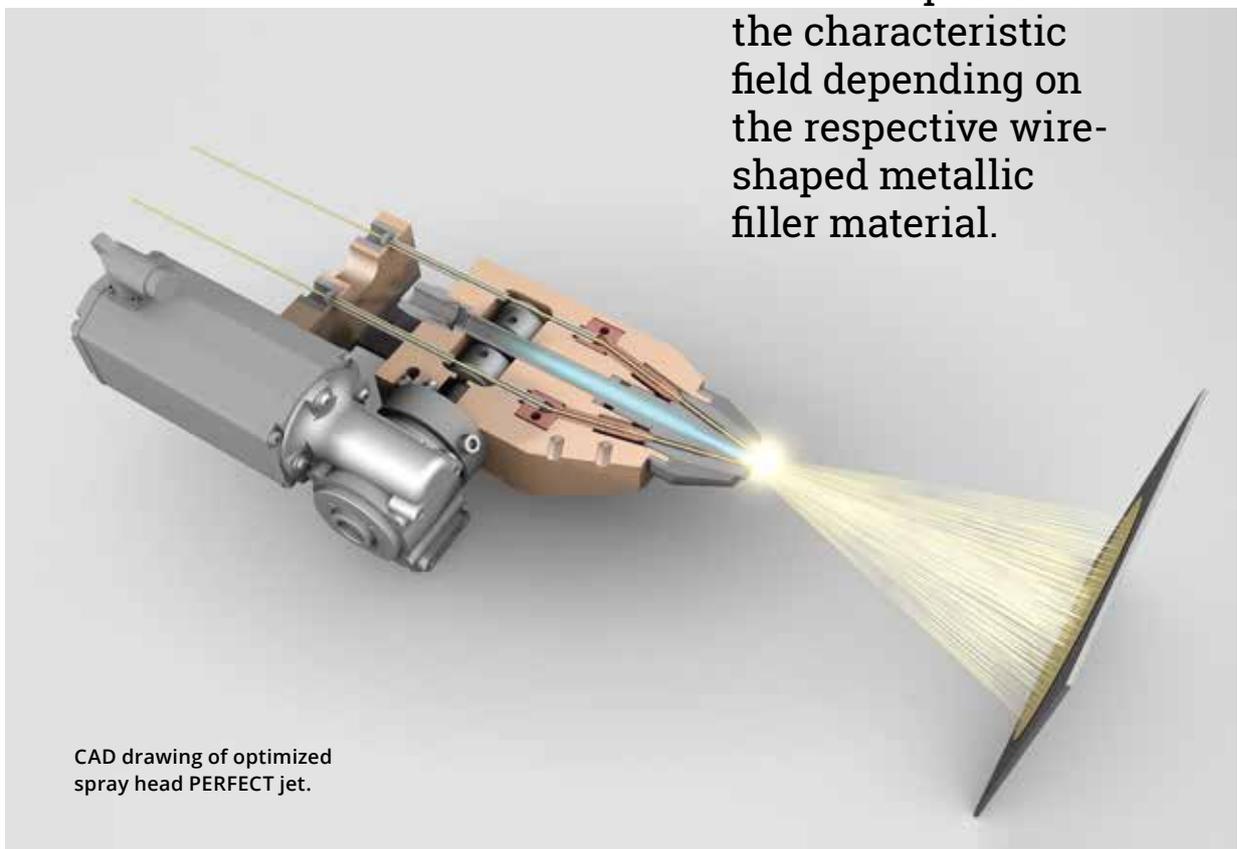
- For pipelines the right corrosion protection is the alpha and omega when it comes to durability and resistance of the pipes used.
- With PERFECT spray® SMS group is able to apply an almost pore-free thermal layer.

Demand is growing. Requirements are increasing. The energy market is booming as never before. At the same time, expansion and safeguarding of its infrastructure becomes increasingly more difficult. The worldwide pipeline network includes more than three million kilometers and it is growing every year by about 25,000 kilometers. Pipelines are the lifelines supplying the world with essential raw materials and are indispensable for transporting oil, gas and drinking water over long distances. The pipelines are partly exposed to severe conditions. No matter whether piped on above-ground pipe routes, in the ground or under water – the right corrosion protection is the alpha and omega

when it comes to durability and resistance of the pipes used. This is where wire arc spraying comes into play – a process characterized by high application rates and low energy consumption.

SMS group brings together two promising technologies: wire arc spraying and an all-digital current/voltage source developed in-house. This resulted in the thermal arc spray process PERFECT spray® – for the treatment of metallic and non-metallic surfaces.

Highlight of PERFECT spray® system: Active process control by fully parameterizable current voltage source in connection with active adaptation of the characteristic field depending on the respective wire-shaped metallic filler material.



CAD drawing of optimized spray head PERFECT jet.

Thermal spray process conquers new markets

With the wire arc spraying system for thermal spraying according to DIN EN ISO 14917, SMS group opens up whole new markets in the corrosion, wear protection and servicing sectors: due to control-specific and design-related disadvantages of wire arc systems available on the market, end users had to accept significant restrictions regarding layer quality and process efficiency before PERFECT spray® was developed. Through new approaches in electric arc control, an open linear design and the development of SMS group's own burner concept with pressure-loss-optimized, turbulence-reduced and high-expanding nozzle system significant improvements in process efficiency and layer quality can be achieved.

The new wire arc system is modular in design and includes ceramic inner flow contours adapted to the corresponding coating application which have been engineered to gas-dynamic factors and can be adapted to the desired gas flow rate or mass flow. There is the possibility to direct the gas flow to the wire ends in a clear supersonic range (gas flow velocity larger Mach 1) or retard the gas to subsonic speed – depending on material or application case.

It is possible to process almost all metallic materials which are deliverable in wire form. By the option of separately controlled wire feeds different cathode- and anode-side materials can be processed, to produce alloys and pseudo-alloys in the process (for example a combination of steel and nickel or aluminium and copper).

Cost-, energy- and material-efficient technology

Current issues and problems of a politically motivated turnaround in energy policy bring coating methods such as wire arc spraying into the focus of technologies which can guarantee long-time corrosion protection in a cost-, energy- and material-efficient manner. Material systems suitable for this task are alloys on the basis of aluminium-zinc which can be processed as pre-alloyed AlZn wire or by using different wires (anodic: zinc; cathodic: aluminium). The SMS group coating system PERFECT spray® enables almost pore-free coating. Because of the possibility of controlling wire feed velocities of cathode and anode separately materials of different melting temperatures can be conveyed homogeneously which makes it possible that a constant

PERFECT spray® OFFERS

- A precise and ultrafast process control
- Full parameter control of power supply for processing different wire materials and diameters
- An innovative nozzle concept for generating high-speed gas flow
- A wear-resistant and process-safe wire contacting concept
- A maintenance-friendly burner and highly functional, durable materials for all system components

arc resistance (minimal length variation) is adjusted. The layers are additionally post-treated with a special sealant on Sol-Gel basis and guarantee with recent standards and depending on layer thickness corrosion protection for more than 20 years – even under heavy seawater weathering.

With a future-oriented PERFECT spray® the spraying unit is not only perfect for application in an industrial environment, but also qualifies it for science and research to open up new resource-saving applications and markets. ♦



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Further information

<https://www.sms-group.com/sms-group-magazine/overview/smart-coating-with-perfect-spray/>

Optimization through continuous development

WORLDWIDE

For over eight decades now, SMS group has designed and manufactured cold pilger mills – our latest developments strengthen the market position of our customers.

Cold pilger mills from SMS group enable our customers to manufacture highly sophisticated products. This approach is continuously pursued by us. With the current developments the production process of plant operators is taken to a new level.

Our first mill has been installed in 1935 and since then we have taken every challenge to further improve our cold pilger mills. This is reflected for example in the development of our drive types VM, HM, L and most recently L+ but also in the increasing size range of the finished tubes. Through a new design and manufacturing approach of our mill stand we can achieve an increase of production capacity.

Continuous development of the crank drive while at the same time decreasing the assembly space and reducing

maintenance costs result in various drive types: from vertical mass (VM) balancing, through horizontal mass (HM) balancing to the Lancaster (L) mass balancing principle as mostly used for car engines. These optimizations resulted in today's established solution with two separate compact drives for the crank and balancing shaft (L+).

New design approach

With the KPW 370 L, the largest cold pilger mill ever built by SMS group was taken into operation last year. The mill saddle including roll assemblies weighs over 45 tons and is moved more than 1,200 millimeters back and forth with every single stroke, while the mill is running at full speed (at 65 crank shaft revolutions per minute). Being equipped with hydraulic overload device and motorized roll gap adjustment the mill saddle is optimally prepared for this task.

To increase the output of the KPW 50 SMS group pursued a new design approach to significantly reduce the weight of the mill saddle. Adaptations in shaping and the use of 3D printed components allowed for a weight reduction by one quarter. At the same time, the stiffness of the structure can be obtained. The aim is to increase the machine speed from 200 rpm to then 250 rpm. ♦



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Higher availability and increased yield

AUSTRIA

voestalpine Tubulars commissions new SMS group crimping press.

voestalpine Tubulars GmbH & Co KG, based in Kindberg, Styria, Austria, has commissioned a three-die crimping press supplied by SMS group. The new press, which replaces a predecessor model supplied by SMS group back in 1998, will assure voestalpine Tubulars an increase in plant availability and higher yield. With the new press, the company will be able to further optimize crimping geometries and reduce set-up times. The entire crimping cycle - performed in combination with the associated auxiliary equipment - has been reduced to just 17 seconds.

SMS group has supplied a three-die crimping press to voestalpine Tubulars.

Thanks to the modern hydraulics and control systems, and the three-way-controlled hydraulic cylinders, the new crimping press in operation at voestalpine Tubulars carries out the crimping centrally at very short cycle times. During this process, no shear stress is being induced into the material and there is no buckle formation in between the crimping dies. This will result in a substantial improvement in the crimping shapes of the wide range of very different hollow geometries.

"SMS group has met our expectations in all respects in terms of technology, delivery deadlines, quality and solution competence. The new crimping press will largely improve the plant performance of our push bench area," says Heinz Teuschl, Head of Operations at the Kindberg mill.

The new crimping press is part of the CPE (Cross Piercing Elongating) line on which voestalpine Tubulars manufactures high-grade tubular products for a broad application range. ♦



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Crimping is a process that forms metal plates into curved moldings without reducing the thickness of the plates.



ThreadView autonomously measures all cut threads during seamless tube production.

Innovative measuring system

WORLDWIDE

SMS group introduces autonomous optical measuring system for examining threads and sealing lips on oilfield tubulars.

SMS group accompanies its customers during the entire process of seamless tube production – from a continuously cast bloom up to the finished tube. The tubes are often processed on our thread-cutting machines and are used worldwide as oilfield tubulars – also known as OCTG tubes. Our machines provide high-quality finished products to international standards, such as API or GOST.

Regular checks are indispensable to ensure proper quality of cut threads. So far, the examination was possible only manually – i.e. by hand – and thus was a time-intensive challenge. The consequence: tube ends could only be inspected randomly and not to the full extent.

100-percent inspection

This issue prompted SMS group to expand its portfolio by a thread measurement system: ThreadView is intended to support customers with quality assurance and should be fully integrated in the thread cutting line. The process allows for measuring, evaluating and documenting pipe ends following the cutting process. Thereby, ThreadView operates fully autonomously measuring 100 percent of the cut threads. In this way, inaccuracies, defective tools and tube ovalities are detected within a very short period of time and the productivity of the finishing line is steadily increased.

Measurement of premium threads

But it is not only the infinitely variable diameter adaptation that makes the measuring system unique. With the aid of the technology applied it is also possible to measure the so-called premium threads.

The thread is scanned with cameras and additional optical sensors and then compared with specified dimensions. Here, no limits are set to the individuality of the threads consisting of various thread and sealing lip types. The software of the innovative measuring system provides the possibility to configure and combine thread and sealing lips freely – comparable with a modular system. In this way, specific tube joints can be defined and adapted at any time by the customer himself.

The helical angle at the tooth of premium threads is negative and therefore cannot be detected with conventional measuring technology. As the only system capable of measuring the premium thread, ThreadView offers a particular added value to our customers.

Innovative and intuitive

The measured data recorded are shown by ThreadView in tabular form. In this case, a line corresponds to a measured tube. Thanks to

the colored background according to the traffic-light system, faulty threads can be recognized at first sight. To obtain a more detailed view a double click on the corresponding tube is sufficient. In response, all measured values are compared with their target values in a popup window. The grade is also marked by means of a colored background so that deviations are quickly and easily identified.

In addition to the numeric measurements the contour of the measured thread in this display is compared with the target contour. In this way, occurring errors can be additionally examined and understood.

View into the future

With ThreadView SMS group sets an autonomous optical measuring system against the market requirements enabling a 100 percent inspection – even with premium threads. Consequently, the system combines two unprecedented options.

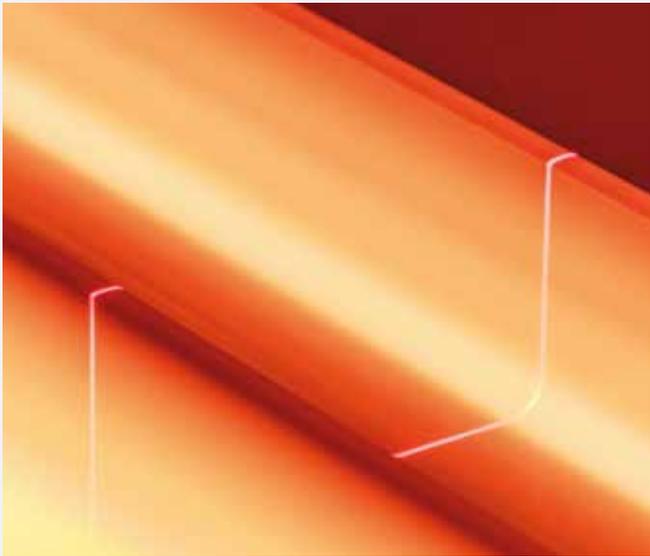
An added value for the customer is that the process data obtained by means of ThreadView can be analyzed in future even more effectively, i.e. ThreadView could help for instance to predict the time of the next tool breakage. ♦

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Ready for Industrie 4.0

AUSTRIA

TBK Automatisierung und Messtechnik is scoring points on competency in laser measurement technology.



Laser measurement of H-beam.



Measuring device for sections in use.

TBK Automatisierung und Messtechnik GmbH is one of the new members within the SMS family. The company headquartered in Graz, Austria, is proud to be the competence center of SMS group for laser measurement devices. TBK was founded in 1986 as technical office by Heinz Kotzmuth. Very soon, the company focused on developing laser measurement systems based on the light-section method. Due to the shortcomings of conventional laser measurement systems applying the shadow method, the company became one of the pioneers in using the laser light-section method allowing TBK to completely measure the cross-section of a rolled section. As early as 2004, TBK and SMS group have been closely cooperating with each other supplying measuring systems for section mills. Already in 2013, SMS group participated in the company taking over the remaining stakes in 2018.

Nowadays, TBK is one of the leading suppliers of laser measurement systems for the steel industry. 30 highly qualified staff members including engineers, software programmers and scientists develop and plan measuring systems for all section types and applications. The measuring systems are manufactured in TBK's own workshops where they are also tested before they are sent to the customers, one of the reasons why turnover within SMS group could be increased through the consolidation strategy of measuring activities. In addition to that, switch cabinets and sensors are manufactured in-house.

Today, the market calls for direct information on the quality of the products manufactured such as dimensions, shape and surface quality allowing the mill operator to optimally adjust the plant online: digitalization in the rolling mill. As a result, sales have increased in recent years by using a consolidation strategy of measurement activities within the SMS group. ♦



Solution for all long products

SHORT INTERVIEW

Ralf Kremer, Managing Director of TBK Automatisierung und Messtechnik GMBH explains TBK laser measuring systems in an interview.

Mr. Kremer, what are laser measuring systems based on the light-section method?

Ralf Kremer: With the laser light-section method used by TBK, the entire profile cross-section can be measured. To achieve this, special lasers project lines onto the product surface. The reflected laser radiation is captured by cameras and converted into distance values. By using these values, TBK systems are able to calculate the cross-section of the product. A high-resolution and high measuring density allows for the creation of a 3D product model detecting surface flaws. Conventional laser measurement systems apply the shadow method. With random measurements, just a few measurements can be performed, such as product height or width.

Can you support this with figures?

Ralf Kremer: MEERgauge® – a measuring system for bars, wire rod and pipes/tubes – provides up to six million measuring points per second. The measuring data density coincides with short exposure time and synchronous measuring probes.

Which products can be measured?

Ralf Kremer: TBK measuring systems can be applied for all long products. This includes wire rod, bars, pipes/tubes, sections, rails and special profiles. Continuous casting material, such as billets, blooms, beam blanks or slabs can also be measured. Our portfolio encompasses measuring wheels and rings on ring rolling machines and forged products.

The product diversity in the area of light-, medium-section and sectional steel production is very demanding for contour measurements. How does TBK counteract this?

Ralf Kremer: In the case of very large formats, such as beams with web heights of more than one meter, the measuring window must be adequate continuous casting material. Therefore, the mechanical sensor stability in relation to each other must have top priority. Within PROgauge – a flexible measuring system for beams, sections and rails – constructive measures are required for air and water cooling to ensure that high thermic loads are effectively compensated.

What is the difference of TBK systems compared with other measuring systems?

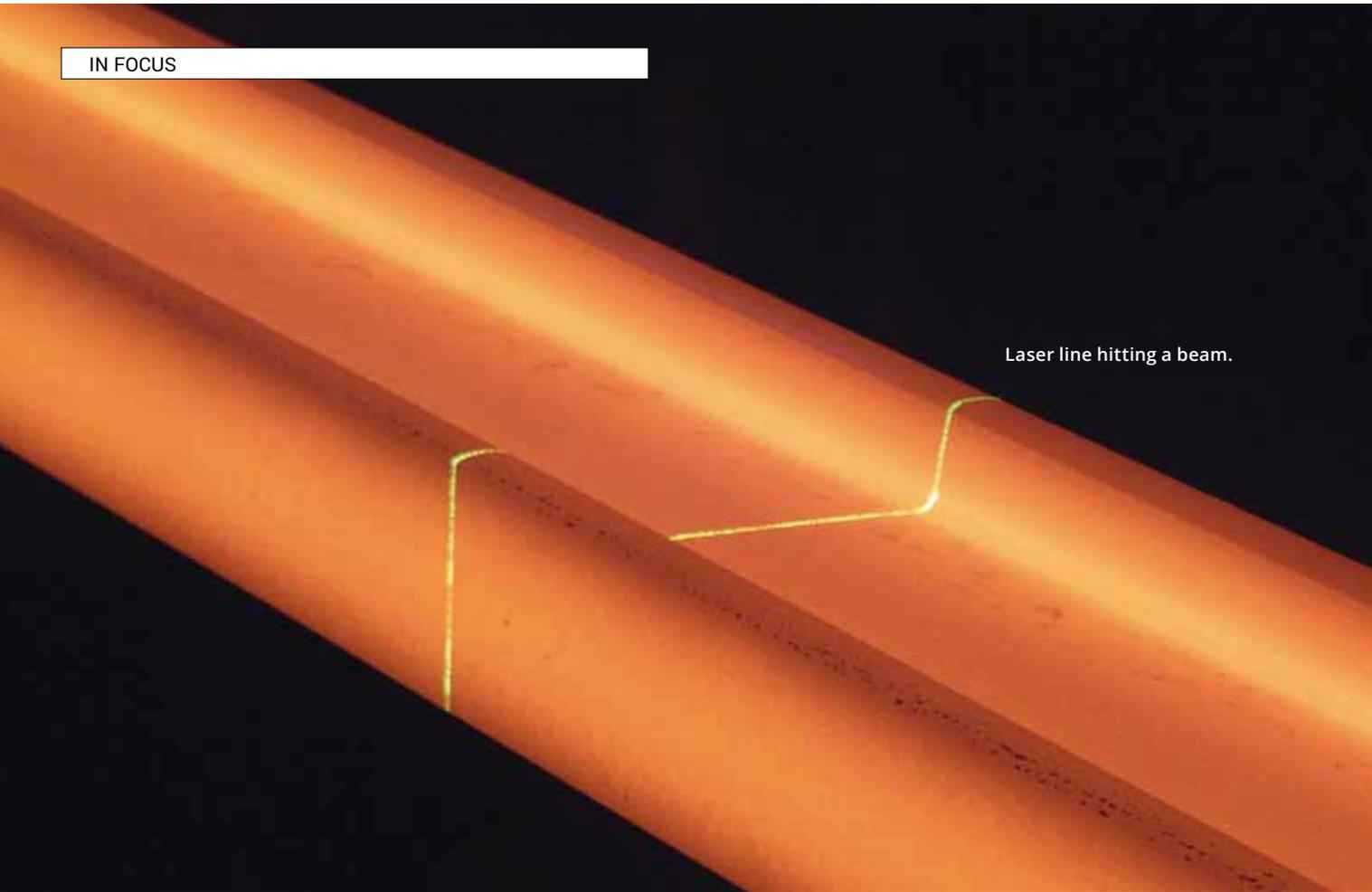
Ralf Kremer: As market leader in measuring speed – a key quality criterion for measuring devices – our systems feature a maximum rolling speed of up to 120 meters per second. Short exposure times and synchronized sensor measurements minimize the impact of lateral movements. With high rolling speeds, SurfTec surface flaw detection is available. Furthermore, TBK measuring systems enable the control between contour measurement and mill control system. This means that roll adjustments can be corrected during ongoing production by means of computer-based interpretation of measuring results.

Are TBK measuring systems suited for digitalization, for example for Industrie 4.0?

Ralf Kremer: Our measuring devices provide comprehensive product data such as size, shape or surface condition, temperature and speed. Such information combined with other mill data enables the operator to adjust the mill such that stable products are achieved within the desired tolerances. ♦



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Laser line hitting a beam.

Laser measurement improves quality and boosts yield

JAPAN

Subsidiary TBK Automatisierung und Messtechnik sold five measuring units operating to the laser light-section principle to Japan within 18 months.

Due to the successful market penetration in Japan and thanks to the good reputation and excellent performance of TBK Automatisierung und Messtechnik GmbH, a company of SMS group domiciled in Graz, Austria, five laser measuring units have been sold within a period of merely 18 months. The Tokyo offices of SMS group K.K. strongly supported TBK in its sales activities and project handling. For more than 30 years now, TBK has been active as a supplier of laser measuring systems based on the light-section method and can hence be called a pioneer in this technology that allows the complete section to be visualized.

The first measuring system supplied to Japan for measuring wire rod was commissioned at the beginning of 2018. Since the gauge proved to operate reliably, TBK sold another measuring system for merchant and reinforcing steel bars which has been in operation since spring 2019. Since then, further units have been supplied to four different Japanese customers.

References in Japan for all types of sections

Lately, Yamato Steel has placed an order for a PROgauge light-section system for beams up to 1,000 millimeters. This laser gauge is designed to measure a wide range of medium-size and heavy sections such as H-beams and channels. The system also includes a SurfTec module detecting, in the first step (online), surface defects in hot condition directly behind the last mill stand and then allowing defects from the rolling process or from defective material to be detected in the second step (inline). This way, further processing of defective material is prevented and the frequency of manual inspections significantly reduced. The gauge combines two functions in one unit: shape and size measurement as well as surface analysis. Due to its high scanning rate and a large number of measuring points, the surface can be represented in 3D.

In the meantime, TBK has managed to obtain references in Japan for all types of sections and the complete size range of the products: wire rod, bars, rebars, light as well as medium and heavy sections.

The Japanese market has recognized the advantages of a laser gauge measuring the dimensions of the finished product directly in the rolling line, and of the fact that surface inspections can be omitted or drastically reduced, since manual checking is no longer required. The plant operator additionally benefits from improvements in quality and increased yield thanks to permanent monitoring. The investment might pay off after only one year. As Japanese steel producers have a vital interest in continuous process improvements, the measuring unit is best suited and acknowledged. Due to the excellent references of TBK in the field of measuring units operating to the laser light-section principle, the performance of these units has won over Japanese customers. ♦



Contact

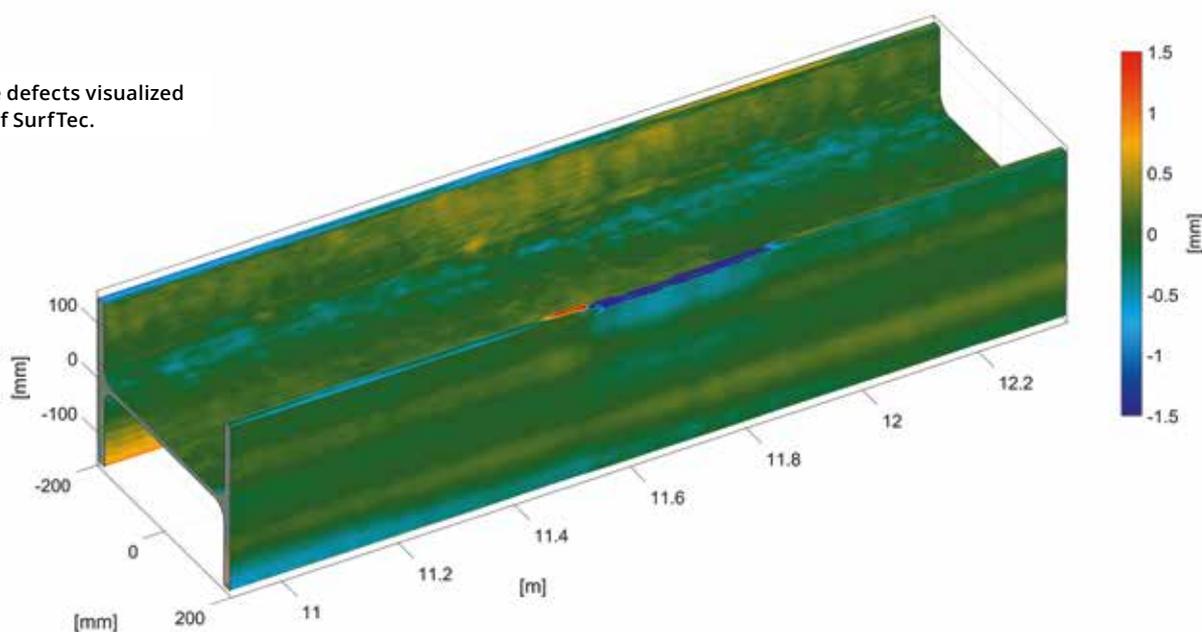
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Further informationen

www.tbkautomatisierung.at

Beam surface defects visualized
with the aid of SurfTec.



Outlet of a bar mill.

13

months only took the modernization project at Daehan Steel until completion to the full satisfaction of both companies.



Increase in production efficiency

SOUTH KOREA

Quenching and HSD® lines from SMS group successfully commissioned at Daehan Sinpyeong.

South Korean Daehan Steel Co., Ltd. has smoothly re-started production with the new quenching and high-speed lines supplied by SMS group following the modernization of its Sinpyeong bar mill.

The Final Acceptance Certificate (FAC) was signed two months ahead of the original schedule, thanks to the strong cooperation between SMS group and Daehan Steel.

The main target of the modernization was to reduce the ferro-alloys content in the billets and thus to achieve a substantial reduction in production costs. The upgrade also aimed to improve the production efficiency and to enhance the product range by rebars from 16 to 35 millimeters and steel grades up to SD600.

The modernization project was completed within 13 months only and ended to the full satisfaction of both companies.

The scope comprised the replacement of the existing quenching line with a new one, two dividing shears with associated pinch rolls, bar braking system and an HSD® line (High-Speed Delivery), the unique system to feed bars onto the cooling bed at high speed via rotating channels. Additionally, the supply included an automation package for machine and process control. ♦



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Fine-grained structural products with TMbaR

CHINA

SMS group takes a step into the future with thermomechanical rolling of rebars (TMbaR) providing a reduced manganese content in the billet and improving the product characteristics at the same time.

- **Mechanical strength values and ductility are sustainably improved by grain refining.**
- **TMbaR will be used in future in two Chinese rebar mills. The solution for thermomechanical rolling saves alloying additions and reduces operating costs.**

SMS group has been a pioneer and promoter of the thermomechanical rolling process for decades. Today, a new chapter has been written by applying this concept to the production of reinforcement bars (rebars). SMS group's thermomechanical rolling of rebars, the so-called "TMbaR" offers the benefit of producing fine-grained structural products while at the same time reducing the manganese content in rolled stock. The exceptional ductility properties of seismic grades (i.e. HRBF400E) can only be optimized at that level by thermomechanical rolling.

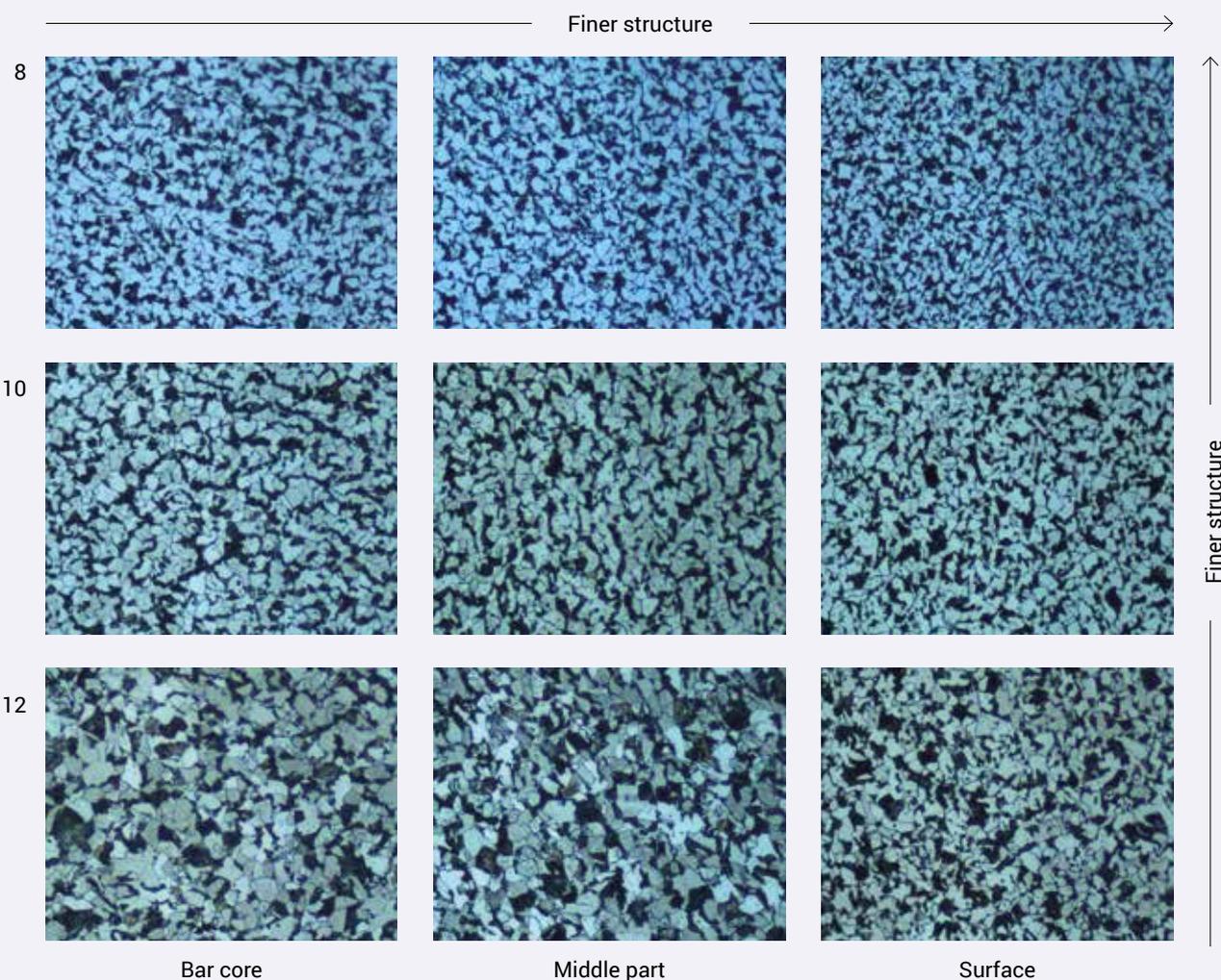
In order to achieve the fine-grained microstructure three process steps need to be ensured:

- precise and reproducible cooling and equalization before the final passes
- high deformation during the last passes
- soft-cooling after last passes

Thus sufficient cooling and equalization capacities need to be considered during the design of the plant as well as a rigid design of the wire rod block, which can bear the higher rolling forces created by the reduced rolling temperature (750 °C – 820 °C). SMS group's solution is:

- applying an increased number of water boxes arranged in the loop in front of the finishing blocks
- MEERdrive® rolling block, which besides the rigid design offers through its single drive solution the necessary flexibility to control the process of an optimized recrystallization after rolling

Rebar 8 – 10 – 12 comparison microstructures, 500X



Ensuring the above-mentioned boundary conditions the grain sizes can be improved from typical ranges of ASTM 8 – 10 (conventional rolling) to ASTM 12 (thermomechanical rolling).

Improved material properties, saved alloy additives and reduced operational costs

Two companies, Lianxin Steel and Shandong Laigang Yongfeng Steel, decided to introduce the TMbaR process by SMS group in their new rebar rolling mills. Both mills are designed for an annual capacity of 1,000,000 tons.

The TMbaR rebar mill for Shandong Laigang Yongfeng’s Dezhou site in the diameter range of 8 – 32 millimeters produces straight bars with diameters of 8 – 25 millimeters at a max. speed of 45 m/s and bar coils by a VCC® (Vertical Compact Coiler) with diameters of 8 – 32 millimeters at a max. speed of 35 m/s. Yongfeng choses to install a new high-speed rolling area including two 6-stand MEERdrive® blocks, cooling and equalizing lines, a high-speed delivery area consisting of a high-speed delivery system (HSD®) with dividing shears and bar braking as well as a VCC® system for coils up to 5 tons. Additionally, the scope of supply included the complete package of electric & automa-

tion and the supervision for erection & commissioning. The plant started production in October 2019.

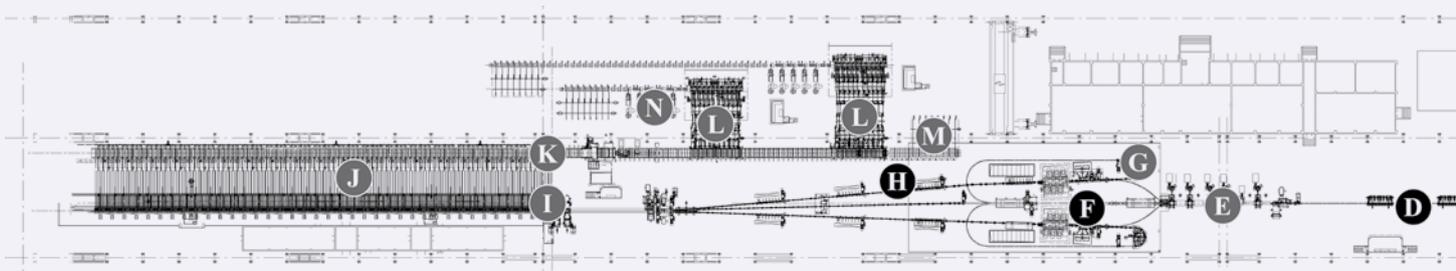
Lianxin Steel ordered a TMbaR rebar mill for its Dafeng site that has already been commissioned at the beginning of 2019. The plant is designed in the diameter range of 8 – 40 millimeters at a max. speed of 45 m/s. SMS group supplied all rolling mill stands for roughing, intermediate and finishing mills, two six-stand MEERdrive® finishing blocks, shears, water boxes as well as the double HSD® system. Additionally, the complete package of electric & automation and the supervision of erection and commissioning were present in the scope of supply.

These companies trust the long time experience of SMS group in the field of thermomechanical rolling with extensive cooling and equalization lines arranged as loop. The new TMbaR rebar mill allows them to react better and faster on market demands with improved material properties, saved alloy additives and reduced operational costs.

TECHNOLOGICAL HIGHLIGHTS

A technological highlight of the equipment is the well-proven loop technology which allows achieving effective temperature equalization across the feeder section in front of SMS group's MEERdrive® finishing blocks. The single drive concept of these blocks provides utmost technological and economic benefits over other drive concepts in terms of overall processing costs. The robust cassette-type design makes for consistently high performance with minimized maintenance requirements. The equipment has been specially designed for long rolling campaigns under the high rolling load demanded by the TMbaR process.

Lianxin technological units



- | | |
|---|---|
| A Re-Heating Furnace 200 TPH | H Final Water Cooling Line |
| B Roughing Mill Area | I Bar Brakers & Rotating Channels |
| C Intermediate Mill Area | J Cooling Bed |
| D Intermediate Mill Water Cooling Line | K Cold Shear |
| E Pre-finishing Mill Area | L Double Bundling Station |
| F Main Water Cooling Line | M Short Bar Recovery |
| G Loop Line, MEERdrive® Blocks | N Tying Machines and Collecting Area |

TMbaR – thermomechanical rolling at Lianxin

Today, we can already take a look at the main results achieved on the first plant supplied by SMS group in China – expressly designed to accomplish the new Chinese standard, with the aim of obtaining an ultrafine microstructure starting from billets of controlled chemical composition without the necessity of adding micro-alloying elements.

After initial tests have been performed with rebar HRBF400E for diameters of 8, 10 and 12 millimeters it can be summarized that thermomechanical rolling, to produce rebars in full ferritic – pearlitic structure, has been successfully applied. The results of the first trials show that all the mechanical properties of yield strength (YS), tensile strength (TS), elongation and TS/YS ratio were easily obtained.

For all three rebars produced in Lianxin, the obtained results followed the new Chinese standards GB/T1499.2 - 2018. The grade HRBF400E

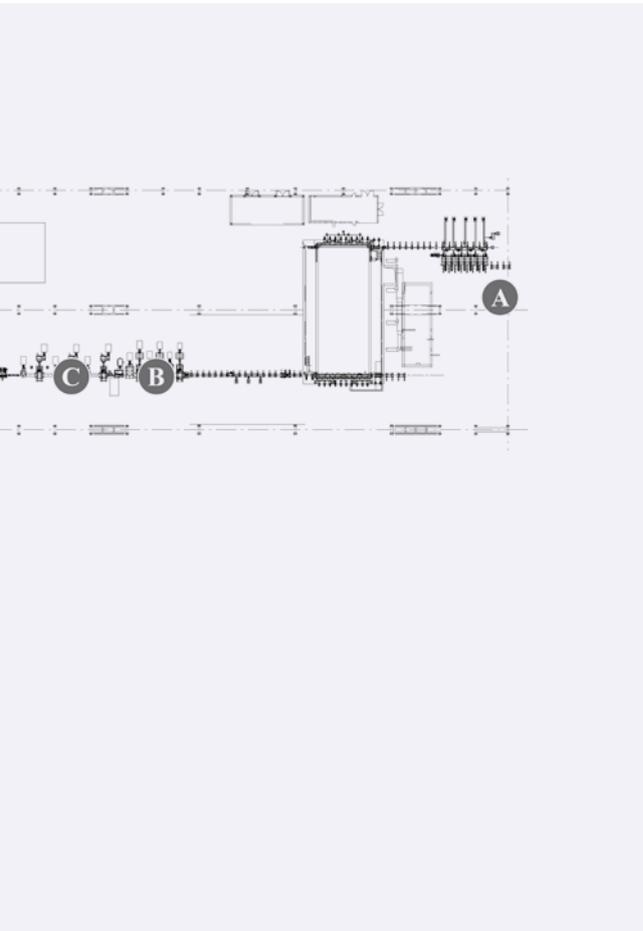
showed an ultrafine (grain size always higher than ASTM 9) and weldable microstructure. The image on the previous page shows the core, middle and surface area of the three sizes rolled during the commissioning phase. Due to different rolled stock diameters, it should be noted that there are little differences in microstructures related to deviation in the cooling conditions of the cross section.

Especially elongation and TS/YS ratio satisfied the more stringent requirements of the seismic application rebar.

Mechanical characteristics of HRBF400E are considerably higher than the standard limit (YS=400 MPa and TS=540 MPa) due to the manganese contents, in the range 1.2 – 1.4 %. Further process implementations will be applied to reduce Mn content to < 0.8 percentage, with the aim of decreasing production costs, still maintaining all the mechanical and microstructural characteristics of grade HRBF400E. ♦

1,000,000

tons of rebar can be produced
per year by Lianxin Steel
and Shandong Laigang Yongfeng.



Contact

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More yield. Higher quality. Intelligent digitalization.

WORLDWIDE

The new drawing lines for bright steel deliver 20 percent more output offering customers a competitive edge that pays off.

- **The new high-performance drawing lines of SMS group convince with a big increase in output, quality and productivity.**
- **The integrated safety concept protects the operator in an optimal way.**
- **The machines are highly automated, the adjustments are motorized and reduced changeover times increase the availability of the line.**

The new drawing lines for bright steel of SMS group achieve about 20 percent more output. At the same time, quality, safety, maintainability and process transparency are enhanced. Complete new perspectives are opened up with innovative measurement technology in connection with digitalization. Innovations are available as package to the customer for the new investment of a drawing line or for individual modules.

Falk Rößeler, Product Division Head Bright Steel at SMS group: "We as Leading Partner in the World of Metals are in close contact with our customers and we know exactly the requirements of plant operators in the future. Based on this knowledge, we have put all

assemblies and technologies under scrutiny for further development. We have questioned everything. Our primary goal was a significant increase in performance. In addition, we wanted to prepare the plants for digitalization as regards Industrie 4.0 in a sustainable way and that is what we have achieved. A 20 percent increase is an enormous leap forward for our customers and a competitive edge that pays off."

Digital test laboratory

SMS group has created optimizations and new developments along the entire process chain of drawing lines from coil preparation to drawing unit up to finishing. In each individual process step significant improvements were attained which comes in useful particularly when new high-strength grades are drawn. The highlights include the new coil preparation, the completely re-engineered caterpillar drawing unit as well as the innovative measuring technology with its monitoring and analysis options.

Dirk Heßberger, Design & Engineering Bright Steel SMS group: "For his drawing line the customer is provided with a digital test laboratory enabling him to overview the entire process – from machinery equipment to forming

force, straightening force, straightness up to plant condition. On the basis of measured data and analyses with our monitoring system Genius CM®, the plant operator clearly determines where the limits lie and where optimization scope still remains. Consequently, the operator is able to increase his performance for certain processes or in a specifically targeted manner for certain products. With these digital options the customer also reaches optimal plant adjustments for new products much faster.“

Certified quality

Another aspect of Industrie 4.0 measuring technology is safeguarding constant quality. Based on data and analyses, the assemblies can be perfectly pre-adjusted. Manual interventions of the operator are not necessary and different settings are thus prevented. An automatic pre-adjustment together with permanent data recording for uninterrupted quality documentation create ideal conditions for certifications or special audits.

Faster coil changing times

The new coil preparation with dual pay-off reel increases performance on the one hand, enhancing reliability at the same time. To achieve this, a new concept has been developed, providing utmost operator protection at maximum level of productivity. Coil and uncoiling process are hermetically secured with massive components and self-closing enclosures. The coil is delivered to the line by radio remote control using a manipulator. The operator is in a safe area where he is able to feed the coil with utmost precision. Automatic deactivation takes place should malfunctions such as nodes arise during uncoiling. Unlike earlier installations, all risks in connection with coil preparation are thus eliminated, which means that the patented solution enables a preparation of new coils in parallel with the ongoing uncoiling process on the other reel crown. Consequently, significantly faster coil changing times are possible with increased productivity.



Caterpillar drawing unit. The highlights include the new coil preparation, the completely overhauled caterpillar drawing unit as well as the innovative measuring technology with its monitoring and analysis options. The newly designed drawing system achieves drawing speeds of up to 250 meters per minute. By interacting with the high drawing speed of the caterpillar drawing units, productivity could be increased by up to 20 percent.

Higher drawing forces and speeds

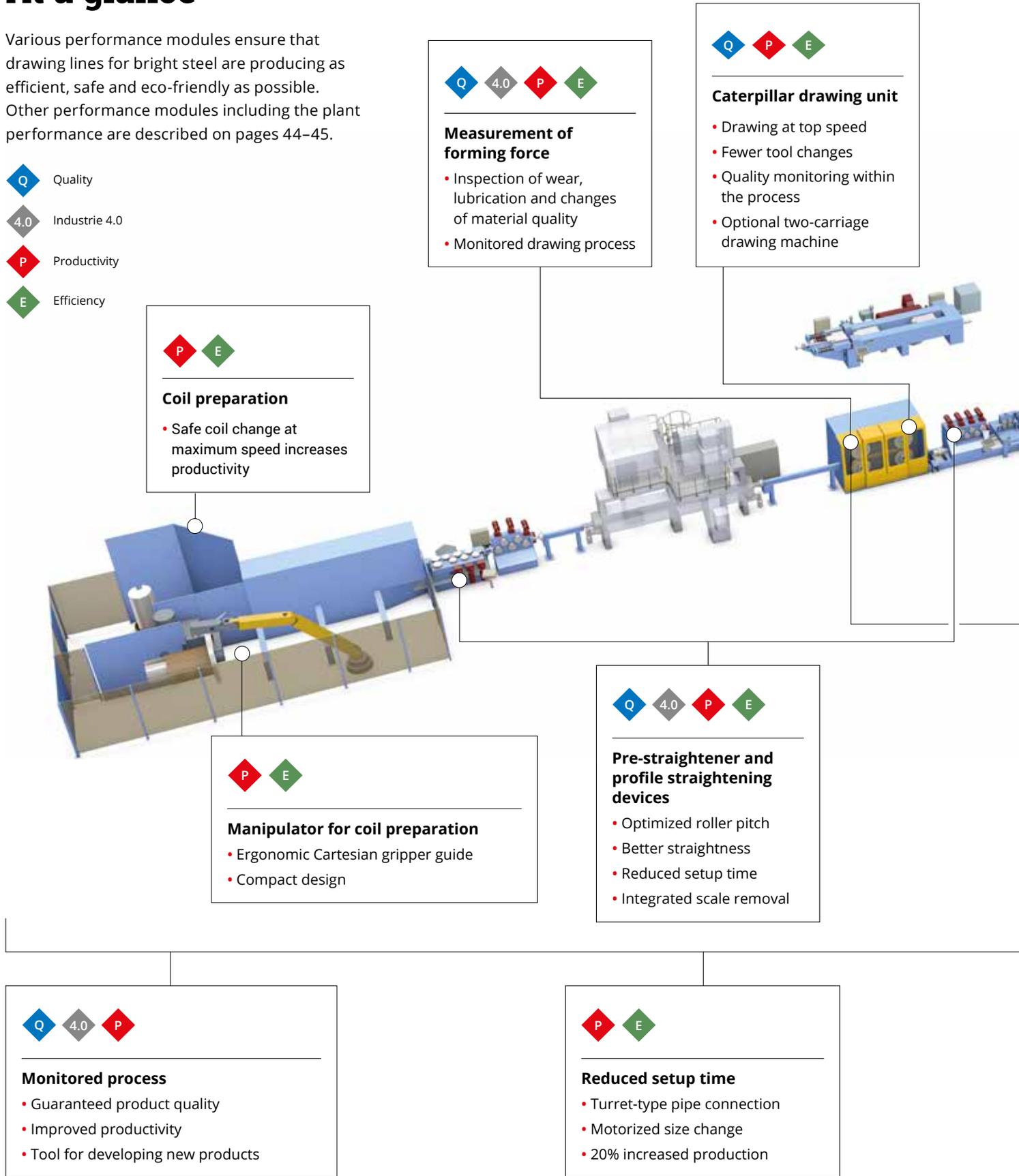
The new caterpillar drawing unit is the latest solution of SMS group offering enhanced drawing force for higher forming grades and high-strength materials of more than 1,300 MPa. Thanks to a completely continuous drawing process, bar quality is consistently of the highest standard as regards length, straightness and surface. The redesigned drawing system achieves drawing speeds of up to 250 m/min.

► Continue reading on page 36

At a glance

Various performance modules ensure that drawing lines for bright steel are producing as efficient, safe and eco-friendly as possible. Other performance modules including the plant performance are described on pages 44–45.

-  Quality
-  Industrie 4.0
-  Productivity
-  Efficiency



Measurement of forming force

- Inspection of wear, lubrication and changes of material quality
- Monitored drawing process

Caterpillar drawing unit

- Drawing at top speed
- Fewer tool changes
- Quality monitoring within the process
- Optional two-carriage drawing machine

Coil preparation

- Safe coil change at maximum speed increases productivity

Manipulator for coil preparation

- Ergonomic Cartesian gripper guide
- Compact design

Pre-straightener and profile straightening devices

- Optimized roller pitch
- Better straightness
- Reduced setup time
- Integrated scale removal

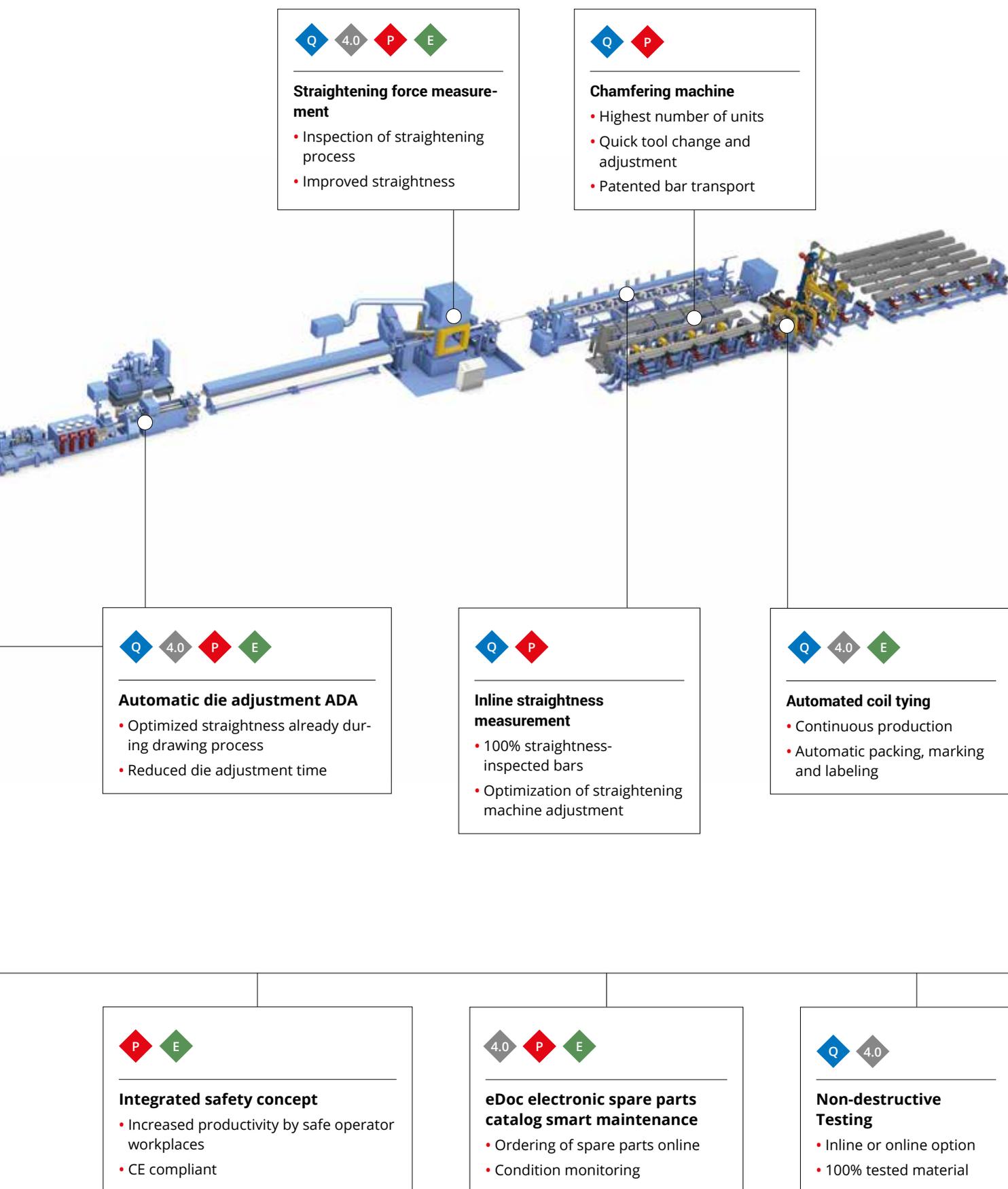
Monitored process

- Guaranteed product quality
- Improved productivity
- Tool for developing new products

Reduced setup time

- Turret-type pipe connection
- Motorized size change
- 20% increased production



The bar length tolerance could be minimized from ± 5 millimeters to ± 1 millimeter. The performance can also be increased by higher availability which can among others be achieved with less wear parts and an automatic lubrication system. Maintenance shutdowns are also significantly reduced since the whole installation is maintenance-friendly and easily accessible.

Jörg Lindbüchl, Design Manager Bright Steel SMS group: “With our tools such as the integrated drawing force measurement it is now possible for the first time to virtually look into the core process. In this way, knowledge can be gained as never before. We therefore integrated a load cell directly at the die.”

Another innovation is ADA (Automated Die Adjustment), for which a patent is pending. With ADA a good material straightness can be reached already during the drawing process. A laser measuring device is therefore installed near the impact shear detecting the alignment of the bar by a laser grill in a highly precise manner. In case of deviations the die is readjusted fully automatically.

Several improvements could also be achieved for the proven two-carriage machines which are familiar to many users. This particularly includes the electrohydraulic drawing jaw control which is adjusted individually or to the respective product depending on the material thus preventing quality defects. Likewise, the new gearbox technology contributes to a constant quality with an intelligent drive concept, permanently monitoring torque, speed, temperature and wear.

“With our tools such as the integrated drawing force measurement it is possible for the first time to virtually look into the core processes so that insights can be gained as never before. We therefore integrated a load cell directly at the die.”

Jörg Lindbüchl, Head of Design Department Bright Steel, SMS group

Improvements all along the line

The new pre-straightener and the straightener following the drawing unit now provide rolls with two profiles and a polygon shaft reducing changeover times. Adjustments take place fully automatically and the modular rolls offer an optimized pitch.

The impact shear consists of a massive block for precise cutting. In the near future, it is planned to manufacture the control head by means of the 3D metal printing method. This absolutely innovative manufacturing process of SMS group results in constructive advantages and attains a considerable weight optimization, whereby increasing the cutting speed. Already now, the shear interacts with surface defect detection. As soon as defects are detected the system defines an optimized cutting strategy increasing the output and minimizing the rejects. This system is also registered for patent approval.

The two-roll straightening and polishing machine is provided with individually designed rolls to reach straightness to 100 percent even with demanding grades. This is supported by straightening force measurement which serves for process monitoring and straightness optimization.

An increase in performance must take place from A to Z: for that reason, the chamfering machines have also been designed for higher output and an extended diameter range. The innovations include the individually configurable screw drive without gearbox, quick-change chamfering heads and integrated chip conveyors. On demand, the chamfering head can be equipped with a milling tool to attain an entirely plane bar tail end.

Handling and transport equipment have also been further enhanced with the goal to secure continuous production. In other words, minor malfunctions or interruptions of individual machines are intelligently compensated or buffered to make sure that the overall process can continue.

Fit for Industrie 4.0

The entire high-performance drawing line is provided with state-of-the-art measuring technology forming the basis for digitalization. This

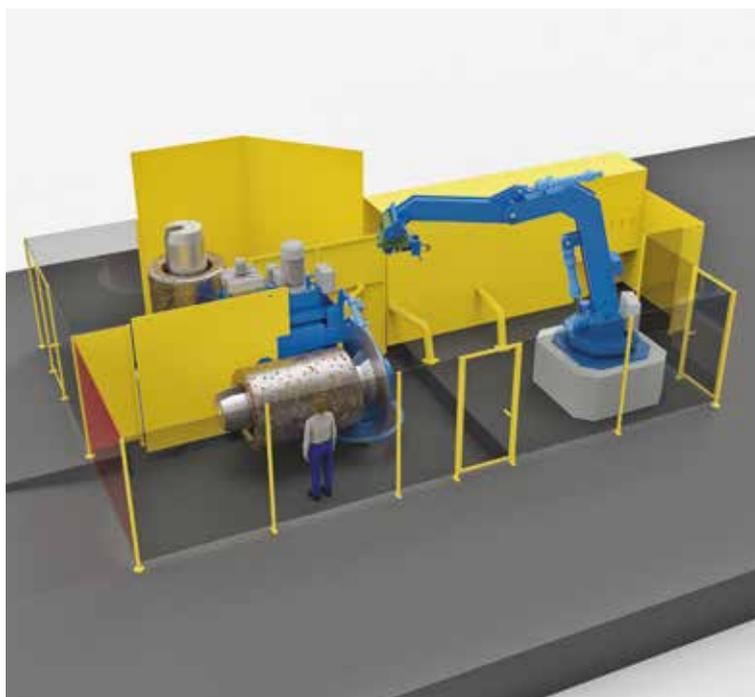
includes force measuring at the die and the straightening machine. Other features include straightness measurements and non-destructive testing. All adjustments are motor-controlled and can be retrieved in a recipe-controlled manner. All data and parameters are saved in a platform and recorded for quality-certified processes or for own reporting. In addition to that, the data serve for early alarm activation and for analysis as well as for automation with reproducible processes and qualities.

With Genius CM®, SMS group provides a smart, digital tool for monitoring and analysis. By means of Genius CM®, all plant results, trends and correlations of the process data are displayed to the plant operator on a web-based and intuitive interface. The “digital laboratory” enables the operator to optimally parameterize the drawing line or individual processes.

Maintenance and service are also prepared for top performance and for the future. In this way, expert assistance can be made use of as quickly as possible via remote control. For identification of spare parts plant operators are supported by eDoc with smart ordering functions, the electronic parts catalog of SMS group. Instead of, as in the past, searching written documentation manually, parts or spare parts can be easily identified and displayed directly on the machines via tablet or smartphone. And the order can be placed directly via the terminal device.

Conclusion

The new high-performance drawing lines of SMS group convince with a large increase in performance, quality and productivity. The operator is optimally protected by an integrated safety concept contributing also to an increase in performance with parallel processes as during uncoiling. The machines are highly automated, adjustments are motorized and reduced changeover times increase the availability. By interacting with the high drawing speed of the caterpillar drawing units, productivity could be increased by up to 20 percent. Energy consumption, tool wear and operating costs could be significantly minimized. Also with



Coil preparation. The new coil preparation with double pay-off reel increases the output and improves the safety because massive components and automatically closing enclosures safeguard the coil and the uncoiling process.

regard to sustainability the new lines are convincing with consideration of the Water Resources Act, oil extraction and noise protection. Thanks to perfectly synchronized interfaces, intelligent individual solutions are combined to an integrated superior system featuring maximum level of automation and safety. ♦



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Further information

<https://www.sms-group.com/plants/all-plants/bright-steel-lines/>

Modular production

CHINA

Xinjiang Amer Qian Golding Cable has ordered a CONTIROD®* copper wire rod plant from SMS group.



A comparable CONTIROD®* casting and rolling plant for copper wire.

Xinjiang Amer Qian Golding Cable Co., Ltd., a subsidiary of Amer Group, has placed an order with SMS group for a CONTIROD®* casting and rolling plant to produce copper wire. In total, the new CONTIROD®* plant of the CR-3500 type has been the fourth plant for the Amer Group over the last decade. The new plant is destined to be installed at the Urumqi location in the Xinjiang Province. The technological know-how of copper specialists from SMS group and the proven plant concept were the decisive factors for the order.

The high-performance wire rod line CR-3500 is designed for the production of up to 35 tons of ETP copper wire per hour corresponding to an annual production output of about 225,000 tons. ETP copper wire (Electrolytic Tough Pitch) serves as starting material for the production of conductors for the electronic and electrical industries. With the new CONTIROD®* plant, Amer Group expands its production capacities to meet the demand in the western Chinese regions consolidating its position as one of the leading Chinese wire rod producers.

Two process step in one operation

The CR-3500 for casting and rolling copper wire in one process is modularly structured and consists of a shaft melting furnace, a holding furnace, a twin-belt caster, a twelve-stage rolling mill with separate individual drives, a deoxidation and cooling section as well as a wire coil station, strapping unit and foil packaging plant.

For the CONTIROD®* CR-3500 SMS group employs state-of-the-art technologies, for example Lambda control on the shaft furnace, frequency-controlled three-phase drives, and a deoxidation and cooling line with separate media circuits. The above features enhance the comprehensive process efficiency while product quality is improved at the same time. Fuel, working material and power consumption can be significantly reduced. As a result, CONTIROD®* is marked with the SMS group ecoplants label.

In addition to the proven Lambda control, an improved charging and distributing system for cathodes and return scrap is employed on the shaft melting furnace. This technology minimizes the consumption of natural gas by efficient heat transfer and increases product quality.

Molten copper is continuously cast in an almost horizontal way via the Hazelett twin-belt caster to a casting ingot with a cross-sectional area of 6,510 square millimeters. A homogeneous casting structure and an even oxygen distribution in the casting ingot are key factors for a high-quality wire rod. A chamfer plane and a spraying unit optimally prepare the casting ingot for the additional rolling process.

Consistent quality

In the rolling line with altogether twelve individually driven mill stands the rectangular casting ingot is rolled down to eight millimeters round wire. Due to a specific force control from the individual mill stands, a top wire quality with fine-grained homogeneous rolling structure can be attained.

In a two-stage deoxidation and cooling section a water-alcohol solution first of all reduces the oxide layer on the wire rod surface. In a second step the wire rod is cooled down with water until a configured target temperature is reached. A laser measuring system controls the final diameter of the finished wire rod.

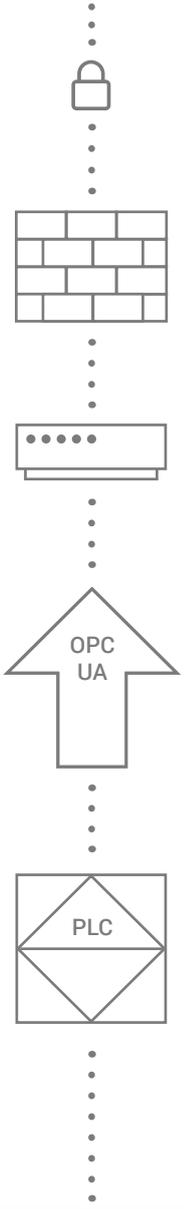
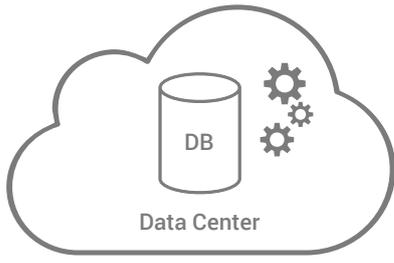
In a wire coil station with automated strapping unit and foil packaging plant the finished copper wire is prepared for further transport. A previously applied wax coating ensures that an oxidation process by ambient air is prevented.

The CONTIROD®* CR-3500 is scheduled to go on stream at the end of the second quarter in 2021. ♦

*CONTIROD® is a registered trademark of Aurubis Belgium.



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Data linked easily

WORLDWIDE

SMS-Metrics offers customer-specific solutions for clear data preparation.

Linking machine data with process know-how is a significant added value for users. For various SMS plants such as extrusion presses, eccentric presses and Contirod®* wire rod mills such link already exists. This means, that users are not only provided with a tool for recording measured values but also have access to process know-how and dashboards displaying machine-specific correlations. Since state-of-the-art SMS plants are equipped with a variety of high-quality sensors an enormous potential is available through digitalization.

SMS-Metrics can be integrated in local or cloud infrastructures. Here, open standards such as OPC-UA (Open Platform Communications – Unified Architecture) are thoroughly applied. Due to neutrality and flexibility, it can be ensured that data are available in the long term. Here, data

security is entirely of particular importance. Accepted data transfer encoding mechanisms are applied. The customer has transparent access to his data at any time and decides who gets access.

Seamless integration

SMS-Metrics is a component of digitalization which can be seamlessly integrated into other products. Consequently, customer-specific tools may benefit from this high-grade data processing. The tool scales from individual machines up to a complete plant. The digitalization products of SMS group offer a special highlight since manufacturer specific knowledge is included in data processing. This solution combines expert knowledge in many SMS fields such as technology, engineering and software development.





Here you can find further information on SMS-Metrics.

System introduction can be realized easily and signals can be quickly integrated into a cloud variant. Additional hardware is not necessary since all new SMS group plants have already been prepared for SMS-Metrics. At any time, the system can be flexibly extended or upgraded.

SMS-Metrics is particularly interesting for technologists, production planners, plant managers, maintenance experts and machine operators. Individual dashboards can be configured for each user group. ♦

SMS-Metrics is an innovative and efficient tool for recording, saving and evaluating machine data in real time. Based on modern software, it is possible to achieve an all-time flexibility and process transparency. SMS-Metrics supports the customer in expanding his process know-how. In the browser, evaluations can be easily prepared, dynamically adapted and retrieved worldwide.

*CONTIROD® is a registered trademark of Aurubis Belgium



Here, the conversion of a cathode shaft furnace is presented in a video.



SHORT ASSEMBLY TIMES

The first segment of the new cathode shaft furnace is positioned in the existing building at Deutsche Gießdraht.



COOPERATION

To be able to meet the limited timeframe all persons involved are cooperating closely and in partnership.

Safeguarding the future

GERMANY

A modernization measure secured an essential part for further development and future viability of Deutsche Giessdraht GmbH in Emmerich.

Deutsche Giessdraht GmbH, a company of Aurubis Group Deutschland, was faced with the tasks to not only keep its more than 40-year-old plant competitive but also comply with higher environmental, safety and emission requirements.

A great challenge of the project was a limited timeframe since only a summer shutdown period of maximum three weeks is available every year to make sure that customers are otherwise continuously supplied. In a close contact, an unconventional concept was created considering customer-specific requests. The complete conversion work was divided into two construction stages to make it possible that re-vamping was carried out within scheduled stoppages. Only through close and cooperative partnership of all persons involved the implementation could be realized within the specified time interval on time and completely.

In the first phase of construction in 2018, control and safety equipment was modernized and preparations were made for the foundation of the new furnace.

Simplified control

The modern control system is a significant simplification for operators providing at the same time a transparent data display. Based on the experiences gained during the application of the new control other optimization and customer requests were expressed which were then also implemented during the second construction phase. In

addition to that, the burner supply was optimized and renewed. Through the new uniform design of the burner configuration a high flexibility is reached when burners are replaced.

For the second construction phase extraordinary ideas were translated which could only be realized with excellent cooperation of all persons involved. To reduce the assembly time the bottom furnace segment was already relined locally before it was taken into the building and only then it was installed. Usually, the furnace is first completely mounted and then relined, i.e. the necessary drying time would have prolonged the necessary timeframe significantly.

During the scheduled summer standstill period in 2019 only three weeks passed between complete cold blowing of the cathode shaft furnace up to furnace reheating. After just four weeks the first 1,000 tons of dg-RheinRod™ were produced. The salable copper wire thus met the ambitious requirements of Deutsche Giessdraht GmbH and its numerous customers. ♦

 **Günter Gesche**
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“It was a so-called brownfield project, which means the new plant had to fit into the existing environment. This requirement has been perfectly met by the engineers of SMS group.”

Dr.-Ing. Ansgar Wilbrand, Production Manager
Deutsche Giessdraht GmbH



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. ♦



Contact

performance@sms-group.com

New integrated mechatronic solution



All plants

Torque drive – Highly efficient, compact, mechatronic solution

Performance Checkbox



Challenges

- Maximum process-oriented drive performance with low maintenance

Solution

- Torque drive components integrated in the mechanical application

Technical advantages

- No gear
- No gear lubrication
- Lower weight
- Fewer wear parts
- Easier assembly
- Fewer spare parts

Efficiency

- Machine efficiency level of 98%
- Low noise level

Productivity

- Low maintenance
- No wear parts

Quality

- Very high control performance



All plants

X-Pact® Vision Operation and Visualization – Innovative HMI and new control station

Performance Checkbox



Challenges

- Complex process interactions
- Quick reactions
- Minimized potential for operating error

Solution

- Clear view to the process, intuitive navigation
- Individual adaptability, operator guidance
- Focus on ergonomics & operating personnel

Technical advantages

- Central access to information
- Ideally prepared for modernizations
- Higher efficiency due to intuitive and ergonomic design
- Fast overview of the performance capacity

Efficiency

- Higher efficiency due to intuitive and ergonomic design

Industrie 4.0

- Secure and time-saving overview and evaluation of the production process results
- Data access via mobile devices



All plants

X-Pact® Process Guidance – New standard for the future automatic control of complex plants

Performance Checkbox



Challenges

- Process-oriented operation guidance

Solution

- Uniform interface in a process-oriented manner
- Communication via data cloud and database accesses
- Avoiding redundancies in the automation levels
- Process optimization system can be incorporated
- Component-oriented system extendable by adding further modules and applications

Technical advantages

- High transparency and scalability of the system
- X-Pact® Process Guidance is rendered future-proof thanks to the uniform system platform and universal interfaces

Efficiency

- Process-oriented, ergonomic and simple operation

Industrie 4.0

- Systematical cross-linking of knowledge and data
- Future-proof progress due to cloud computing and Industrie 4.0

China

In the world's largest steel market, SMS group has established with prospects for growth.





**PLUG &
WORK TEST**

The Plug & Work test includes digital commissioning of the customer plants. New automation systems are completely installed, tested and pre-optimized, long before erection work on site is going to start.

Partner in China with a long tradition

INTERVIEW

Due to its long-lived concepts and know-how in the field of digitalization, SMS group scores in the Chinese steel industry.



NORBERT THEELEN,
CEO, SMS GROUP CHINA

Mr. Theelen, why should Chinese steel-makers execute their projects with SMS group?

SMS group pledges to be the “Leading Partner in the World of Metals” with quality and innovation in its DNA. With over 140 years of history and covering the entire value chain of the global steel industry, we team up with the customers and help them get closer to their objective of staying ahead of the market competition.

SMS group’s roots in China can be traced back to more than a century ago, when in 1904 SMS provided a rolling mill for Hanyang Iron Plant. In the late 20th century, tapping in China’s reform and opening-up, SMS group had been actively taking part in establishing China’s most renowned steelmakers with its cutting-edge hardware and up-to-date technologies.

Agile and flexible, we develop marginal solutions tailored to the needs of our customers, and we help them modernize their plants to ensure greater efficiency, lower upgrading costs, increased productivity and better product quality.

Our full range of life-cycle services, including consultant and technical assistance, will help customers boost their plant availability. Moreover, we have been paying attention to the topic of digitalization for many years. We offer the plant operator practical solutions for his production processes with a view to Industrie 4.0, which is also called 5G by our Chinese customers as the complete infrastructure for collecting data is wirelessly implemented today through the 5G network that has been put on stream in China last year.

What are the challenges in the Chinese market and how does SMS group master them?

China is the largest steel market in the world. Since surpassing an annual crude steel output of 100 million tons in 1996, China has globally topped the category for 22 consecutive years. By the end of 2019, this figure reached 990 million.

The rapid development of the steel industry referred to growth in capacity. To-



SMS group employees
in front of the Shanghai
workshop.

day, the plants are geared to produce quality, with 200 million tons of steel capacity being shifted from densely populated urban zones facing high environmental impact to developing regions or coastal areas. The new plants will be high-tech plants with top-quality equipment and best efficiency up to self-learning metallurgical plant and rolling mill complexes. The relocation has turned into a race towards the best-possible technologies and to lower OPEX costs combined with reduced CAPEX and excellent environmental compatibility. And this is exactly where we come in – with our cutting-edge products, local expertise and an extended range of services.

One of SMS group's leading strengths in the digital era is enabling a plant to self-learn. In China, we will promote such projects, exemplified by the learning steel mill which we erected at our U.S. custom-

“We cooperate with our customers very closely and support them in staying ahead of their competitors.”

Norbert Theelen, CEO SMS group China

er Big River Steel. The smart steel mill continually optimizes the production process from the raw material all the way down to the finished product, supported by the use of process know-how and expertise as well as physical and data-controlled models.

How will SMS group develop on the Chinese market in the next few years?

SMS group China sticks to the “In China, for China and the world” principle, having set up offices in Beijing, Shanghai and Wuhan, as well as highly sophisticated workshops in Shanghai and Tianjin.

Benefitting from increased mobility and connectivity - based on the expansion of the high-speed train network – SMS group China is able to rapidly respond to customer needs, with speed being the crucial factor for getting ahead of competitors. Also, SMS group China will continue to advance digitalization.

We are striving to take part in miscellaneous relocation and modernization projects, to handle the business locally and to manufacture our own products in order to finally provide the plants with spare parts and services in China for China. In the long run, plants will become more and more modern, however, effectiveness can be increased and the environmental impact be reduced already now by using performance modules. We have been talking to a couple of customers on the option of a long-term CO₂-free steel production process. ♦



1



2

- 1 SMS group China follows the motto “In China, for China and the world”.
- 2 Top-quality production for the customer.
- 3 Norbert Theelen talking with Jack Lu, General Manager Shanghai Workshop of SMS group (left).
- 4 The Chinese workshops of SMS group manufacture equipment for new plants and modernization projects.



3



4

Excellent!

INDIA

SMS group's Indian manufacturing facility at Bhubaneswar, SMS India Pvt. Ltd., which ranks among the most advanced heavy machinery workshops in the world, has received the Manufacturing Excellence Award 2019 from German Engineering Federation VDMA.

The 8th VDMA Mechanical Engineering Summit, held on September 6, 2019 in Bangalore, India, saw the presentation of the Manufacturing Excellence Award for Working Conditions and Work Safety in the small and medium industries category to SMS group's manufacturing workshop in Bhubaneswar, India. In a wide range of aspects – such as health and safety of employees, staff facilities, plant administration, environment, and contributions in support of the welfare of neighboring communities – the workshop was recognized as the best in class of German manufacturing companies in India.

Operating with an integrated quality management system to ISO 9001 and 140001 (in the revised version of 2015) and ISO 45001-2018 (in the revised OSHAS version: 18001-

Exterior view of the workshop at Bhubaneswar.



2007), the workshop produces high-grade equipment components to global quality and delivery reliability standards.

With over 700 skilled workers, the workshop – in addition to the manufacturing of components – also performs extensive repair and refurbishment services for its customers, promoting the “Make in India” initiative established by the Indian government.

Clear focus on customer satisfaction

Commenting on the future vision of the workshop, Ulrich Greiner, CEO of SMS India Pvt. Ltd., explained: “To me the most important thing about our workshop’s positioning is the fact that we are the leading supplier in terms of manufacturing quality and customer satisfaction in the Indian manufacturing sector. This is the only viable basis for us to expand our customer base in the primary industries sector, in which we fulfill the extremely exacting requirements of OEMs and provide highly value-adding services. This is a key focal area for us because, while the steel sector in India is currently in a cyclical downturn, other industries require products and services of the kind we can supply.”

The VDMA award honors the company’s excellent order processing performance, which has been rated by numerous SMS group customers as outstanding. In particular, the company’s high dependability, straightforward communication channels, and excellent welding skills are definitely far beyond standard. Also in manufacturing processes involving copper or stainless steel, for example, or in build-up welding of wear-resistant special alloys including subsequent machining, the manufacturing workshop fulfills the most exacting customer requirements.

The workshop’s commitment to the continuous enhancement of its operational excellence has proved to pay off in the form of excellent working conditions and highest occupational safety standards.

“Thank you for the excellent briefing and the highly interesting tour of the plant. I wish SMS every success as they continue on this impressive path here in Bhubaneswar.”

Dr. Martin Ney, German Ambassador to India



Left to right: Rajesh Nath, Managing Director, VDMA India; Rahul Oza, Partner, Head of Mumbai, Pune office; Roedel & Partner Consulting Pvt. Ltd.; Rakesh Adlakha, Vice President and Plant Head Bhubaneswar – Manufacturing, SMS India; Ulrich Ackermann, Managing Director, Foreign Trade Division, VDMA Frankfurt, Germany.

Workshop safety initiatives

For SMS group, the health and safety of its employees – throughout the world – has always been a key concern. Therefore, the Bhubaneswar workshop has set up an EHS (Environment, Health and Safety) team which organizes regular safety courses and other specialized training sessions to promote the workforce’s awareness and knowledge of safety regulations.

Safety committee meetings, with participation of the plant management, are held on a monthly basis to discuss safety issues observed and decide on appropriate remedial action. Additionally, a system has been established which ensures that all incidents at the facilities are reported and logged on a daily basis. A safety manual, a safety awareness campaign, and an “on-site emergency plan” have been put in place to ensure general safety of the workers. The prize received for the – on global standards – best Working Conditions and Work Safety testifies to the efficiency of all these measures. As well as the safety award, the workshop also scooped the “Surakshit Sramik Bandhu” (Safe and Dedicated Employees) award for its workers from the government and associated agencies of the state of Odisha. ♦

 **Rakesh Adlakha**
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New blast furnace boosts hot metal capacity



RUSSIA

NLMK's new No. 6 blast furnace was blown in in October 2019. With technology and know-how from Paul Wurth, NLMK has been able to increase its hot metal capacity.



As part of the contract, NLMK receives process support for the operation of the blast furnace from Paul Wurth.

Within the frame of NLMK Group's Strategy 2022, No. 6 blast furnace at NLMK's main site in Lipetsk, Russia, was completely rebuilt during a furnace outage from May until October 2019. Blow-in of the new blast furnace No. 6, designed and equipped by Paul Wurth, took place on October 31st.

NLMK's order awarded to Paul Wurth included engineering, supply of equipment and site supervision related to the complete rebuild of BF6's central unit, i.e. the blast furnace proper and directly attached systems and equipment.

Close cooperation

Under this contract, Paul Wurth first had to adapt the earlier delivered basic engineering to the final technical solutions chosen together with the customer. Further, the company was in charge of the overall engineering which has been executed in close collaboration with local engineering specialist NLMK Engineering.

Paul Wurth's scope of supply comprised the blast furnace shell, hearth lining with super-microporous carbon material and the ceramic cup, all other refractories, all cooling elements (copper and cast iron staves, copper cooling boxes, tuyeres and tuyere coolers), low-energy tuyere stocks and a completely new bustle pipe. The original Bell Less Top®, Paul Wurth's first ever reference in the former Soviet Union and in operation since 1978, has been replaced completely by a new, state-of-the-art parallel-hopper type system (60 m³ hopper volume) including the pressure equalizing and bleeder valves. Furthermore, Paul Wurth supplied the cooling water pump house with the complete instrumentation, and general electrical and control equipment. The process control for the new furnace will now be supported by TMT's stockline recorders, SOMA® acoustic top gas temperature measurement and 3DTopScan®

3.4

million tons of hot metal
is the new blast furnace's
annual capacity.

burden profile mapping system. Dedicated mathematical models of Paul Wurth's BFXpert® level-2 automation package complement the new process automation system. For the casthouse, four sets of TMT's fully hydraulic clay guns, taphole drills and radar level probes for torpedo ladles have been part of the order.

Efficient preparation of the rebuilding project

The previous No. 6 blast furnace was taken out of operation in May 2019. A dedicated team of Paul Wurth experts supported the customer and other contractors during the pre-shutdown activities, and supervised erection and commissioning of the new plant units.

NLMK's new BF6, with a hearth diameter of 12 meters, an inner volume of 3,818 cubic meters, 32 tuyeres and 4 tapholes, is designed for a nominal production of 3.4 million tons of hot metal per year. As part of the contract the customer also purchased the process technology for operating the furnace from Paul Wurth. ♦

 **Further information**
www.paulwurth.com



January 2020,
work in progress:
modernization
of BF2 hot blast
stoves plant at
Novokuznetsk.

Replacement during running production

RUSSIA

EVRAZ ZSMK and Paul Wurth upgrade hot blast stoves of No. 2 blast furnace.

Back in 2014, Paul Wurth won a tender for engineering a complete new hot blast generation plant in preparation of the project. Already at that time, Paul Wurth's experience and technology convinced the customer and were perceived to be superior to other competitors. In particular, ZSMK's experts decided in favor of hot blast stoves with internal combustion and ceramic burner of Paul Wurth design and the 3-stoves operation concept as the most appropriate engineered solution for an existing plant in operation. After execution of the full engineering package (basic and detailed engineering including a local portion for conversion into Russian norms and regulations), EVRAZ ZSMK expressed great satisfaction with Paul Wurth's performance.

In 2017, Paul Wurth won the tender bid for the supply of technological key components like ceramic burners, checker support systems, ignition burners, stainless steel and fabric

compensators, insulation bricks, shaped brick rings, material against stress corrosion cracking as well as silica bricks for the stove domes. The concept foresees that the new hot blast stoves will be built and commissioned one by one while the blast furnace remains in operation during the entire transition period.

First hot blast stove already in operation

After the material and equipment supply, Paul Wurth's started to be present on site in June 2018 for supervising the works on hot blast stove No. 7. In May 2019, the new stove was ready for heating up; it was taken on blast on June 20th. The next hot blast stove to be replaced is No. 6: the former installation has already been demolished and the new stove is scheduled for commissioning in July 2020. This will be followed by stove No. 5 as the final phase of the overall project and scheduled to be completed by May 2021.

With a hearth diameter of 9.75 meters and inner volume of 2,000 cubic meters, No. 2 blast furnace is the smallest of three ironmaking units at ZSMK. All three furnaces are already equipped with Paul Wurth's PCI technology, which have provided for significant hot metal production cost savings since its start-up in 2014. The combined capacity of the Novokuznetsk ironmaking plant is 18,700 tons of hot metal per day. ♦



Further information
www.paulwurth.com

New hearth after furnace campaign of more than 20 years

CZECH REPUBLIC

Třinecké Železárny banks on Paul Wurth expertise and technology for optimum furnace campaign strategies and maximized service life.

Třinecké Železárny, a.s., an integrated steel works located in the very North-East of the Czech Republic in the town of Třinec, produces added value products such as rails, sections, steel wire and bar, seamless tubes as well as special steel for tools and springs. The whole production bases on an ironmaking plant consisting of two blast furnaces of nearly equal design, with a joint capacity of slightly above 2 million tons of hot metal per year.



Workshop assembly for checking the carbon block lining for the hearth.

In late spring 2019, Třinecké Železárny awarded a contract to the Paul Wurth group for the complete reline of the hearth and bottom of No. 6 blast furnace. The project includes basic and detail engineering for the new hearth and the supply of all refractory materials.

Construction site management included

On top of the refractory engineering and deliveries, Paul Wurth will be responsible for all site activities such as salamander tapping, removal of residual hot solid material, demolition of the old hearth, assembly of the new hearth as well as the corresponding site management and supervision of installation.

Already during the tender phase, Paul Wurth had advised Třinecké Železárny over an extended period on possible campaign extension measures and reline techniques. This included the assessment of the status of No. 6 BF's hearth by application of multipoint thermocouple sensor probes (MTP probes) installed in two steps in 2017 and 2018.

The upcoming reline of the hearth of BF6 is the result of trustful consultation and partnership between Paul Wurth and the customer in choosing the appropriate reline strategy for this ironmaking plant. The currently installed hearth of this furnace had been designed by engineers of DIDIER/DME – today known as Paul Wurth Deutschland GmbH in Wiesbaden. This hearth has been in operation for more than 20 years by now and will have reached a campaign of 22 years when the reline starts in 2021. ♦

2 million
tons of hot metal capacity
per year.

 Further information
www.paulwurth.com

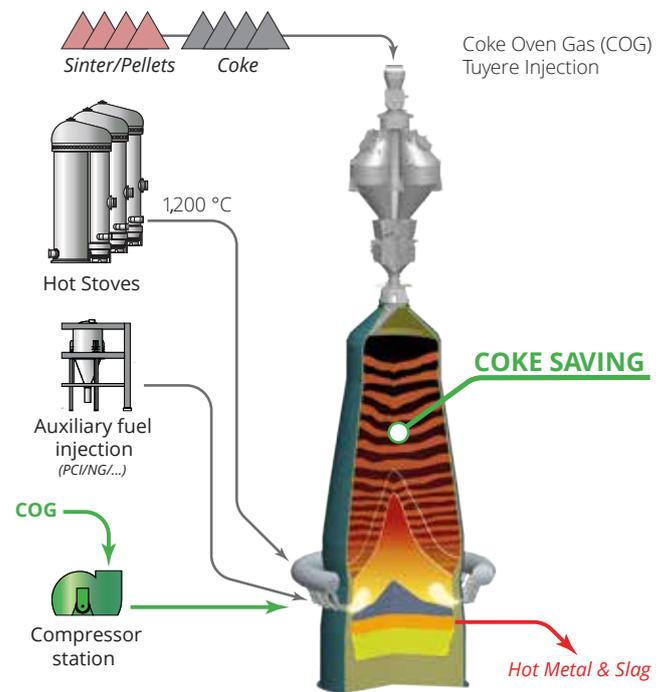
Reduction of carbon footprint

GERMANY

Paul Wurth supplies new injection technology for coke oven gas to be employed at ROGESA blast furnaces.



Facilities of
blast furnace
No. 5 at
ROGESA,
Dillingen/Saar.



ROGESA Roheisengesellschaft Saar mbH (ROGESA), a joint subsidiary of AG der Dillinger Hüttenwerke (Dillinger) and Saarstahl AG, has awarded Paul Wurth the order to design and supply coke oven gas injection systems for the company's blast furnaces No. 4 and No. 5 located in Dillingen/Saar, Germany.

With this new technology, coke oven gas becomes a metallurgical process gas instead of being used for producing energy at a low efficiency level. In its new role, coke oven gas will partially replace both pulverized coal and metallurgical coke as reducing agents in the blast furnace process, thus contributing to reducing the carbon intensity in the blast furnace as well as the carbon footprint of the overall ironmaking operations. ROGESA, Dillinger and Saarstahl consider the application of this technology as a bold step toward hydrogen based ironmaking of the future.

Perfect project preparation

In preparation of the project, Paul Wurth accompanied the customer during research work and pilot plant trials. Now, the order is being executed on a turnkey basis and includes design and engineering for the two coke oven gas injection sub-plants, supply of technological key items such as flow control and check valves, supply and erection of

vessels, piping and supporting structure, automation of the plants and integration into the existing process technology and plant configuration.

As per the project schedule, coke oven gas injection is to start in summer 2020 at half the number of the hot blast tuyeres of No. 5 blast furnace. The aim is to operate permanent injection at all the tuyeres of the two furnaces by the end of 2020. ◆

 Peter Kinzel
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Within Paul Wurth's strategy towards carbon neutral primary metallurgy, coke oven gas injection at the tuyere level is a part of the company's portfolio of readily available solutions for the stepwise reduction of CO₂ emissions in existing integrated steel plants.

Individual oven pressure control for optimum emission control efficiency

CHINA

Another Chinese cokemaker trusts in plant engineering expertise and cokemaking technology from Paul Wurth.

After Shandong Iron & Steel Group Rizhao, a second Chinese coke maker has decided in favor of Paul Wurth technology.

In late September 2019, Paul Wurth was awarded orders for the supply and engineering of SOPRECO® Single Oven Pressure Control Systems for two top charging coke oven batteries which will be part of the new coke making plant of Xiangtan Iron & Steel in Xiangtan, Hunan province, in Central China. Each battery counts 50 coke ovens with a height of 7.3 meters and will be equipped with SOPRECO® technology, Paul Wurth's proven state-of-the-art solution for individual oven pressure control and coke oven battery emission control.

Technology attracts the interest of coke producers

This is the second cokemaking technology project for Paul Wurth in China. The order comes from Shandong Province Metallurgical Engineering Co. Ltd (SDM), with whom Paul Wurth had concluded a cooperation agreement as early as in 2013. Based on this cooperation, top charging batteries of Jumbo type were commissioned at Shandong Iron & Steel Group Rizhao in 2017 and 2018. The success of the Rizhao project, which saw the first introduction of Paul Wurth's cokemaking technology in China, generated much interest amongst Chinese coke makers and has played a decisive role for the award of the new project.

First coke is foreseen to be produced at Xiangtan's coke oven battery No. 1 at the end of 2020. ♦



Further information
www.paulwurth.com





Jumbo type coke batteries of Paul Wurth design are already in operation at Rizhao.

Casting of steel in special sizes

U.S.A.

Nucor Corporation awards SMS group order to supply one of the world's largest continuous casters.

"SMS group and Nucor make a good team, and the caster will be essential to the success of our new plate mill facility."

Johnny Jacobs, Vice President and General Manager of Nucor Brandenburg



From right to left: Leon Topalian, Nucor President & COO; John Ferriola, Nucor Chairman and CEO; Burkhard Dahmen, SMS group GmbH President & CEO; Keith Watson, SMS group Inc. Vice President.

Nucor Corporation has selected SMS group for the supply of a single-strand caster for ultra-wide and thick slabs. Designed for an annual capacity of 1.45 million tons (1.6 million short tons), it will be a core element of the production chain of the Nucor's new plate mill facility in Brandenburg, Kentucky, U.S.A. The new casting machine will be one of the largest casters worldwide.

The caster will produce slabs of 8 to 12 inches (200 to 305 millimeters) thickness and up to 124 inches (3,150 millimeters) width. Slab lengths vary from 104 to 600 inches (2,642 to 15,240 millimeters).

A casting machine with special technological features

To meet Nucor's challenging project objectives, several special technological features will be incorporated into the new vertical bending caster. These include robotic applications on the casting platform, and the HD mold^{FO} technology with fiber optics and electromagnetic stirring. In addition, a quenching unit and a secondary cutting line will be incorporated.

Various X-Pact[®] technological packages like Process Guidance, Solid Control, Tech Assist with Liquid Core Reduction and Dynamic Soft Reduction[®], integrated in the SMS Electric & Automation system will support the caster performance. An integration test with virtual 3D production and active participation by Nucor personnel will take place in the SMS test field. ◆



Keith Watson
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A thin-slab caster of comparable design in operation.

THE CUSTOMER

North Star BlueScope is owned by BlueScope, a leading international supplier of steel products and building solutions found in the global building and construction industry based in Melbourne, Australia. North Star BlueScope has relied on SMS group's cutting edge innovations and know-how for many years. This order marks the next step in a successful cooperation between both companies.

Convincing integrated supply package

U.S.A.

North Star BlueScope Steel selects SMS group for supply of new single-strand continuous caster.

North Star BlueScope Steel, located in Delta, Ohio, U.S.A., has selected SMS group as the supplier for its new single-strand thin-slab continuous caster. The new casting machine will have a thickness range of 95 to 110 millimeters and a width range of 900 to 1,595 millimeters. It will allow North Star BlueScope Steel to increase thin-slab production from 2.2 million metric tons (2.4 million short tons) to over 3.3 million metric tons (3.6 million short tons) per year.

North Star BlueScope selected SMS group as the supplier for the new casting machine,

last but not least, due to the good experience and successful cooperation with SMS group during a maintenance and optimization project on a casting machine built by another manufacturer. Another reason for placing the order with SMS group was the convincing, cost-efficient design proposed, which provides for components usable on both casting machines.

Innovative technology packages

The scope of supply includes the complete cast floor equipment, including the ladle turret, the mold and the vertical-bending containment zone, and a pendulum shear to cut the strand into slabs.

The new casting machine will be equipped with X-Pact® Width Control, X-Pact® Solid Control that includes width-dependent air-mist secondary cooling and solidification control, Level 2 X-Pact® Cast Optimizer and the HD mold^{TC} mold monitoring system. ♦



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Advanced solution for high-grade wire rod

SPAIN

Global Steel Wire S.A. awards SMS Concast with modernization order for a six-strand billet caster.

Global Steel Wire S.A. (Celsa Group), located in Santander, Spain, has placed the order for the upgrade of their continuous billet casting machine with SMS Concast, a company of SMS group. Steel production at Global Steel Wire S.A. (GSW) is focused on wire rod in special steel grades for the automotive and special engineering industries. Currently, the existing caster produces roughly 900,000 tons of steel per year in

180 millimeter square sections. The aim of the modernization is to increase the production flexibility by broadening the range of cast formats by the addition of 200 to 240 millimeter square sections, increasing the casting speeds, and consequently enhancing the productivity and the quality of the cast products.

The upgrade is to be implemented with minimized interruption of production. The start-up of the upgraded machine is scheduled for early 2021.

30 percent less energy consumption

The order includes the installation of CONDRIVE mold oscillation drive systems on all strands. CONDRIVE has already been tested and has been successfully running on one strand at Global Steel Wire since October 2018. Also the powerful electromagnetic mold stirrers, CONSTIR-MEMS are part of the supply in order to achieve the required quality standards. As an additional feature of the stirring system, CONSTIR-MWS (Modulated Wave Stirring) will allow the energy consumption of the stirrers to be reduced by up to 30 percent. ◆



Roberto Marcuzzi
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Industrie 4.0 solution:
SMS Concast to install CONSAFE technology for thermal mold monitoring.

Billets produced on an SMS Concast caster.

The world's widest slabs

CHINA

SMS group supplies continuous caster with Industrie 4.0 technology for high-quality steel grades.



Shandong Iron & Steel Group Co., Ltd., Rizhao, China, has awarded SMS group the final acceptance certificate, following the successful commissioning of its new continuous caster for ultrawide slabs.

The single-strand caster is designed for an annual production of 1.5 million tons of steel slabs with widths of up to 3,250 millimeters and a thickness of 150 millimeters. This means the casting machine is able to cast the widest slabs in the world. It processes structural steels, and micro and low-alloy steel grades. Peritectic grades make up more than 45 percent of the overall production output. The slabs are hot charged to the Steckel mill which rolls them down to sheet and hot strip.

Shandong Iron & Steel also ordered latest quality-enhancing digitalization solutions for the casting machine. The digital HD LASr (High Definition Laser Aligning System remote) alignment assistant, developed by SMS group, guarantees that the molds and segments are perfectly aligned. HD LASr (mold) and HD LASr (segment) systems constitute an intuitive operating concept for high-precision measurement and the optimal setup of the molds and segments in the workshop, using a 3D system – an important prerequisite for high slab quality.

SMS group uses HD mold^{TC} (TC = thermocouples) technology in this caster. Additionally, the narrow sides are equipped with HD mold^{FO} (FO = fiber optic sensors), Breakout Prevention Assist and Mold Temperature Assist systems.

Digital assistance systems improve quality

The Breakout Prevention Assist system reliably prevents breakouts resulting from stickers in the mold, ensuring high availability and the effective protection of the machine against damage.

Mold Temperature Assist provides information in 2D or 3D about the distribution of the heat discharge, alignment of the submerged entry nozzle, stirring effect, and the contact between the strand shell and the copper plates.

In addition, the mold features HD mold^{FO} copper plates which are equipped with fiber optics for signal transmission. More than 500 measuring points are arranged over the complete mold surface, from the top to the bottom end of the mold. Only with HD mold^{FO} can the local strand shell thickness and the thicknesses of the liquid and solid flux layers be directly visualized. This pro-

vides more in-depth understanding of the solidification process.

Additionally, the plant is equipped with Industrie 4.0 technologies developed by SMS group for smart plant data processing and process automation. Based on the steel grades to be processed, the X-Pact[®] Tech Assist system automatically selects the optimal technological parameter settings for the metallurgical process.

Convenient plant control

X-Pact[®] Process Guidance provides automatically – whenever needed – all relevant process information, prompts and HMI screens. All plant control and maintenance functions can be conveniently executed from the operator's station.

X-Pact[®] Business Intelligence combines the data from different systems, enabling interaction with dynamic applications and dashboards.

“Our very good collaboration with SMS group was characterized by mutual trust and highly effective results. With our new casting machine, we have successfully taken another step towards Industrie 4.0, something we are really proud of,” says Zheng Qiang, Marketing Department, Shandong Steel Group Rizhao Co., Ltd.

The continuous caster comes with a wide range of technologies that ensure very good internal quality of the slabs: the hydraulic-powered resonance oscillator, for example, and X-Pact[®] Width Control, an online width adjustment system that sets the mold narrow sides during casting. Other features are the width-dependent air-mist secondary cooling system and the technological process model X-Pact[®] Solid Control (formerly DSC[®]).

SMS group supplied all the X-Pact[®] electrical and automation systems for the continuous caster, the technological control systems (level 1) and the technological process models (level 2).

SMS group's scope of supply additionally included the training of the customer's personnel, supervision of local manufacturing, installation and/or supervision of installation activities, and technical assistance during commissioning. ♦

1.5

million tons of steel slabs in widths of up to 3,250 millimeters and 150 millimeters thickness is the annual capacity of the new casting machine of Shandong Iron & Steel Group, Rizhao.

Target values exceeded shortly after commissioning

U.S.A.

New torque retainer from SMS group increases operational reliability of AOD converter at NAS.

For North American Stainless (NAS) in Ghent, Kentucky, SMS group has successfully commissioned a torque retainer for the 160-ton AOD converter No. 1. The customer issued the final acceptance certificate shortly thereafter. The aim of the revamp – which was to reduce the torque that had previously been causing uncontrolled vibrations and damage to the bull gear, bearings, and foundations of the converter drive during AOD converter operation – was fully achieved in every respect.

The uncontrolled vibrations in the gear unit and converter vessel were substantially reduced, and the target values could even be exceeded under production conditions shortly after commissioning.

SMS group supplied the torque retainer as a compact electrohydraulic unit. The scope of supply also included the engineering, supervision of the erection and installation work, and technical assistance during commissioning. Both, the cold and hot commissioning were completed jointly with the customer, and the latter was performed while production was ongoing. For this, NAS put SMS group's proven

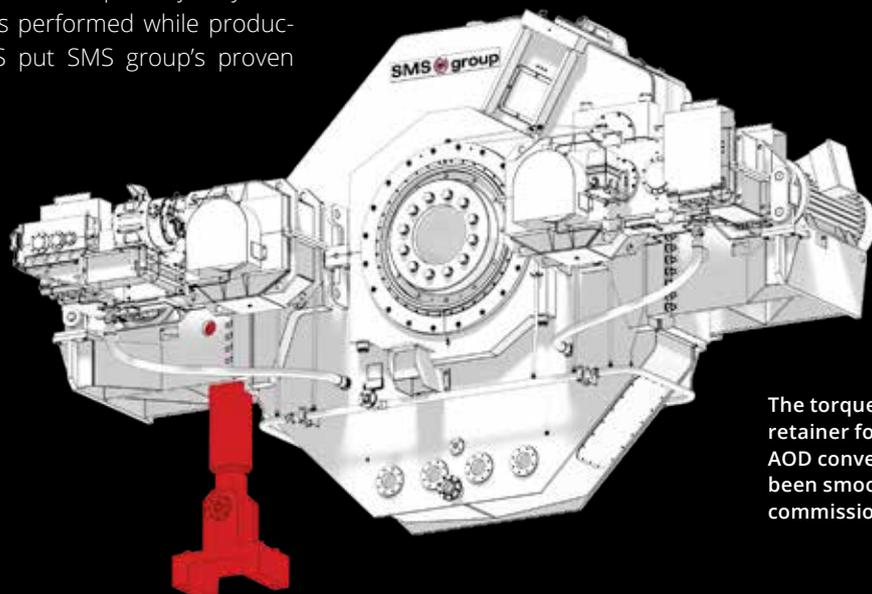
installation concept into action. Thanks to effective joint planning, it was possible to bring forward the plant shut-down date.

Improved operational reliability

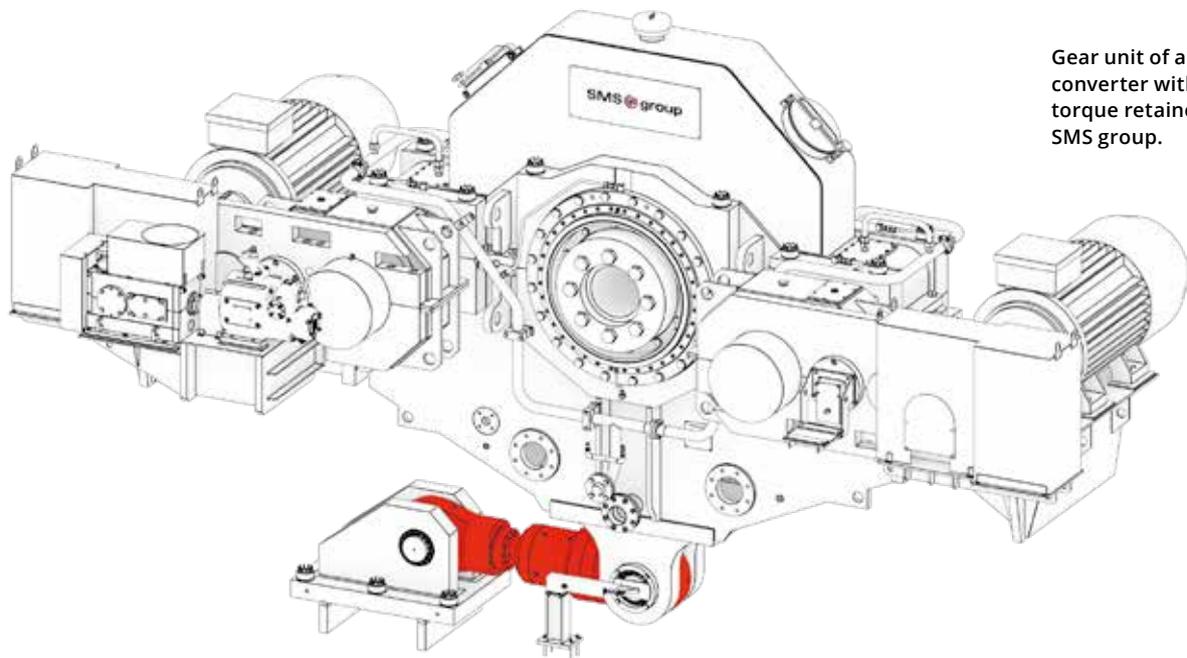
NAS is very satisfied with the results. The availability and operational reliability of the AOD converter have been significantly improved. Gear unit maintenance will also be drastically reduced. This revamp means NAS is able to utilize larger tuyeres and thus increase the blowing rate. Duncan Bassett, Head of Mechanical Maintenance at NAS: "What impresses us is just how quiet the AOD converter and its entire surroundings are. The integration of the torque retainer in the existing converter went without a hitch, and the electrical and automation systems were adapted especially for us. From a technical and economic perspective, this torque retainer from SMS group is just the right solution." ♦



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The torque retainer for an AOD converter has been smoothly commissioned.



Gear unit of an AOD converter with vertical torque retainer from SMS group.

Destructive forces substantially minimized

SPAIN

Acerinox Europe banks on torque retainer from SMS group.

For Acerinox Europe S.A.U., Los Barrios (Cádiz), Spain, SMS group has successfully commissioned a torque retainer for the 120-ton AOD converter No. 2. The customer issued the FAC shortly thereafter.

The aim of the revamp, which was to minimize the destructive forces on the gear unit, bearings, and foundation when operating the AOD converter, was fully achieved in every respect. In addition, the use of the new electrohydraulic torque retainer has significantly reduced uncontrolled vibrations in the gear unit and the converter vessel. The target values in terms of reducing torque were achieved under production conditions shortly after commissioning.

SMS group supplied the torque retainer as a compact electrohydraulic unit. The engineering, installation, supervi-

sion of the installation as well as the technical assistance during commissioning were also included in the scope of supply of SMS group. Both, cold and hot commissioning were performed during ongoing production in cooperation with the customer.

Custom-tailored, flexible revamp concept

Thanks to an installation concept specifically developed for Acerinox Europe plant shutdown time could be reduced. The individual units were installed as stand-alone solutions during plant operation, then brought into service during scheduled downtimes or ongoing production. The final installation was also carried out during a planned shutdown and took just one extra day, instead of the usual five days.

Manuel Reberdito, Head of Mechanical Maintenance, Acerinox Europe, says: "We are impressed by SMS group's flexible response to our operational requirements thanks to the revamp concept. The torque retainer from SMS group is the right solution, from both a technical and an economical perspective. Acerinox Europe is completely satisfied with the results, and in particular with the enhanced availability and improved operational reliability of the AOD converter. In addition, the maintenance work at the gear unit will drastically reduce." ♦

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Powerful drive, strong performance

THE NETHERLANDS

SMS group has successfully modernized the edger main drive of the 88-inch hot wide-strip mill No. 2 at Tata Steel IJmuiden in the Netherlands. Commissioning took place in August 2019, according to schedule. ▶



REVAMP

Pre-assembly of the complete edger gearbox and preparation for acceptance by the customer.

- In order to meet future requirements, Tata Steel IJmuiden decided to modernize the edger main drive.
- All core components were manufactured, pre-assembled, tested and approved in the Hilchenbach workshop of SMS group.

In the steel industry in general and in sheet and strip production, there has been a trend for some years to produce a higher proportion of high-strength grades and new steel grades. For manufacturers this means having to adapt their equipment to the demands resulting from that trend and to ensure high equipment availability. In a rolling mill, the mechanical gear components in the drive train are particularly affected.

Against this background, Tata Steel IJmuiden placed an order with SMS group in summer 2018, covering the modernization of the edger main drive at the first roughing stand of the 88-inch hot wide-strip mill No. 2. The edger was originally supplied by SMS group and has been operating for almost 35 years. The aim of the modernization was to replace the existing single-piece edger gearbox with a maintenance-friendly and easy-to-disassemble gearbox of the latest two-piece design. In addition, the core components should be optimized according to the current requirements of the edger and thus ensure the economic operation of the edger in the future.

Optimized gearing

The essential components of the edger gear unit are the gears. SMS group advanced the gear material and design permitting new gears with higher capacity and higher safety factors to be used for existing systems within a given installation space. The gears were optimized with "Advanced Gear Design". This means that in the same space much higher torques can



Before: Edger before revamp.



The project teams of Tata Steel IJmuiden and SMS group after successful acceptance in the Hilchenbach workshop.

be transmitted safely. Tata Steel IJmuiden benefits from this development thanks to the modernization.

As part of the contract SMS group renewed the entire edger main drive consisting of motor couplings, two-part edger gearbox, universal joint shafts and roll-side wobblers. The edger gearbox consists of two halves, each weighing around 90 tons. Further parts of the supply scope included the complete disassembly of the existing edger main drive and complete assembly of the new one. The scope



After: Edger after revamp.



After: Roughing stand with edger after revamp. Exit side view.

was completed by replacing the cabling as part of the electrical installation and by adjusting the lubrication and hydraulic lines of the gearbox and the ventilation ducts for engine ventilation.

The core components of the main gearbox, including the gearbox housing, were completely manufactured, pre-assembled, tested and approved by the customer in the Hilchenbach workshop of SMS group.

The main revamp took place as planned during the regular summer shutdown in 2019. On August 25, 2019, the modernized edger was successfully put into operation. Already one month later, on September 26, the final acceptance was granted. ♦

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14 months until final acceptance

CHINA

Modernization of laminar cooling system in the hot strip mill of Ningbo Iron & Steel Co., Ltd. successfully completed.

The hot strip mill is located in the province of Zhejiang and comprises three walking beam furnaces for slab reheating, a two-stand roughing mill, a seven-stand finishing train, runout roller table with laminar cooling system as well as three downcoilers. The annual mill capacity is four million tons with strip thicknesses ranging from 1.2 to 19 millimeters and strip widths from 900 to 1,630 millimeters. The rolled steel material is used in the household appliance, building and automotive industries.

The main targets of the modernization were, on the one hand, an improved cooling performance with tighter coiling temperature tolerances and, on the other hand, an extension of the product mix by dual-phase steel grades DP 600

and DP 800 for automotive purposes, by pipe grades X60 and higher as well as non-grain-oriented electrical steel.

The modernization package for the roughly 90-meter-long cooling zone comprised the complete mechanical equipment, including six super-reinforced cooling groups at the entry side of the cooling section and six reinforced cooling groups ahead of the trimming zone. To avoid strip flatness problems in the cooling process, SMS group supplied advanced header technology ensuring uniform spraying over the complete strip width. Furthermore, a new cross-spraying system has been installed that operates at a pressure of 20 bars and allows for highest cooling efficiency.

In the field of electrical and automation systems, SMS group supplied, for the existing Level 1 and Level 2 systems, the proven X-Pact® technology with sophisticated models for the calculation of cooling system set-ups and of cooling patterns as well as extended cooling strategies.

“Thanks to the new mechanical equipment, process models and basic automation, the cooling results have improved significantly. The period from mill stop to re-start was only 15 days. We thank SMS group for the excellent cooperation,” says Han Jianguo from Ningbo Iron & Steel. ♦

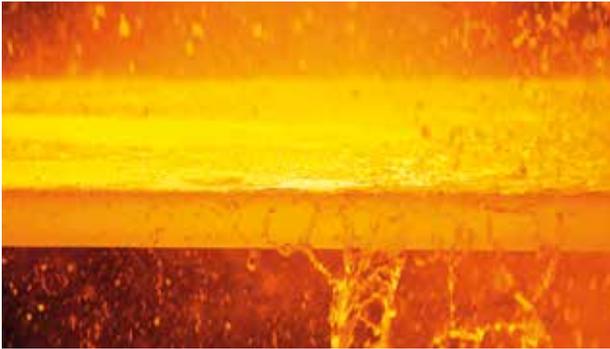
 **Marc Utsch**
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Cooling section at the exit side of Ningbo Iron & Steel's hot strip mill, as modernized by SMS group. The cross-spraying systems were also reinforced in addition to the laminar cooling.

“With the new cooling and automation systems we have effective and valuable tools available for the production of high-strength steels as well as tube and pipe steels.”

Han Jianguo,
Ningbo Iron & Steel



Successful re-commissioning of SSAB Borlänge's hot strip mill.

Improved rolling process control

SWEDEN

In July 2019 already, SSAB Borlänge has successfully rolled the first transfer bar after revamping the side guides at its hot-strip mill roughing stand R1 by SMS group in the summer shutdown 2019.

The modernization performed by SMS group was aimed at rolling wedge- and camber-free transfer bars and at stabilizing the strip run in the downstream process steps in the finishing train and the exit roller table including coiler.

To achieve these objectives, SMS group implemented the following scope of modernization in the hot strip mill: In addition to installing the new hydraulic side guides at the roughing stand entry and exit ends, the pertaining X-Pact® Level-1 automation including Roll Alignment Control (RAC) was provided and integrated into the existing basic automation systems. The side guides were revamped with the aid of several components already available at the hot strip mill.

The new and strong hydraulic side guides at the roughing mill stand entry and exit sides serve for slab respectively transfer bar centering, with simultaneous positioning of the hydraulically operated horizontal adjustments at the roughing mill stand, and allow wedges in the thickness profile to be compensated and hence cambers to be prevented.

The contracted scope of SMS group also included a new sizing unit for side guide setting and the valve stands.

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Aluminium hot strip mill at Ravenswood.

Modernization of finishing mill exit end

U.S.A.

SMS group has received an order from Constellium Rolled Products Ravenswood, LLC, U.S.A., for the modernization of the 2,845 millimeter (112 inch) finishing mill exit end of its aluminium hot strip mill. This modernization of the exit end covers the replacement of two "constant passline" coilers with a single fixed position coiler. The aluminium hot strip mill is a key production unit at Ravenswood and is essential for providing hot rolled coils for further processing by the cold rolling mills. This revamp will provide Constellium with improved equipment reliability and reduced equipment down time.

SMS group's scope of supply includes a new deflector roll and pinch roll unit that are used with new strip threading guides to direct the strip from the exit end of the finishing mill to the coiler mandrel. The existing coil mandrel assembly with gearing will be disassembled from one of coilers that is being removed and reinstalled into a new coiler gearbox. The new coiler gearbox will be driven through the existing drive train of one of the existing coilers. An additional 500 HP motor is being added to the two existing 500 HP motors of this drive train to provide increased strip tension. An existing beltwrapper is being reinstalled into a new support structure. A new outboard bearing unit and snubber roll unit are also being supplied. The coil will be removed from the coiler mandrel with a new coil car and will be transported to a new coil OD bander. After banding the coil will be transported to the existing exit coil handling equipment. SMS group has collaborated with Premier Automation to provide the automation of the new exit end equipment and to coordinate this automation with existing control systems.

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Consistent material flow along the process chain

CHINA

Ningbo Powerway banks on AMOVA logistics concept for its copper production operations in China.

Ningbo Powerway Alloy Material Co., Ltd., subsidiary of Ningbo Powerway Group, has contracted AMOVA GmbH, a company of SMS group, to supply a logistics system for the complete works complex at its Yinzhou site in China. Ningbo Powerway Group is one of the most important producers of non-ferrous metals bars, wire rod and strips in the Chinese economic region. The finished products made from these primary materials are used for a wide range of applications in the electrical and electronic industry.



Reference logistics system for aluminium coils.

This recent order continues a successful cooperation, which began about five years ago when AMOVA supplied a packaging line for narrow-strip coils to Ningbo Powerway.

AMOVA designs a complete, all-encompassing logistics concept for the facilities in Yinzhou that will assure maximum efficiency of the material flow. AMOVA is going to link all process stages from the raw material storage area down to the dispatch area, including the higher-level materials control and tracking systems. The containers, which are manually filled in the raw material storage area with scrap blends for the different copper alloys, will be transported to the melt shop by means of rail-bound vehicles. There the containers will be stacked for intermediate storage until they are taken to the melting furnace by crane. Operation of the crane will be fully automatic, including the emptying of the containers.

Downstream of the melting and milling shop, the strips are intermediately stored in the flat product storage area which will be served by an automatic gantry-type crane. Freely navigating vehicles will transport the strips from there to and between the downstream processing stages – rolling, annealing, cleaning, cutting and slitting – and finally to the buffer store from where they are taken to the packaging area. The packaged finished products will be intermediately stored in an automated high-bay store until they are dispatched.

Production start in spring 2021

AMOVA is going to supply two transfer cars, each designed to autonomously pick up or put down three containers at a time and transport the three containers as a set from the filling area to the intermediate storage area of the meltshop. The supply scope additionally includes a fleet of six freely navigating vehicles for the transport of the coils and the scrap containers, two additional buffer storage areas equipped with automatic cranes, a coil stacking device for

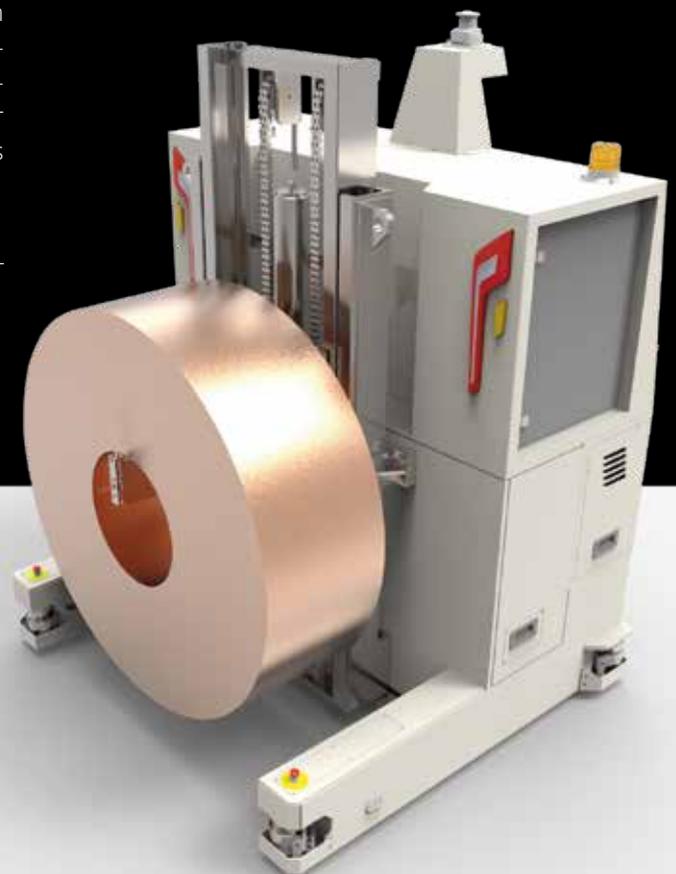
the annealing plant, and the automated high-bay store, which – depending on the type of stored items – can accommodate up to 2,064 pallets. Also the management software for the various storage areas, including an integrated material flow control system, is part of the supply.

Last but not least, AMOVA will be responsible for the implementation of the Level 1 and Level 2 automation. The WMS (Warehouse Management System) will be set up as a redundant server system with virtualization. Until the MES (Manufacturing Execution System) will have been commissioned, the input terminals of the WMS will be used for the exchange of information with the various processing and cutting lines, and with other important constituents of the production process (e.g. the storage and buffer areas, and the Vehicle Management System of the freely navigating cars). In addition to acquiring process and material data, the WMS performs functions such as material tracking and plant performance analyses, which may be used as a basis for the independent calculation of Overall Equipment Effectiveness (OEE). The use of customized and animated graphics will make the system extremely user-friendly, as a matter of course, also via mobile devices.

For more than 30 years, storage and transport systems from AMOVA have been successfully in use in China in aluminium plants, in particular. With this recent order from Ningbo Powerway, AMOVA has now also entered the segment of intralogistics in Chinese copper production and processing facilities, in addition to packaging systems for copper products, which AMOVA has in the past supplied to various customers in China. ♦

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More than 60 years of expertise make AMOVA a highly valuable partner for customers not alone in the steel and NF-metals industry. The company has successfully transferred its know-how also to other fields of application, such as air cargo handling and port logistics.



Autonomous navigation
Freely navigating
vehicle for the
transport of coils/slit
coils up to 12 tons.

Big part, strong start

SLOVAKIA

In August 2019, the hot strip mill of U.S. Steel Košice in Slovakia resumed operation after the successful modernization of the roughing mill main drive. SMS group supplied the spur gear unit.



Shipment of the pre-assembled gearbox from the SMS workshop in Hilchenbach.

A roughing mill spur gear unit is an impressive component not only because of its size. It is one of the main drives of the roughing mill and thus transmits the highest torques that are necessary for transfer bar rolling. This makes it one of the components with special demands.

Essential components of the spur gear units are the gears. Gears from SMS group are executed in "SMS Advanced Gear Design". The tooth and flank profiles are individually and precisely designed for the specific requirements, so that an optimal, even load distribution over the entire tooth flank is achieved during load conditions. This increases the safety and the torque capacity of the gears compared to the standard toothing design. The production competence of SMS group allows spur gears with very large diameters to be produced. As a result, the main gears of a roughing mill can be designed with less gear stages compared to the usual design of competitors. This results in savings in rolling operation, such as energy, media and installed components.

Two-stage gear set

In fall 2018, with these advantages in mind, U.S. Steel Košice, the Slovakia-based steel producer, placed an order with SMS group to modernize the main gear unit of the second roughing mill



“U.S. Steel Košice is very satisfied with the new gearbox from SMS group.”

Uwe Berkholz, Technical Project Manager, employed in the Design Drive Department of SMS group

stand of its hot strip mill. U.S. Steel Košice has been operating the plant since 1996. The scope of supply included a completely new, state-of-the-art two-stage gearbox including input and output couplings.

“Special customer requirements as well as the local conditions such as the existing foundation, were taken into account,” says Nikolai Penner from the Drive Systems Department of SMS group, who was responsible for the sales-related part of the project. Furthermore, the fast and smooth conversion was in the foreground.

The components were manufactured and pre-assembled in the Hilchenbach workshop of SMS group. After the pre-assembly, the gearbox with a total weight of 118 tons was delivered to U.S. Steel Košice. There, the gearbox could not be moved to its place of use in one piece due to the load limitation of the overhead crane. It had to be dismantled and assembled on site together with the customer. The partnership-based cooperation was very successful, so that production could be resumed in August 2019, as scheduled, after a planned shutdown of ten days. ♦

At U.S. Steel Košice, the gearbox had to be dismantled and assembled again at its final position. The picture shows the two-stage gear set.

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Photo: thyssenkrupp Rasselstein GmbH



The six-stand tandem cold mill of thyssenkrupp Rasselstein GmbH will be provided with a new, process-optimized oil application system from SMS group.

THE CONTRACTOR

thyssenkrupp Rasselstein GmbH is a subsidiary of thyssenkrupp Steel Europe AG and ranks among the three largest packaging steel producers in Europe. At the world's largest production site for packaging steel in Andernach, Germany, thyssenkrupp Rasselstein produces tinned and special chromium-coated thin sheet (tinplate).

Modernization of six-stand tandem cold mill

GERMANY

Process-optimized oil application system will lead to significant quality improvement in production.

In March 2019, thyssenkrupp Rasselstein GmbH has awarded SMS group an order covering the modernization of the oil application system of its tandem cold mill No. 2.

With the current modernization by SMS group, thyssenkrupp Rasselstein wants to adjust the oil application system of the tandem cold mill to the continuously increasing future market requirements regarding product quality and thus further expand its market position.

At the time of commissioning in 1971, the six-stand tandem cold mill No. 2 was considered the latest cold rolling mill of this type in

the Federal Republic of Germany. It already had a high degree of automation and achieved very good strip qualities at rolling speeds of up to 2,400 meters per minute.

Flexible control

The modernization is aimed at achieving a high degree of flexibility regarding the control of various process-influencing parameters for the production of state-of-the-art end products.

In addition to providing the required design services and supplying all mechanical equipment as well as the electrical and automation systems, the contracted scope of SMS group and Lux Automation GmbH, a company of SMS group, includes the dismantling of the old systems as well as the erection and commissioning of the new equipment.

The modernization will be implemented in two stages of construction. Commissioning of the second construction phase is scheduled for 2021. ♦



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Tandem cold mill of the latest generation

CHINA

Commissioning at Shandong Nanshan Aluminium started on time.

The cold rolling mill is built at Shandong Nanshan's production site near Longkou Town in the Shandong Province, Eastern China. At this site, Shandong Nanshan Aluminium Co., Ltd. already operates a hot rolling mill for plate and strip production as well as another cold rolling mill from SMS group.

The new TCM is designed to be flexible in the production of automotive sheet, beverage cans and aerospace applications. The maximum strip width is 2,350 millimeters, the thickness spectrum of the final products ranges

2,350

millimeters is the maximum strip width. The thickness spectrum of the final products ranges from 4.00 to 0.20 millimeters.

from a maximum of 4.00 to a minimum of 0.20 millimeters.

The TCM has been supplied including coil preparation and inspection station as well as facilities for coil and sleeve handling.

Both mill stands are of CVC®plus six-high design and equipped with all the latest actuators for precise roll gap adjustment. In the area between the mill stands, there is a highly efficient interstand cooling system (type HEC) installed which ensures a high production output.

Targeted inductive heating

Another technical highlight is the inductive roll barrel heating for the selective heating of the work roll barrel in the strip edge area. It counteracts the phenomenon of tight strip edges involved in aluminium strip rolling processes. Compared to alternatively used systems, the inductive work roll barrel heating is particularly effective and energy-efficient.

Three Multi-Plate® filters, size MPF 3-21, from SMS group for rolling oil filtration contribute to environmentally friendly and sustainable plant operation. The exhaust air is purified by an Airwash™ system from SMS group. The rolling oil system, the hydraulic systems, the lubrication oil plant as well as the fire extinguishing system complete the scope of supply.

During the further commissioning, the TCM will reach its full capacity step by step. ♦



Three Multi-Plate® filters from SMS group clean the rolling oil efficiently and environmentally friendly.

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Extended product portfolio

U.S.A.

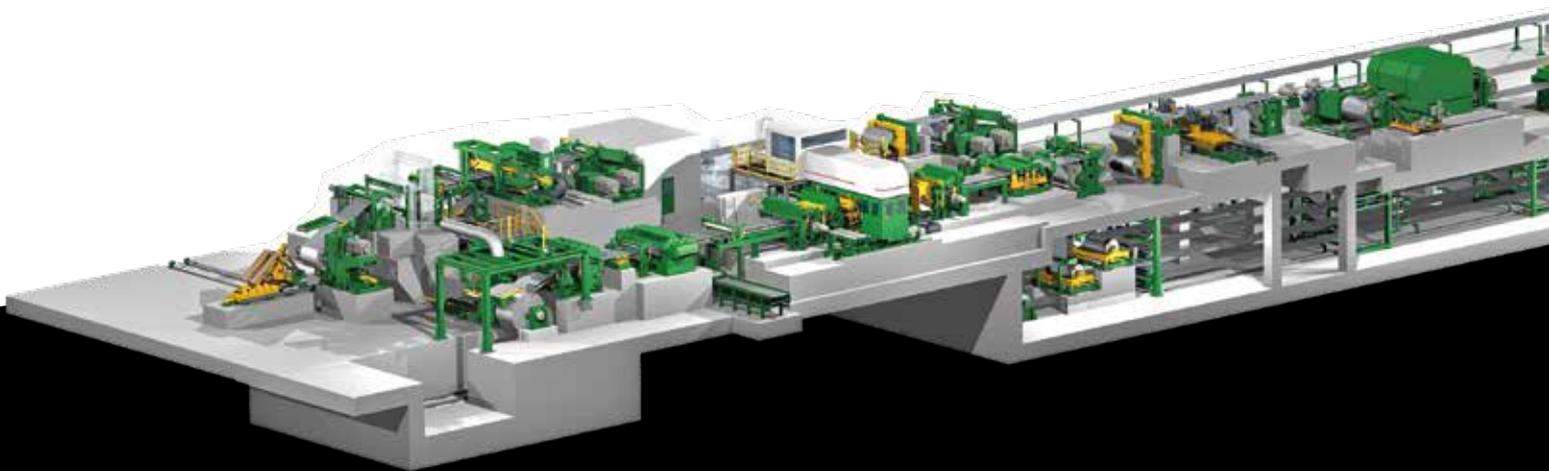
Nucor Steel Gallatin processes first coil on its pickling and galvanizing line with unique “heat-to-coat” technology from SMS group.

NUCOR
NUCOR STEEL GALLATIN

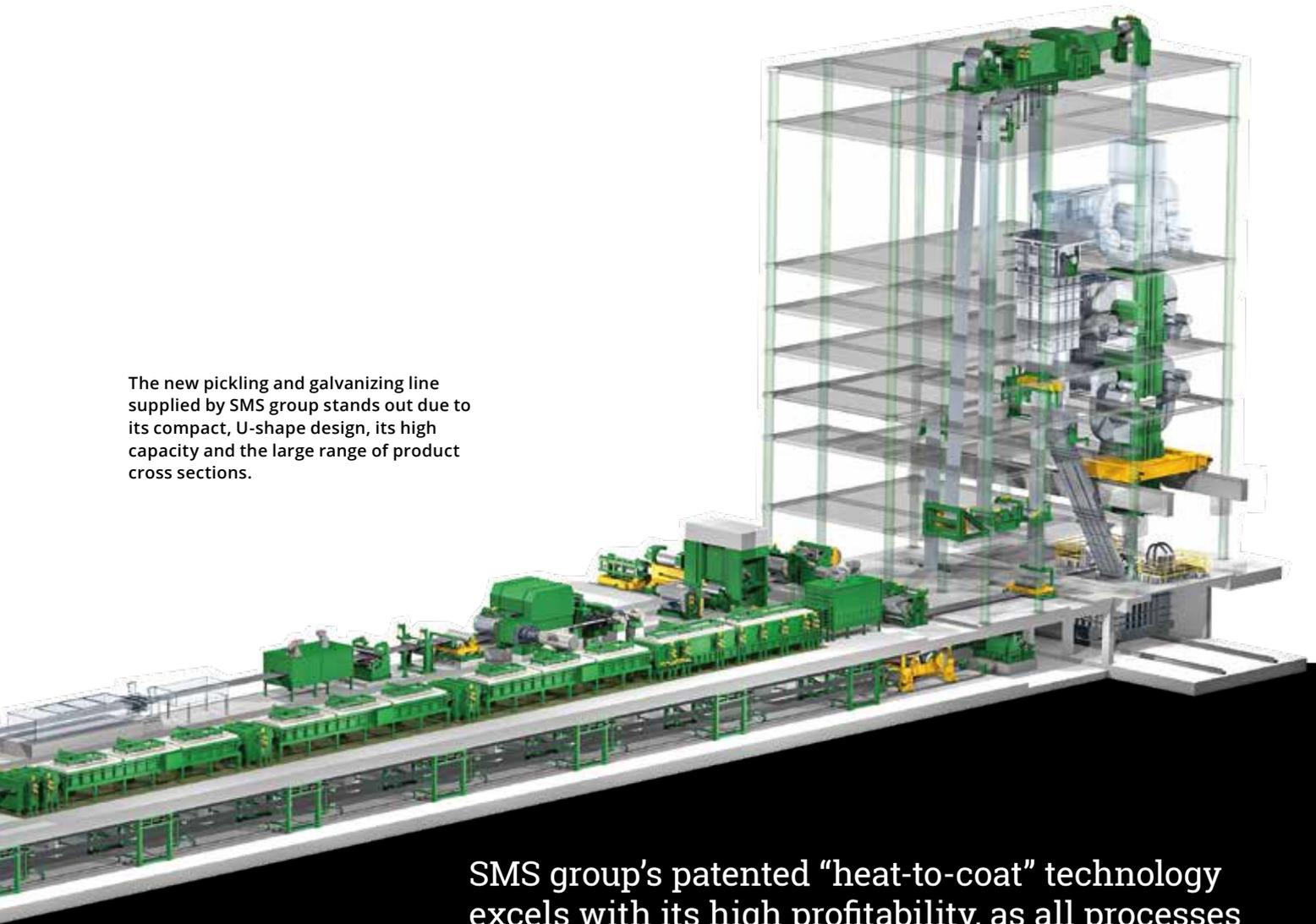
Pickling and galvanizing of the first coil in September 2019, has marked the production start of the new pickling and galvanizing line at Nucor Steel Gallatin in Ghent, Kentucky. SMS group delivered the whole line out of one hand as a systems supplier and has been responsible for engineering, process technology, furnace technology, pickling and galvanizing technology as well as electrical and automation systems. The “heat-to-coat” technology is characterized by its compact and operator-friendly U-shape design, the turbulence pickling system, the high-power inductive heating system, the FOEN® galvanizing equipment and the Drever after-pot cooling system.

The line is designed to produce 500,000 tons of galvanized hot strip per year with a maximum capacity of 180 tons per hour and a large strip cross section (up to 6.35 millimeters thickness and up to 1,854 millimeters width), which sets a new standard in hot strip galvanizing. There is a broad area of applications for the material, especially in construction, transportation and in the automotive industry and it is possible to substitute galvanized cold strip by hot strip. ♦

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The new pickling and galvanizing line supplied by SMS group stands out due to its compact, U-shape design, its high capacity and the large range of product cross sections.



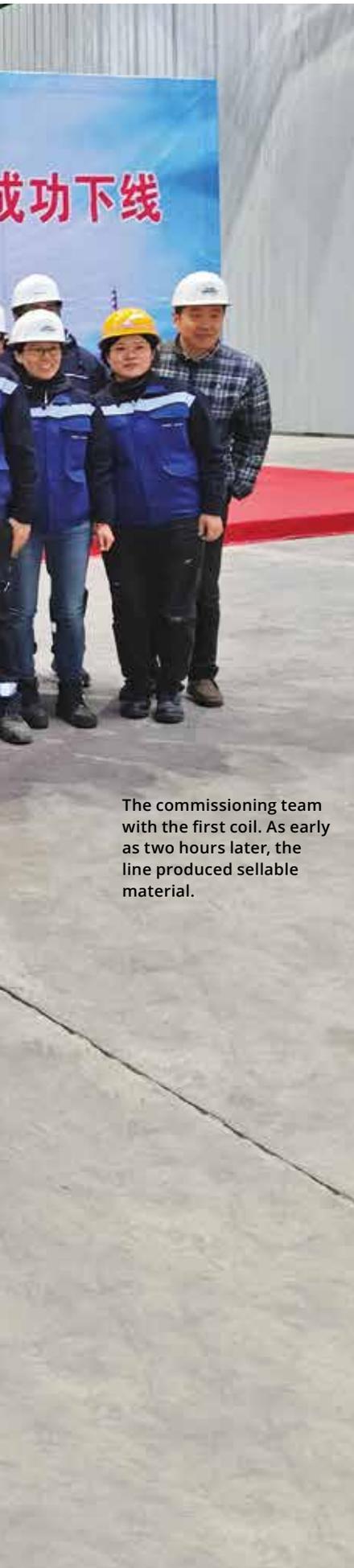
SMS group's patented "heat-to-coat" technology excels with its high profitability, as all processes take place in a single facility. The technology permits the production of galvanized steel strip with durable corrosion protection, an appealing visual appearance, as well as excellent mechanical properties while keeping production and investment costs at a low level. This is the third "heat-to-coat" line SMS group has installed with excellent results.



Hot-dip galvanized steel strip

CHINA

Shougang Jingtang starts production on new hot-dip galvanizing line for high-strength steel grades supplied by SMS group.



The commissioning team with the first coil. As early as two hours later, the line produced sellable material.

Shougang Jingtang (Shougang Jingtang United Iron & Steel), China, successfully commissioned the new hot-dip galvanizing line supplied by SMS group. The new line is especially equipped to produce high-strength grades with tensile strengths of up to 1,350 MPa. The capacity is 360,000 tons per year of hot-dip galvanized steel strip, which will be used mainly in the automotive industry to produce structural parts and car body shells for lightweight cars. The first coil was produced on November 13, 2019. Directly after the start-up Shougang Jingtang was able to produce 1,000 tons of sellable galvanized material. A second campaign of 5,000 tons was produced in December 2019. By mid-January 2020, another 14,000 tons were produced.

Profound expertise

The new hot-dip galvanizing line is the sixth strip processing line SMS group installed for Shougang Jingtang on Caofeidian Island, a man-made island offshore the Chinese province of Hebei. Besides the good experience with SMS group the main reason to decide in favor of SMS group as supplier of the new line was SMS group's vast experience in the field of high-strength steel strip. The exit section is designed to even process steel strips with a tensile strength of up to 1,500 MPa, since Shougang Jingtang plans to use the line also for developing new materials. Thus, especially the skin-pass mill, tension leveler and side trimming unit have been designed specifically for these requirements.

Galvanizing line for 360,000 tons per year

The hot-dip galvanizing line processes strips up to 1,580 millimeters wide and between 0.6 and 3.0 millimeters thick. Maximum strip speed during the galvanizing process is 160 meters per minute. The product range includes high-strength grades such as HSLA, DP and Q&P as well as soft steel grades. To satisfy particularly high demands on surface quality, a FOEN air knife precisely and homogeneously sets the thickness of the zinc layer. The air knife system is equipped with a contact-free edge mask, automatic gap width adjustment and HD cameras for continuous quality monitoring.

In addition to the engineering for the complete mechanical equipment and the manufacturing of high-quality key components, SMS group's scope of supply also included equipment installation and commissioning. SMS group also supplied all X-Pact® electrical and automation systems. EMG Automation provided the strip guiding system including BREIMO strip width measurement and EMG SOLID® oil layer thickness measuring equipment. ♦



Contact

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Energy-saving color coating line for aluminium strip

CHINA

Tianjin Zhongwang Aluminium Co., Ltd. produces first coil on new line.

In July 2019, the first color-coated coil has been produced on the new color coating line at Tianjin Zhongwang. The line was completely supplied and commissioned by SMS group GmbH. The outstanding feature of the plant design is the compact coating process with chemical pre-treatment section, subsequent strip coating process and drying furnace being perfectly harmonized. For many products, the drying oven only uses energy recovered from the process. This ensures low consumption of resources and energy while achieving high product quality. The line is designed for strips with thicknesses between 0.15 and 0.50 millimeters and widths ranging from 950 to 2,000 millimeters. In the process section, the strip is coated at a speed of 250 meters per minute, whereas in the entry and exit sections speeds of up to 300 meters per minute can be attained. The materials processed are 3xxx series aluminium alloys, as well as alloys 5052 and 5182.

Uniform coating result, low media consumption

Equipped with a high-quality control system, two finish coaters ensure a uniform and precise coating result that perfectly complies with the specified coating thickness, while keeping media consumption low. The solvents are evaporated in a floatation furnace free of contact to cure the paint applied to the strip surface. Along the entire furnace length, hot air jets uniformly heat the strip while it is kept in a floating position by an air cushion. The fact that there is no mechanical contact whatsoever between the strip and any part of the furnace ensures a perfect surface quality. To protect the finished surfaces and to improve the properties for further processing, a wax layer can be applied to the color-coated strips. This is done in a vertical roll coater using heated rolls.

The main components of the line are two uncoilers and cross-cut shears, stitching machine, entry looper, cleaning section, chemical coater, two finish coaters, floatation furnace, exit loopers, inspection station, wax coater, oiling machine, side trimmer, flying shear and two coilers. ♦

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The commissioning team with the first coil.

Substantial reduction of CO₂ and NO_x emissions



SPAIN

ArcelorMittal Asturias commissions SMS group to replace old coke-oven gas burners with hybrid SMS EcoFlame^{PLUS} burners in its Avilés hot strip mill.

ArcelorMittal Asturias, Spain, has awarded SMS group an order to supply a new combustion system for existing walking beam furnaces 2N, 3N and 4N in its Avilés hot strip mill.

The supply scope comprises the replacement of the existing burners with SMS EcoFlame^{PLUS} dual-fuel burners including the conversion required for using converter gas as fuel source. That means, the measures to be taken will exceed the simple exchange of the gas feeding lances. In all, 22 burners will have to be replaced on each of the three furnaces. This solution will ensure more efficient combustion and an optimal flame mix, and will permit NO_x emissions to be reduced to less than 150 mg/Nm³. The volume of CO₂ emissions will be significantly minimized, as well.

The new burners can be fed either with a mix of converter gas and natural

gas or with converter gas only. Using gas from the upstream processes will make the Avilés works more sustainable and environment-friendly.

Converting the three furnaces to the use of 100-percent converter gas or natural gas or any mix of the two gases will allow the converter gas flow rate to be maximized in every operative condition (e.g. utilization of the maximum converter gas flow rate of 40,000 Nm³ per hour with two furnaces working at 50 percent of their thermal power). Switching between the two gases will be performed automatically. ♦

The new furnace burners from SMS group will enable ArcelorMittal Asturias to substantially reduce its NO_x and CO₂ emissions.

Reduction of NO_x emissions to less than

150 mg/Nm³



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Ring rolling with additive manufacturing

WORLDWIDE

In various projects, SMS group is testing new concepts for the table-type ring rolling mill KFRWt neo. ▶

Ring rolling machine
RAW 2500/1250-
16000/3000 of SMS group at
Shandong Iraeta Heavy
Industry, China.



In recent years, SMS group was able to exceed limits of previously rolled ring geometries again and again. Most recently, a ring rolling machine RAW 2500/1250-16000/3000 was installed at a Chinese customer capable of successfully rolling ring diameters of 16 meters with ring weights of up to 130 tons for the first time.

In addition to ring rolling machines for such extreme ring dimensions, SMS group builds also automated mechanical ring rolling machines which make it possible that rings are rolled with cycle times of a few seconds. For these automated machines the ring dimensions are up to an external diameter of 500 millimeters.

Besides a radial multi-mandrel ring rolling machine of the MERW type, the radial multi-mandrel ring rolling machine, type KFRWt neo, should be mentioned as another example. The KFRWt of old design is a table-type ring rolling machine, the design principle of which has been known since the beginning of the 20th century. KFRWt stands for the acronym semi-automated Kreuser spring-ring rolling mill. The original developer, the firm Adolf Kreuser GmbH, Hamm, is the predecessor who has been absorbed by the German machine-tool factory Wagner & Co. from Dortmund. Later, Wagner & Co. merged with J. Banning AG from Hamm to form the WOB Ringwalztechnik GmbH and was integrated as Wagner Banning Product Area into SMS Eumuco in 1997. SMS Eumuco was incor-

KFRWt stands for the acronym semi-automated Kreuser spring-ring rolling mill.

porated into SMS Meer in 2007 and was finally merged with SMS Siemag GmbH in 2015 to form the SMS group.

While the focus of KFRWt was initially on rolling spring rings for railroad car buffers the range of application for the automated ring rolling machines was expanded rapidly by manufacturing also rings for the bearing and automotive industries.

The KFRWt features four rolling stations arranged on a turntable. Each station is equipped with a centering arm, a mandrel roll and roll table.

Rolling up to 720 rings per hour

The turntable surrounds a driven main roll. Its axis and the axis of the turntable are eccentrically arranged to each other. Through the rotary movement of the table around the main roll the rolling gap between main roll and the respective mandrel roll is continuously downsized. As a result, the wall thickness of the ring blank which was previously loaded onto a rolling station is continuously radially reduced. Due to the reduction of wall thickness the ring diameter is increasing. As soon as the adjust rolling gap has been reached the rolling process is completed. The rolled ring can be unloaded from the rolling station and the station can be reloaded with a blank.

For the original KFRWt, the minimal wall thickness and the position of the centering arms during the rolling process are adjusted via mechanical setting elements which had to be partially adjusted for all rolling stations in a time-consuming procedure when product change takes place. To reduce the non-productive times SMS group has revised the concept of the KFRWt and automated the product-dependent adjustments by means of

servo technology. Depending on the ring complexity, up to 720 rings can be rolled per hour, whereby investment costs pay off quickly. SMS group succeeded in placing already four re-engineered KFRWt neo units in the market.

Research on additive manufacturing

In addition to the industrial environment, the table-type ring rolling mill KFRWt neo can also be employed for research purposes. SMS group is successfully cooperating with different research institutions.

Among others, the Ring/Wheel Rolling Division cooperates with Prof. Dr.-Ing. Markus Bambach from the BTU Cottbus, whose focal point of research is on process combination of additive manufacturing (3D printing) and forming technology.

By means of WAAM (Wire Arc Additive Manufacturing) preforms from 1.5125 could be manufactured additively for the first time and then rolled on a KFRWt neo. During initial trials, inner preform diameter and height were remachined.

The aim of the examinations is first of all to formulate statements on formability from accordingly manufactured preforms. In addition to the possibilities of additively manufacturing preforms from special alloys in small quantities to be rolled on by ring rolling, options should later be considered to manufacture profiled preforms which until now cannot or which can only be manufactured in an expensive procedure with conventional process routes. Furthermore, examinations should also be performed to find out whether functional layers are printed onto conventionally manufactured forged preforms by means of additive manufacturing.

The current state of the research results will be introduced on the upcoming **23rd International Conference on Material Forming (ESAFORM 2020)** in Cottbus in May 2020.



Re-engineered KFRWt neo of SMS group.

Example applications can be found among others in the bearing industry where the bearing surfaces should reveal other mechanical wear properties compared to the base material of the bearing. ◆

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EcoDraulic concept to reduce energy consumption

GERMANY

Constellium Singen again relies on the aluminium extrusion technology of SMS group, supplemented by a state-of-the-art soft- and hardware package.

Constellium Singen GmbH has contracted SMS group to supply a 45-MN extrusion press for its largest works in Germany. Based on a long-lasting business relationship, Constellium Singen again counts on the technological expertise of SMS group.

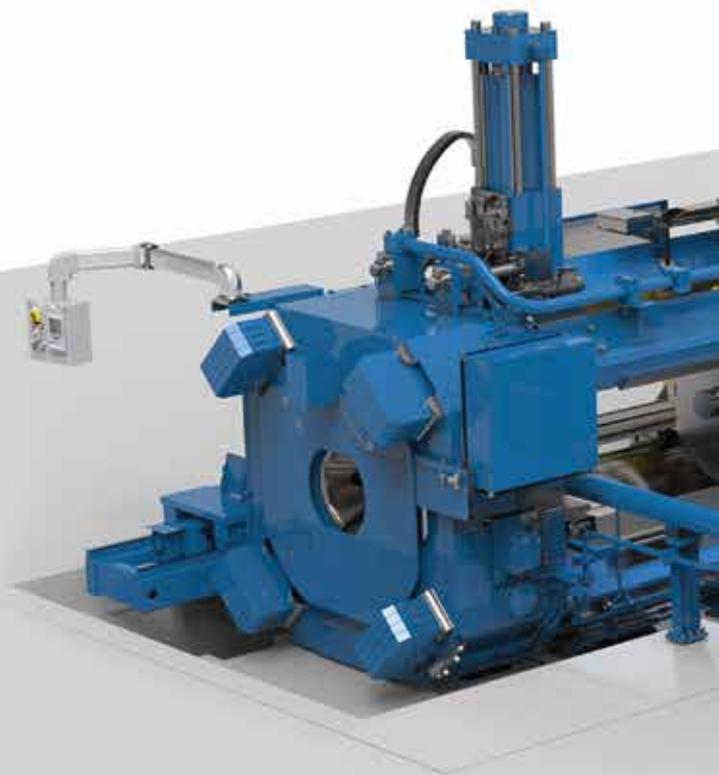
The 45-MN aluminium extrusion press will be installed by SMS group in a newly established production hall at the Singen site. With the new plant, Constellium Singen will be able to increase its production capacity of high-quality aluminium profiles of most different cross-sectional geometries and also to respond to the growing demand by the automotive industry more flexibly. Commissioning is scheduled for summer 2020.

Up to 10 percent less energy consumption

The 45-MN front-loading extrusion press will be built to SMS group's latest design and be equipped with the highly precise linear guidance system for all moving main components of the press, with servo drive technology for all

auxiliary functions as well as the proven EcoDraulic concept to reduce energy consumption of the hydraulic pumps. Using the EcoDraulic system permits energy savings of up to ten percent to be achieved as compared to modern extrusion presses operating without that system. The intelligent start-stop automation deactivates all hydraulic pumps not required for the extrusion process.

Another highlight of the press will be the self-adjusting, moving discard shear which automatically adapts to the height of the tool package and ensures optimum and clean cuts. The scope of supply will include further crucial auxiliaries such as billet loader and dummy block lubrication system. An electrically operat-





The new 45-MN front-loading extrusion press from SMS group.

SOFTWARE SOLUTIONS

The smart press control system PICOS.NET (Process Information and Control System) visualizes and coordinates the control of the individual plant areas and provides an array of further useful functions, for example billet length optimization, billet recording as well as fault diagnosis. The process software CADEX (Computer Aided Direct Extrusion) serves for the optimization of the extrusion process. It simulates the process and provides best possible extrusion parameters for isothermal and isobaric extruding.

ed linear billet loader will make sure the aluminium billets are safely and quickly fed to the press and, thanks to its telescopic gripper, will reduce non-productive time.

For the control and optimization of the production process, the new 45-MN extrusion press will be equipped with the most modern soft- and hardware package. The smart press control system PICOS.NET (Process Information and Control System) visualizes and coordinates the control of the individual plant areas and provides an array of further useful functions, for example billet length optimization, billet recording as well as fault diagnosis. The process software CADEX (Computer Aided Direct Extrusion) serves for the optimization of the extrusion process. It simulates the process and provides best possible extrusion parameters for isothermal and isobaric extruding. The result is an improvement in product quality at optimum utilization of the press force. ◆

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New melting furnace

SPAIN

Hertwich supplies aluminium multi-chamber melting furnace and continuous homogenization system to Exlabesa.

Exlabesa, Europe's largest independent extruder, expands the aluminium remelt capacity at its Padrón facility. In close partnership with Hertwich Engineering, a company of SMS group, Exlabesa put into operation a Hertwich continuous homogenizing plant at its Padrón-based facility in the second half of 2018. Following this investment, Exlabesa has now ordered a PR130 multi-chamber melting furnace, complete with charging unit, which will increase the capacity of the Padrón casthouse to 60,000 tons per year.

The new furnace with a capacity of 130 tons per day will be designed to process a relatively wide range of scrap: production scrap, clean profiles with lengths of up to seven meters, sawing chips, clean and lacquered scrap (shredded or in pieces), ingots and market scrap. To remelt this loose and

moderately contaminated scrap, an Ecomelt-PR furnace with preheat ramp, melting chamber and main chamber will be installed. This furnace concept was developed about 20 years ago and since then has proven its worth in many casthouses.

The scrap to be melted is transferred onto a ramp in the preheat chamber by an automatic charging unit. During the charging process, the surrounding area is protected from the furnace atmosphere.

In the preheat/melting chamber the material is heated to approx. 500 degrees Celsius to remove adhering organic compounds. Based on extensive operational experience, this chamber has been designed to optimize heat transfer and reduce preheating time. For a furnace with a daily melting capacity of 130 tons, Hertwich specifies two charging cycles per hour (each with three tons of scrap).

The preheated and decoated material is pushed from the ramp into the melt bath. An electromagnetic liquid metal pump ensures the melt transfer between both furnace chambers and the availability of the required energy for melting in the melting chamber. The melt level in the melting chamber and the melting rate can be adjusted by this liquid metal pump. During the melting process, the scrap remains submerged at all time in order to avoid oxidation losses.

Improved consumption values

The temperature level in the main chamber from which the melt is tapped for casting is about 1,000 degrees Celsius, hot enough to burn all pyrolysis gases generated during scrap preheating. The heating system uses the energy in the flue gases to heat the combustion air. In this way, energy consumption values from 450 to 500 kWh/ton are achievable when melting moderately contaminated scrap.

The installation of the new melting furnace will not impair the ongoing casting operation. Commissioning is scheduled for mid-2020. Once this investment has been completed, Exlabesa will own melting, homogenizing and extrusion equipment meeting the latest state of the art.

Exlabesa is a global company that covers the complete aluminium production cycle including extrusion, coating, anodizing, machining, bending and recycling for a wide range of industrial sectors and fields of application. With a total of 22



extrusion lines (press capacities from 13 MN to 65 MN) installed at seven production centers located in the U.S.A., UK, Spain, Germany (weseralu GmbH & Co. KG), Poland and Morocco, Exlabesa has the capacity to produce up to 176,000 tons of profiles per year. ♦

 **Further information**
www.hertwich.com

Multi-chamber melting furnace with preheat ramp (Ecomelt PR) from Hertwich.



The new furnace will be capable to melt up to 130 tons of scrap per day.

Record-breaking performance

CHINA

AVIC Shaanxi Hongyuan Aviation Forging commissions the world's largest clutch-operated screw press from SMS group.



Inauguration of the clutch-operated screw press from SMS group at AVIC Shaanxi Hongyuan Aviation Forging. From left to right: Han Jianfeng, Sales Manager, SMS group; Wang She, Director of Hongyuan Technical Transformation Dept.; Dr. Thomas Winterfeldt, Executive Vice President Forging Plants, SMS group; Hu Xiangdong, Vice President of Shaanxi Hongyuan Aviation Forging Company Ltd.; Qu Weimeng, Vice Director of Hongyuan Technical Transformation Dept.; Gong Xiaoqi, Vice Director of Precise Forging Branch.

China-based AVIC Shaanxi Hongyuan Aviation Forging Co., Ltd, a subsidiary of AVIC Heavy Machinery Co., Ltd. in partnership with SMS group, has put the world's largest clutch-operated screw press into operation at its site in Xi'an, Shaanxi Province. The inauguration of the new press was celebrated together with numerous customers and invited guests who had the opportunity to see the impressive technology for themselves.

The SPKA-type clutch-operated screw press, supplied by SMS group, has a screw diameter of 1,330 millimeters, a hard-on-hard blow force of 365 MN, a gross power of 27,000 kJ, and a weight of 2,900 tons. It is already the worldwide third clutch-operated screw press of this size supplied by SMS group, and exceeds with its performance data the two existing presses delivered before.

High-energy forging at shorter ram stroke

The clutch-operated screw press from SMS group offers tremendous flexibility when it comes to optimizing the forging process, and requires far less stroke to achieve the preset ram speed than a conventional slipping-wheel screw press. The maximum ram speed is attained after just ten percent of the ram stroke, and remains at a constant level until the ram hits the part being forged.

This type of press is particularly suitable for high-energy forging as typically used for turbine blades or structural aircraft components, for example.

AVIC Shaanxi Hongyuan Aviation Forging is one of the largest manufacturers of structural components, aviation discs and turbine blades for the Chinese aviation industry. By investing in the new press, the company intends to increase its production volume and component portfolio, and supply the aircraft industry with forgings produced on the new press from high-alloy steel, titanium- and nickel-based alloys. ♦



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A large industrial screw press is the central focus of the image. It consists of a long, vertical, polished metal shaft with several cylindrical sections. At the bottom, a large, multi-fluted screw is visible. The machine is mounted on a yellow base. In the foreground, two workers in white uniforms and hard hats are standing on a metal platform, looking at the machine. The background shows a large industrial building with blue structural elements and yellow overhead cranes.

The new clutch-operated screw press has a screw diameter of 1,330 millimeters, a hard-on-hard blow force of 365 MN, a gross power of 27,000 kJ and a weight of 2,900 tons.

SMS group's manufacturing site in Mönchengladbach: first joining (wedding) of screw and nut of the SPKA supplied to AVIC Shaanxi Hongyuan Aviation Forging.



Hertwich multi-chamber melting furnace Ecomelt PS.

More capacity for scrap recycling

GERMANY

Otto Fuchs orders aluminium multi-chamber melting furnace from Hertwich.

Otto Fuchs KG supplements its Meinerzhagen casthouse with one Ecomelt-PS150 melting furnace and two tiltable holding and casting furnaces from Hertwich Engineering, a company of SMS group. The new recycling furnace will be the fifth Ecomelt furnace and with a capacity of 7.7 tons per hour the largest one at Otto Fuchs. The two casting furnaces, which are also part of the supply scope, are designed for a capacity of 20 tons. This order continues the successful partnership between Otto Fuchs and Hertwich, which has been existing for more than 15 years now.

The high load on these components as well as the extraordinary safety requirements for the solutions used in the automotive, aerospace and construction industries postulate the precise control of all production steps already for the semi-finished products.

Hence, Otto Fuchs consistently relies on its own semi-finished material production to ensure product quality. Return materials arising from further processing (e.g. head and butt ends, burrs and swarf) are almost completely recycled inhouse. Recycling such scrap in a homogeneous, high-quality and most efficient manner represents a challenge to the remelting technology.

Fully automated furnace operation

The Ecomelt-PS150 furnace currently on order with a melting capacity of 7.7 tons per hour will be the largest multi-chamber melting furnace installed at Otto Fuchs to date. It combines scrap preheating and submersion melting of cleaned scrap in one compact unit. The entire furnace process is fully automated by a measurement and control system.

Scrap is charged from the top into the vertically arranged preheat shaft and preheated to a maximum temperature of 500 degrees Celsius. Below this temperature, partial melting is ruled out. Combustion gases are ducted from the main chamber to the melting chamber and the preheat shaft.

At the bottom end of the preheat shaft, the preheated material directly immerses into the flowing melt bath of the melting chamber. An electromagnetic liquid metal pump ensures the proper melt flow between the furnace chambers and the flooding of the shaft floor.

The two single-chamber furnaces, which are part of this order as well, will be placed in the casthouse between melt-

7.7

tons per hour will be the capacity of the largest Ecomelt furnace at Otto Fuchs.

OTTO FUCHS KG

As an internationally operating and leading company in the non-ferrous metals industry, Otto Fuchs KG is especially known as a strong supplier of high-quality semi-finished products (forgings, extrusion products and rolled rings made of aluminium or other metals) and of forged car wheels ready for mounting. Among other things, Otto Fuchs forged products are used in the automotive, aerospace and construction industries.

ing furnace and casting unit. The molten metal will be transferred from the Ecomelt melting furnace to one of these furnaces for possible re-alloying. Finally, the melt will be transferred via a casting launder to the casting machine, as needed. Both of these furnaces will be hydraulically tiltable. This arrangement ensures a continuous casting operation and reduces downtime for alloy change.

The amount of scrap is dynamically rising: While in 1995 some 400,000 tons of scrap were generated in Germany, in 2007 (before the financial crisis) the total scrap production was already 850,000 tons. For 2020, the German scrap production volume is estimated to be more than 1.5 million tons.

Due to its material value, aluminium recycling is economically rewarding. With the future operation of five Hertwich Ecomelt furnaces, Otto Fuchs will have optimally adapted to this development. ♦

Energy savings with high currents

WORLDWIDE

A new, important module has been added to the X-Pact® world of electrical and automation systems for electrolytic strip processing. The new X-Pact® High Current switched-mode power supply units are an innovative solution for more sustainable production.



- X-Pact® High Current switched-mode power supply units enable customized, module-based DC power supply for electrolytic processes in the steel industry.
- The compact design makes the system perfectly suitable for new plant installations and upgrades.
- As this SMS group solution saves more than 40 percent of energy and reduces the costs of installation, commissioning and maintenance, it qualifies as an Ecoplants module.



Here you can find more information on X-Pact® High Current.

During the many years that electrolytic treatment plants are in operation, market environments can change dramatically. Emission regulations may become stricter, and the costs of energy and raw materials may rise. Suppliers and operators of strip processing plants worldwide are faced with the challenge of reducing energy consumption and operating costs. Most effective levers to achieve this are the reduction of CO₂ emissions, higher availability of their plants and processes, and innovative developments that enhance strip processing performance.

Switched-mode power supplies (SMPS) are today the standard in most direct-current applications (such as charging devices, power supply units for computers, LED drivers, etc). Since SMPS for high currents (of about 80,000 amperes) reached commercial maturity a few years ago, SMS group has successfully used them in its strip processing lines.

Benefits of switched-mode power supply units of SMS group design

Alongside the system-inherent advantages of a switched-mode power supply unit, such as modularity, space-saving design and high availability, X-Pact® High Current achieves dramatic energy and CO₂ savings, thanks to which it is included in the portfolio of Ecoplants modules, SMS group's holistic sustainability concept.

In everyday production, power rectifiers are often operated at partial load as they are designed for maximum requirements. The advantages of the SMS group's switched-mode power supply units over conventional thyristor units in terms of energy savings become particularly evident during partial load operation. A replacement of older thyristor-based DC power supplies may achieve energy savings (costs and CO₂ footprint) of more than 40 percent.

What is more, thanks to the modular design of the SMS group switched-mode power supply units, plant availability will be significantly improved. Should individual power modules fail, other modules can immediately take over the DC power supply of the process, avoiding any interruption of the production process.

A defective module can be exchanged during a line stoppage in a matter of minutes by just one person. Another benefit is that the costs of keeping spare parts in stock are significantly reduced, thanks to the very small number of different modules used.

THE BENEFITS OF X-PACT® HIGH CURRENT AT A GLANCE

- High power-efficiency of more than 90 percent over much of the operating range
- High energy and CO₂ savings versus conventional thyristor units
- Ultra-low residual ripple also during partial-load operation
- Excellent control accuracy
- High availability thanks to modular design
- Power factor of the switched-mode power supply units >95
- Power factor 1
- Ease of maintenance thanks to pull-out system
- Easily expandable for capacity increases
- High current levels of up to 80,000 amperes achievable thanks to power supply paralleling
- Cost-efficient system thanks to standardized cabinet design
- UL or CE certified
- High power-density
- Alternative operating modes (pulse mode, reverse pulse mode)

Should it turn out during operation that the installed DC power supply capacity is not sufficient, further modules can be easily added to the installed units.

Alongside the "regular" control options, such as high-performance current and voltage control (low residual ripple, high control accuracy, etc.), pulse mode or reverse pulse mode operation are possible alternatives.

SMS group's comprehensive know-how and longstanding experience both in plant engineering for electrolytic strip processing and in power supply technology makes this integrated, high-performance solution for processing lines of this type so unique. ◆

AI application improves on-spec mechanical properties

WORLDWIDE

Noodle.ai and SMS digital launch AI-fueled application for the steel industry.

Leading Enterprise Artificial Intelligence® provider, Noodle.ai and SMS digital, the digitalization experts of SMS group, have launched MPV (Mechanical Properties Variability), the first joint application for the steel industry following the announcement of their partnership in June 2019.

As steel industry margins continue to shrink, one promising way for manufacturers to increase profitability is to pursue more advanced, high-strength steel production for applications such as automotive and electrical. However, production of these advanced steel grades requires much tighter control of the overall production process, which is impacted by numerous parameters across the mill.

The MPV application utilizes artificial intelligence (AI) and machine learning to create a unique 'sense, predict, and recommend' framework that addresses challenges associated

with the variability of mechanical properties in steel production. Mechanical properties include things such as yield strength, tensile strength, and elongation. The application senses patterns within mill data to fully understand the drivers of mechanical property variability. It then predicts when increased variability will occur and recommends the optimal input parameters, or PDI (Process Data Inputs) settings, required to optimize target mechanical properties such as yield strength, tensile strength, and elongation.

As a result, the MPV application can help steel manufacturers achieve cost savings three ways: by reducing mechanical properties variability, reducing alloy costs due to better variability control, and minimizing out-of-spec production, which are sold as secondary grades or scrapped. One steel manufacturer using MPV is anticipating savings of two million US dollars per year.

Less variability saves costs

"Our ability to deploy AI to produce steel with tighter tolerances allows us to address the requirements of high margin segments such as automotive and electrical, which immediately impacts our top line revenues in addition to the obvious cost savings," says Denis Hennessy, Director of Product Development at Big River Steel, after implementing the MPV application.

The MPV application uses artificial intelligence (AI) to derive predictions and specific recommendations from correlations within the steelmaking process. The application senses patterns within mill data and identifies drivers of mechanical property variability from these patterns.



Artificial intelligence helps steel producers improve the quality of their products, the availability of their plants and the efficiency of their operations.

In addition to addressing these challenges in mechanical properties variability, the AI and machine learning solutions that Noodle.ai and SMS digital have co-developed will also help steel manufacturers optimize product quality, asset availability and production efficiency. Together, Noodle.ai and SMS digital combine manufacturing equipment expertise, process modeling experience, and cutting-edge data science to accelerate time to value, enabling customers to quickly realize bottom-line impact.

“This partnership with SMS digital was created to make efficiency improvements that not only help steel manufacturers’ bottom line, but to rid the world of unnecessary industrial waste that often plagues this industry,” says Stephen Pratt, Founder and CEO, Noodle.ai. “We are encouraged by the results we’ve already seen with this application developed in partnership with SMS digital, and anticipate being able to assist an even larger list of steel manufacturers as we enter 2020 with MPV and the other applications we developed together.”

NOODLE.AI

Noodle.ai applies advanced data science to industries at the core of the global economy to create a world without waste. With Noodle.ai’s advanced Enterprise AI® applications, business leaders are empowered to make better decisions, reduce wasted energy, money, and resources, and ensure their businesses are built to last. Noodle.ai focuses on radical efficiency for supply chain and manufacturing using leading-edge artificial intelligence.

SMS DIGITAL

A market leading supplier of digitalization for plant and equipment used in steel and NF-metals production and processing, with a special focus on quality improvement, enhancement of plant availability and high-efficiency planning systems.

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. ♦

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Cost-efficient water recovery from blowdown water

WORLDWIDE

Within the scope of the WEISS joint project, SMS group - in collaboration with other project partners - has developed a new process for water recovery.

It is not often that water is on the agenda as an essential resource in steelmaking, as, until now, it has been available nearly everywhere and at any time wanted. However, water will become increasingly scarce and more expensive all around the globe. The resulting water shortage will hence have a growing impact on the production capacities in steelmaking plants in many parts of the world.

In order to offer a solution to plant operators who are facing or will face temporary or even permanent water shortages, SMS group has developed, within the scope of the WEISS joint project, a cost-efficient process to recover water from blowdown water.

For this purpose, SMS group has set up a containerized pilot plant and installed an automated, three-stage desalina-

tion system in cooperation with its partners. From the multitude of processes tested with real water made available by project partner Deutsche Edelstahlwerke in Hagen, Germany, a modularized plant concept for desalination of blowdown water in one to four stages turned out to be best suited for SMS group to flexibly meet a wide range of customer requirements.

The first stage, a low-pressure reverse osmosis, is particularly cost-efficient and able to recover 80 percent of the water in good quality. The second stage, a high-pressure reverse osmosis, can even increase the yield to more than 95 percent.

Cost-efficient reuse

The specific costs involved in this water recovery process are lower than all other conceivable alternatives for water procurement, if there is no water source like groundwater or surface water available free of charge. Seawater desalination is distinctly more expensive, even for production sites located on the coast, on the one hand, because it is necessary to construct and maintain a separate pipeline for water transport and, on the other, because there is an increased demand for energy due to the higher salt content by more than a power of ten. Also, the operating costs of closed cooling towers are considerably higher than with the new desalination process due to the enormous energy consumption of the ventilators, which, even though they may be considered minor in the context of a steelworks' energy requirements,

ADVANTAGES OF THE NEW RECOVERY PROCESS

- compact
- cost-efficient alternative in case of water shortage
- no recipient, no wastewater charges if ZLD is installed
- custom-tailored design thanks to piloting
- minimum efforts due to container solution
- expandable as needed



WEISS is the short name of the project “Efficient cooling water cycle management by integrated desalination using the steel industry as an example”.



WANT TO GO FOR A TEST?
 Interested customers can test themselves the efficiency of the method at their site and rent the remote-controlled pilot plant. For further information please go to: <https://www.bmbf-wave.de/1441.php>

are a crucial factor in total costs. In addition, there is the large space required which has not been considered in the cost analysis as land prices may vary strongly depending on the customer’s location. To treat municipal wastewater is definitely more expensive, just because of the inevitable need to remove the persistent organic residues. In Germany in particular, but also in other industrial nations, the procurement of water from the public supply is definitely more expensive, at the latest when it comes to paying wastewater charges.

To protect the bodies of water, highly industrialized countries and others with a small number of surface waters have provided incentives or passed laws favoring or even stipulating wastewater-free production processes. Such a

process, known among experts as strict ZLD (Zero Liquid Discharge), includes additional evaporation and subsequent drying of the separated salt particles. The evaporation system integrated in the WEISS concept is characterized by an extremely high resistance to corrosion, a clearly reduced tendency to scaling and a minimum energy demand thanks to heat exchangers made of plastics.

Interested customers can test for themselves the efficiency of the method at their own site and rent the remote-controlled pilot plant to pilot the desalination of their own blowdown or circuit water. This way of proceeding permits the best possible and economical plant design to be prepared.

For small to medium-size plants, SMS group has developed a variable, modularized concept housed in insulated, air-conditioned and electrified containers. This means minimum engineering effort for the customers and a high degree of cost certainty. The only required construction activities are to build a foundation. So, the plant can be expanded with minimum effort whenever necessary either to integrate another desalination stage or to enhance the installed desalination capacity. ♦

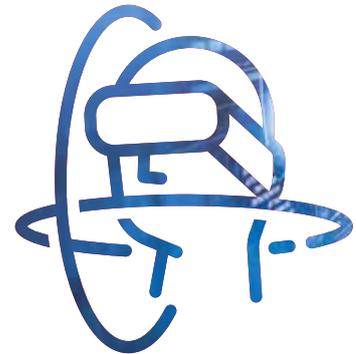
 **Dr. Angela Ante**
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One year of Digital Classroom

GERMANY

The first year of existence of SMS TECademy's Digital Classroom proved to be a complete success. A service customers can look forward to.

SMS  group



On December 5, 2018, the Digital Classroom at the Mönchengladbach site first opened its doors with the inaugural address held by Prof. Dr.-Ing. Katja Windt, Member of the Managing Board. In retrospect, SMS TECademy can say that the past year was a successful year.

SMS TECademy has managed to win first customers for a digital hydraulic system training in the Digital Classroom, among them customer Impol Seval from Serbia. Also, schools and universities made their way to the digital world and were highly impressed by the advanced technology provided there. “We think the Classroom offers great potential for our inhouse vocational training, too,” says Karsten Weiß, General Manager of SMS TECademy.

The room design provides a multitude of individual training variations/options and permits all attendants to actively participate using integrated touch screens, separate processors, 3D shutter glasses, tablets and VR glasses, which are available at all seats. Another highlight is powerwall sharing which allows, for example, a participant to copy the display on the screen of his own brought-along tablet to the projection wall.

To sum up: SMS TECademy registered a multitude of positive feedbacks, a very lively interest and great enthusiasm towards the newly created digital world. Helpful suggestions concerning the application functions have been implemented in the meantime. ♦



More
information on
SMS TECademy
is available here.



The SMS TECademy features equipment to the latest state of the art.

Hydraulic system seminar in the Digital Classroom

GERMANY

In the Digital Classroom users have the opportunity to discover new plants with the aid of virtual reality.

In July 2019, a seminar has been held at SMS group for employees from Impol Seval, Serbia. The participants were trained at the customer training center and the testfield for hydraulic systems in Hilchenbach as well as at the Digital Classroom in Mönchengladbach.

Virtual pump and filter changes

An important aspect for the customer was the opportunity to train real pump and filter changes in the virtual room with the aid of virtual reality. At first, the participants had a digital tour through the plant to become acquainted with their future working environment. This was followed by a demonstration of pump and

filter changes which the participants then had to perform themselves and train thoroughly. As a result, they learned to reliably handle the equipment and make sure future real changes can be done safely and quickly.

Advantages at one glance

Familiarization with the plant and learning future-needed skills in the absence of risks and danger. This is the way to increase operational safety and reduce production downtimes due to improper and nonprofessional working. ♦



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First training courses held by SMS TECademy at Arkansas Steelmaking Academy

Within the scope of the partnership between Arkansas Steelmaking Academy and SMS group, first courses entitled "SMS group Hydraulic Systems" were held in June and October 2019 for participants from the steel sector. Live connections to the Digital Classroom in Mönchengladbach allowed for insights into the latest technology and methodology. In addition, tablets with AR applications were used on site.

The conclusion drawn by the participants of both seminars was positive in every respect. And it showed the high demand for training courses on plant equipment.



Training courses become more digital

INTERVIEW

Karsten Weiß, General Manager of SMS TECademy, on new technologies to train plant operators.

Mr. Weiß, how important are training courses for plant operators today?

They are very important. Our training concepts are made to train the plant staff at an early stage. For this purpose, our TECademy offers a great variety of courses which are also suited for refreshing skills and knowledge. At the beginning of 2018, we inaugurated our Digital Classroom. It provides the opportunity to study maintenance activities at the plant in a virtual environment and before the real plant will have been established. This is an enormous advantage for a fast start of plant operation.

What makes the TECademy so special?

The SMS TECademy is a training academy for customers on an international basis. In addition to organizing trainings for

new plants, it offers, at several dates, numerous special trainings on selected topics from technology, maintenance and plant engineering as well as E-learning. This scope is rounded off by individual training courses specifically tailored to the needs and demands of our customers.

What are, in your opinion, the benefits from using virtual and augmented reality?

These technologies allow for a 3D view of respectively a virtual insight into machines, plants or complete halls. The learner is "standing" in the center of his plant, so to speak. He may go on and on and finally see all the parts installed, virtually remove, turn and examine them in detail.

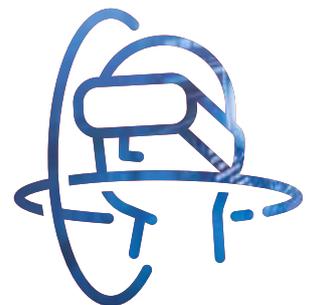
Do you have experience with these technologies?

Definitely. Based on a hydraulic system training, we have prepared a complete training scenario. The picture seen by a wearer of AR or VR glasses is simultaneously displayed at a large-size screen to enable other participants to also experience the procedure live. At the same time, smart information, superimposed to the really shown hydraulic pump, can be transferred to the viewer's field of vision via AR glasses. At that stage, various scenarios can be simulated as, for example, the disassembly and assembly of a pump in individual steps. This makes the design clear, and the assembly and disassembly procedure can be repeated as often as required – until the learner is at home in the plant. It is even possible to work "hand-in-hand" with a colleague and this way to loosen screw connections respectively position hoses or flanges.

Will the training documents become digital, too?

Yes, they will, and for that purpose we use tablets.

The electronic version of our training documentation is available via the "mySMS group" account. The participants will have personalized access to view the material. Notes they have created during the training will also be deposited in the account. Access to these documents will be possible at any time, even after the training. ♦



New perspectives for drawing lines

WORLDWIDE

Automated die adjustment, drawing force measurement, electro-hydraulic drawing jaw adjustment, new pay-off reel, chip breaking function on chamfering machine, quick replacement and overhaul of complete assemblies – such innovations of SMS group's Technical Service open new perspectives to existing drawing lines.



1,500

drawing lines for bright steel have been supplied by SMS group under the brand names Schumag, Kieserling, SMS Meer and SMS group.

Drawing lines for bright steel are true endurance runners. They are permanently in productive use under the toughest conditions. Moreover, the lines are subjected to constantly increasing requirements. The Technical Service of SMS group accompanies customers' drawing lines throughout the entire life cycle – from spare part up to digitalization. Customized service offers are prepared for the plant operators fulfilling their respective needs.

Advantageous modularity

By means of the identification of our performance modules according to productivity, efficiency, quality and Industrie 4.0 the customer can see at a glance how he can benefit from a



The new KiKaHa 3500S pay-off reel for pre-assembly in the workshop in Mönchengladbach.



“At the beginning of our service partnership, there is mostly an equipment check. We identify the current plant condition, determine the demand, and make concrete, customer-specific proposals for quality and performance optimizations and preventive maintenance. We make sure that customers are able to process modern materials, produce permanent top quality and that productivity increases for all processes.”

Stefan Huppertz, Service Engineering Long Products, SMS group



“We have already successfully realized many of these innovations at our customers worldwide. The spectrum ranged from maintenance orders, overhauling assemblies up to complex modernizations. In all cases, high expectations of our customers have been met.”

Dr.-Ing. Philipp Stüer, Head of Repairs and Modernizations
Service Long Products, SMS group

new technology or a service. Modularity not only applies to the service overview but also to the design concepts of the machines, irrespective of whether they have been supplied under the names Schumag, Kieserling or SMS. By replacing complete assemblies SMS group makes service easier, easier to plan, less expensive, and more time-effective. For all machines of a drawing line from pre-straightener via drawing unit, hydraulic impact shear, two-roll straightener up to chamfering machine the Technical Service offers efficient replacement and overhaul of assemblies.

Production-enhancing material preparation

Thanks to the new safety concept, the new pay-off reel KiKaHa 3500S enables plant operators to perform the coil preparation at full production speed increasing productivity on average between five and ten percent. The pre-straightener downstream of the inlet section may be supplied in a heavier-duty design to be able to straighten higher-strength grades.

Intelligent drawing units

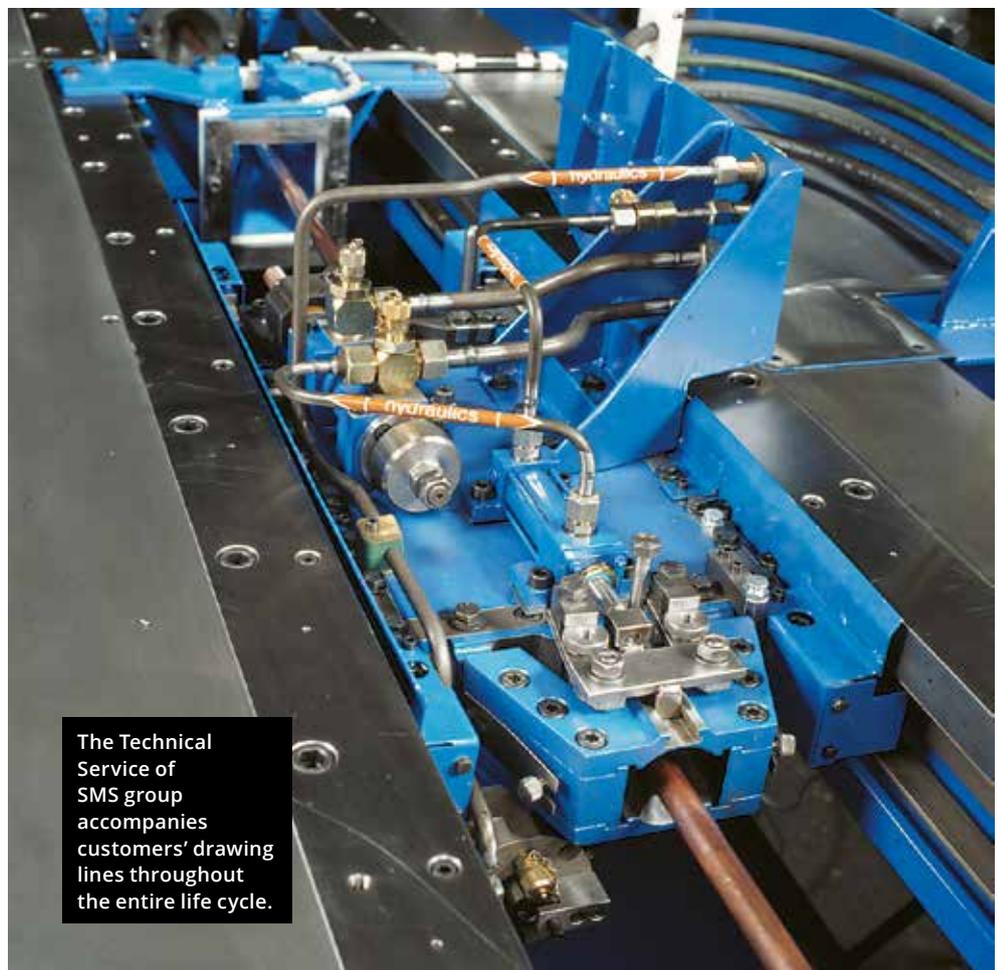
For the new drawing force measurement of SMS group the sensor system is integrated directly downstream of the motorized die. It provides data for digital process monitoring and continuous quality documentation. Drawing force measure-

ment enables real-time analysis of the process, which means that the forming force is measured on the die, thus providing information on machine utilization. Based on these visualized data, optimization potentials are visible and the drawing process can be taken to the limits of maximum productivity. This results in enhanced productivity, maximum machine utilization, reproducible quality, but also equipment protection against overload or recognition of incorrect material.

With the automated die adjustment the straightness of the material is optimized without intervention of operating personnel. To achieve this, a laser measurement device checks for deviations in the area of the impact shear and aligns the die. A motorized adjustment of the die holder by means of the control unit (joystick) can already be realized during ongoing production achieving a major advantage as regards the productivity compared to plants with manual die adjustment when the die can only be adjusted after the machine has been stopped. No marks particularly on thin, sensitive material even at highest production speed – this is one of the main advantages of the new electro-hydraulic drawing jaw control which also ensures optimized material transfer between the carriages.

Perfect finishing

The Technical Service of SMS group provides a whole range of options for the impact shear, e.g. the existing old Bachmann control can be updated with a modernization kit. Or



The Technical Service of SMS group accompanies customers' drawing lines throughout the entire life cycle.

one goes yet another step and replaces the mechanical impact shear with a more efficient, more maintenance-friendly and more precise hydraulic solution. Digitalization has also entered the straightening machine: with straightening force measurement tolerances and thus quality can be improved. An overhaul of the roll set and possibly required redesign of the roll contour enabling the straightening of higher-strength materials also contribute to this. For the chamfering machine the chip breaking function is one of the outstanding new features causing the chips to break during the chamfering process. As a result, the chips can be taken away in an easier and more effective way.

Industrie 4.0

Together with sensor system and analyses, the innovations in the drawing line are the core features for a plant capable for Industrie 4.0 which can be further expanded by the Technical Service of SMS group. This includes the implementation of Genius Basic. With this digital tool all processes or signals of the line can be monitored and clearly displayed. Limits for each process step can be defined and overloads are thus detected early. Existing machine controls S5/S7 can be upgraded with TIA (Totally Integrated Automation), a cutting-edge portal solution for digitalized processes. New digital possibilities also include the electronic parts catalog eDoc of SMS group so

that time-consuming searching in comprehensive manuals is no longer required. The corresponding component can be identified and ordered directly online with the browser on the screen of a PC, laptop or tablet. ♦



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Building on experience

WORLDWIDE

With individually combinable concepts for plant servicing, the Technical Service of SMS group offers tailor-made solutions for every need.

Efficient servicing concepts are constantly gaining in importance.

Low prices, high quality. Competitive pressure is constantly rising and efficient servicing concepts are constantly gaining in importance. But regardless of whether a drawing line, a cold pilger rolling mill or a wire rod mill is in operation – for maintaining a plant the factors quality, productivity, production reliability and the running expenses are always in the focus of the plant operator. Consequently, the maintenance strategy has to be planned and realized on the basis of the current plant condition and in consideration of all parameters over the entire course of the year.

Three maintenance types

To meet these requirements, the Technical Service of SMS group offers assistance for implementing customized maintenance strategies. Basically, many maintenance types differ from each other. In the following, the three most common types are described: outage-related, preventive and condition-oriented maintenance. Outage-related maintenance remedies the fault when it occurs and accepts a plant failure. In the event of preventive maintenance inspections are carried out in a time-based manner so that faults are recognized early and then eliminated. To catch the right time for a replacement in particular for critical components, condition-oriented servicing is required. Here, sensors measure symptomatic characteristics. As soon as the system exceeds a limit value an alarm is triggered.

OBJECTIVES OF MAINTENANCE

- Prevention of system failures
- Maximum use of plant service life
- Improving operational reliability
- Increasing plant availability
- Optimizing operational procedures
- Reducing faults
- Forward cost planning

Individually combinable

To make sure that maintenance objectives are achieved, SMS group offers individual modules for maintenance support. Since all solutions offered can be combined among each other to an individual service package the machine can be constantly optimized over the entire life cycle.

The individual service solutions at a glance:

- **Equipment check:** Specialists record the machine condition offering a well-founded decision-making tool for servicing and/or modernization measures.
- **Alignment check:** Specially trained service technicians check the geometrical alignment of the plant forming the basis for proper profile quality.
- **Hydraulic and electrical optimizations:** The control-related production process is analyzed by SMS group service technicians.
- **Maintenance support:** The Technical Service offers the required support to its customers at all times, regardless of hydraulics, electrics or mechanics, personnel capacities or know-how.

Regular replacement of key components reduces the risk of failures:

- **Local repair:** Replacement of complete assemblies instead of individual spare parts reduces the standstill period in most cases to a minimum.
- **Repair at SMS group:** A worn assembly is sent to SMS group and returned after a general overhaul and inspection.
- **Quality always within reach:** Assembly repaired by OEM secures high plant availability.

Based on the current machine condition a service prioritization can be specified in sequence, frequency and timescale to ensure that a customized service package is compiled for each machine. In this way, a holistic and sustainable maintenance approach is made possible. ◆



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The Technical Service of SMS group provides support for implementing customized servicing strategies.



Full service for maintenance downtimes

INTERVIEW

Dr.-Ing. Philipp Stüer, Head of Repairs and Modernizations Service Long Products, SMS group, explains how maintenance downtimes are used as worthwhile investment for future plant safety and productivity.

Regularly scheduled maintenance standstill periods represent a considerable cost factor for plant operators. When planned intelligently and carried out efficiently, they ensure however smooth continuous operation of the entire plant and constantly high production qualities. In this way, maintenance downtimes can be used as worthwhile investment for future plant safety and productivity.

The Technical Service of SMS group offers comprehensive know-how and the required resources along the entire process chain for planning, implementation and analysis of maintenance downtimes.

The Technical Service of SMS group is characterized by highly qualified staff members with respective service tools and quick access to mobile machining units, proper spare parts and maintenance and service workshops worldwide.

Mr. Stüer, what is the planning process for specific maintenance assignments at the customer?

Philipp Stüer: Effectiveness and efficiency of a maintenance downtime depend on an exact planning process of all details. In cooperation with the plant operator we develop binding timetables of all inspection and maintenance measures. As plant manufacturer we have all plans and technical documentations and a major advantage is expert knowledge of our engineers and technicians who have already engineered, manufactured and commissioned the plant.

How can personnel, spare parts and tool requirements be planned?

Philipp Stüer: Personnel planning will be organized according to customer demands. The team may comprise service experts of SMS group, customer or even external staff. Required spare parts and standard or special tools or mobile machining units must also be planned carefully and in advance. As part of an analysis prior to the start of maintenance downtimes, we match the parts warehouse with real machine requirements. The result is better availability accompanied by cost reductions through the abandonment of unnecessary parts and optimization of warehouse capacities.

How does SMS group ensure that an exact diagnosis of the plant condition is performed?

Philipp Stüer: We hold special checklists for each plant type forming the basis for comprehensive and always identical inspections. This is followed by priority evaluations of the upcoming repair work. We also make recommendations concerning which work should be carried out during one of the next maintenance shutdowns to ensure that the plant quickly returns to service.

The fact that customers benefit from the know-how of SMS group as plant manufacturer is particularly noticeable in re-commissioning. Can you explain this further?

Philipp Stüer: Functional efficiency and reliability of replaced parts and assemblies are tested with our specially developed testing plans and methods allowing the plant to quickly run up to the defined performance and quality level.

Following a successful plant restart SMS group combines the conclusions gained in a detailed analysis. Why?

Philipp Stüer: To be able to track down improvement poten-



“Maintenance downtimes can be flexibly matched with the current order situation while it is possible to increase the level of plant utilization.”

Dr.-Ing. Philipp Stüer, Head of Repairs and Modernizations Service Long Products, SMS group

tials for future maintenance downtimes always with the objective of saving precious time and reducing future expenses as well as costs in the interests of the customer. In addition, the analysis results and the reports of the plant condition form the basis for optimizations. Our knowledge of the local situation places us in a position to perfect the next downtime planning as regards personnel, spare parts and tools.

How can future standstill intervals be organized?

Philipp Stüer: Depending on plant configuration and assignment, flexible instead of regular standstill intervals can also be determined. To achieve this, a close dialog with our customer is needed and maintenance downtimes can be flexibly matched with the current order situation while it is possible to increase the level of plant utilization. Since we additionally offer customizable maintenance contracts the companies preserve the chance to be able to react to changing realities also during the course of the year. ♦

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From old to new

CHINA

Service experts from SMS group complete a successful cold pilger mill overhaul.

Cold pilgering is a rolling process that reduces the diameters and wall thicknesses of metal tubes. SMS group has pioneered this technology by using a special cold forming process, which is both cost-efficient and indispensable for a wide variety of different applications. You can even utilize our cold pilger mills to produce difficult materials that are beyond the capabilities of other processes.

SMS group Technical Service has now realized a major modernization project with a China-based operator of a cold pilger mill – the KPW 25 VMR. The machine was upgraded to an “as new” condition within a very short period of time.

Upgrading required

After more than a quarter of a century of operation of one of the cold pilger mills supplied by SMS group, the operator decided to carry out a basic modernization of the machine with the aim to increase availability and meet the current safety standards. The limited availability of spare parts, especially electrical components, was causing additional challenges. The customer needed a reliable partner to be able to deliver a large quantity of tubes of consistent quality. As a result, the customer commissioned SMS group with the task of modernizing it.

SMS group experts carried out an on-site inspection based on a detailed, machine-specific checklist. During the SMS group equipment check specialized know-how of experienced service staff and engineering experts is combined to develop a tailor-made inspection schedule. A customized checklist ensured the precise assessment of the condition of the cold pilger mill. The aim was to ensure that the maximum potential for improvement was utilized. Based on the results, opportunities for upgrading the existing cold pilger mill according to customer’s requirements in terms of product

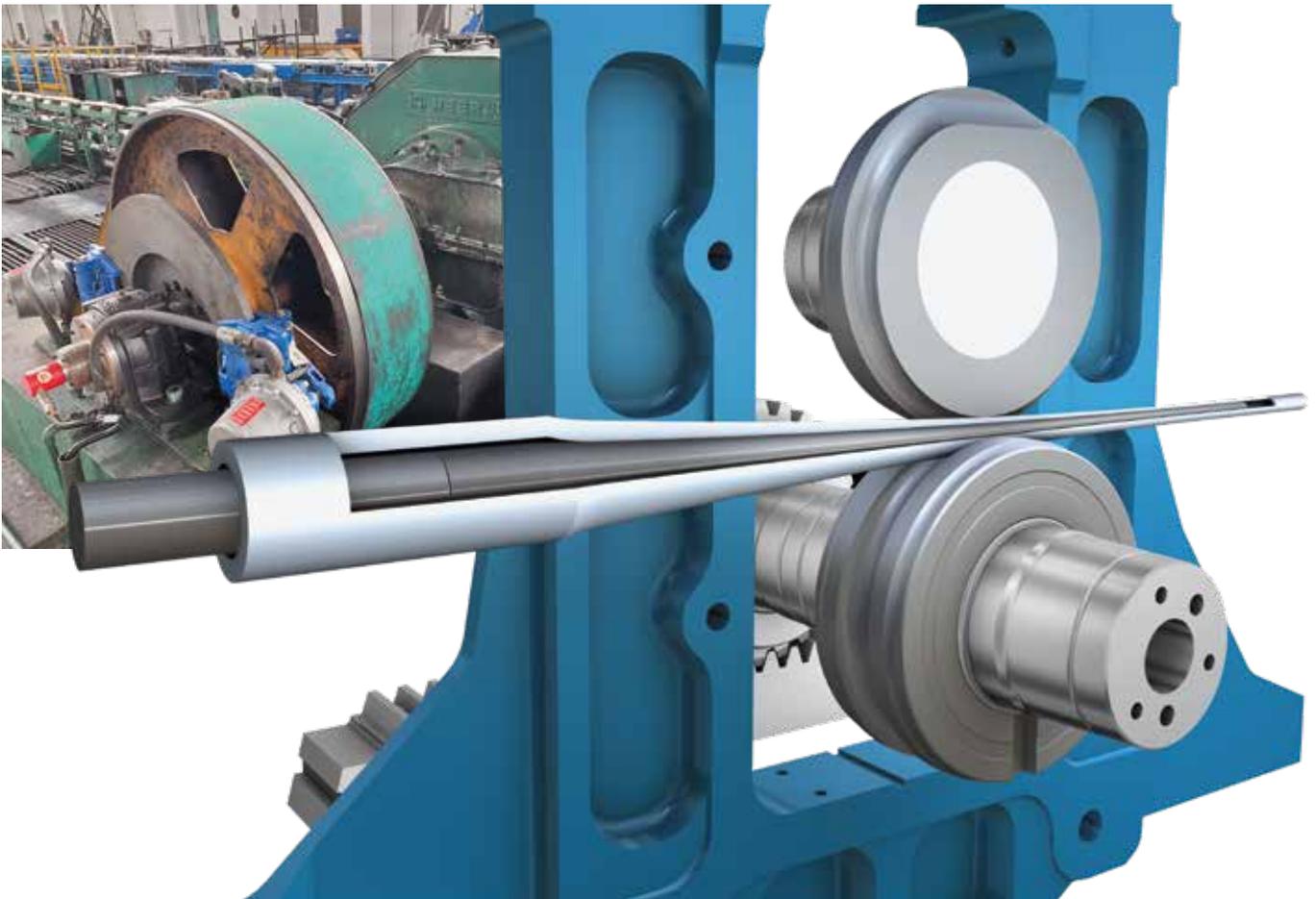
quality and machine availability were evaluated. SMS group then recommended measures for an overhaul that safeguards the quality and availability of the equipment over the long term.

Comprehensive service report and overhaul concept

All of the inspection work performed was documented in a detailed, clearly structured, and easy-to-understand service report. It included the results of the equipment check at an assembly and component level. The electrical and mechanical equipment inspection showed that the electrical hardware, software, and drives were obsolete, and that many mechanical parts needed to be repaired or replaced. These results provided the basis for a detailed specific technical concept for the overhaul, including a customized mix of repairs and modernizations. The concept included among others the repair of crankshaft incl. counterweights, connecting rods, bearing unit, brake with brake disc, exchange of hydraulic parts, several parts for further assemblies and a new mill stand. Furthermore, the transmission shaft, the shear pin coupling, and the angular gearbox were replaced with an electrical shaft. In addition, the switch cabinet, control desk with HMI and several drives were exchanged and a Siemens S7 system was employed as control system.

Reliable Partner

SMS group planned the revamp during a routine plant shut-down period. Since the core parts such as crankshaft and roll assembly were manufactured and quality-checked in Germany machine capacities in the service workshop in Mönchengladbach had to be planned six months in advance so that they were on site before the start of the shut-down in China. The option of manufacturing and overhauling parts or assemblies in Mönchengladbach is interesting for customers not only in Europe but also in North and South America. Customers located in Asia, on the other hand, are able to have parts supplied by a workshop from SMS group’s worldwide manufacturing network. SMS group has expanded its international workshop, service, and production capacities, ensuring its customers benefit from quick and uncomplicated services wherever they are. This



High availability and efficiency of the plants are a requirement for competitiveness in metal processing. Regular inspections and maintenance measures form the basis for safeguarding plant efficiency. To ensure that weak points are detected at an early stage, SMS group has developed machine-specific equipment checks.

allows for an optimum division of labor between the customer and SMS group.

In the case of the KPW 25 VMR, the plant technicians dismantled the plant on site and sent core parts and assemblies to Mönchengladbach. The bearings were then renewed, bores repaired, stands reassembled, adjusted accordingly, and quality-checked. Following their return shipment and re-assembly at the customer, cold commissioning was carried out. While the stands were being reworked in Mönchengladbach, the SMS group service technicians stayed on site to replace the electrical and hydraulic parts and prepare for reassembly and commissioning. Meanwhile, the customer's production facility runs just like a new plant. "Following the

overhaul and modernization, the machine's safety and availability have been increased significantly. Our customer is now able to handle orders with even higher quality requirements," says Frank Isken, Project Manager Technical Service, SMS group. ♦

 **Frank Isken**
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Rapidly implementing smart ideas

WORLDWIDE

No matter how complex and different they may be, the Technical Service of SMS group puts all ideas for product improvements to the test.

The Technical Service is committed to implement ideas for product improvements in a quick, effective and non-bureaucratic manner. Each idea – whether from customer or employee side – increasing productivity, efficiency or plant service life is internally examined by expert staff and developed further. A good example is the modified supply pipe of secondary cooling water to the CSP® segments by applying flexible hoses which has been realized at an American customer.

Sophisticated cooling system

In a secondary cooling system the water supply to the segments is safeguarded by a complex piping system. During segment changes several supply pipes have to be disconnected and then reconnected. This generates a high expenditure of time to the operator restricting plant availability to a great extent.

Prior to every installation, the pipes must be precisely aligned. What makes the alignment more difficult is that the pipes become deformed after extended use. Furthermore, the pipes have a heavy weight whereby erection requires at least two staff members and a crane. In addition to that, the pipes are connected with bolts and the fastening of all bolts with screws (8 screws for each pipe side) is time-consuming due to the limited assembly space and mounting bracket.

During the installation of the supply pipes it is important to check the seals which have to be replaced when worn. If one of the many seals is forgotten during erection it will be identified during a water test. Necessary rework requires another high level of assembly effort since the associated components have to be again completely dis- and reassembled.

Smart idea, rapid improvement

The idea to use flexible cooling hoses with Camlock fasteners instead of a fixed piping brings considerable advantages. Erection can be performed by only one staff member since the hose lines are lighter. Thanks to the flexibility of the hoses an expensive alignment of the pipelines can be omitted. The turnbuckles enable a quick connection, the use of bolts, seal rings and retaining plates can be completely dispensed with. Consequently, work expenditure during installation of the complete pipework is reduced from approx. 12 to about 3 hours. For the protection against slag and steel splashes the flexible hose part is encased with a protective refractory cover.

The concept works well. After conversion work carried out by the Technical Service in Pittsburgh and a successful test at an American customer, all CSP® segments of this customer were equipped with new cooling hoses.

The modification of the cooling hoses is an example for the approach "Design for Service". This campaign was initiated by the Technical Service to examine and implement product ideas at short notice, independent of day-to-day business. Minor as well as comprehensive modifications offering added value to the customer and improving operation and maintenance of machines and plants are in the focus. ♦

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WELL SERVED
To ensure that failures are prevented SMS group offers solutions in predictive maintenance.

Valuable assistance

GERMANY

With in-house spare parts production, modern equipment and flexible shift system the service workshop of SMS group provides support for each problem.



**AVAILABLE
ROUND THE CLOCK**
Thanks to flexible shift
planning, customers re-
ceive help immediately
in case of emergency
– day and night.

- **Modernization, maintenance, repair. The service workshop of SMS group is able to flexibly handle all orders.**
- **Customers benefit from short repair times, the use of cutting-edge technologies and total quality management.**
- **With the help of digital solutions – such as predictive maintenance – downtimes can be further reduced.**

When plant operators are reducing their scheduled summer and winter shutdown periods from about 4 to approx. 1.5 weeks it means an enormous leap for availability, productivity and thus profitability. To achieve this, a number of factors have to be considered which must be made to mesh smoothly. The concept developed by service experts from SMS group for the service workshop in Mönchengladbach provides the framework – greatest possible customer benefit through optimal processes. In this way, downtimes can be significantly minimized also for other customers.

Why size and flexibility do not contradict each other

Filipe Martins Ferreira, Head of Service Workshop Europe at SMS group: “Customers often think that such a big company like SMS group is only strong when it comes to developing and supplying innovative technologies, however, in dealing with repairs and maintenance our size is associated with slowness and bureaucracy. But the opposite is true: we have positioned our service workshop in such a way that as much flexibility and speed as possible are provided. In fact with the best and most experienced experts in guaranteed and certified OEM quality.”

How the Service benefits from strategic partnerships

New services and added values of SMS group's service workshop in Mönchengladbach come at just the right time. Indeed, the markets are changing: digital transformation, new high-strength materials and increased competitive pressure demand for an increasingly higher level of specialization and the focus on core competences. Technologies and plant components are too sophisticated for customers to provide their own maintenance and repair resources completely inhouse. Who could render better assistance in such a situation than the plant manufacturer? According to Filipe Martins Ferreira, the customers of SMS Services also benefit from OEM product developments: “When for example new contours for straightening rolls are available through our research and development we can introduce

these during a service or repair assignment – in other words, we turn optimized contours in the straightening rolls. In this way, the customer not only maintains functional capability of his plants but additionally enhances his productivity and quality through new technologies.”

Why intelligent use is also important when state-of-the-art equipment is applied

“In 2013, we launched a new concept for our service workshop. Until this point in time repair orders were carried out by ongoing production. But this was far too inflexible,” explains Filipe Martins Ferreira. The new workshop was set up on the basis of various analyses including customer requirements while workshops widely scattered until now were integrated into a powerful unit. Since 2016, the service workshop in Mönchengladbach is fully operational.

The equipment available is state-of-the-art and includes most varied test devices, new CNC machines and machining centers as well as all facilities for comprehensive quality management and final commissioning tests. Filipe Martins Ferreira: “Our modern equipment alone is not yet decisive for the success. Intelligent use of capacities is essential. We have developed customized solutions providing good capacity utilization of our machine resources on the one hand, but also having sufficient free spaces to be able to react to short-term customer requirements in a quick and flexible manner. Customers benefit from reduced repair times.”

How customers are better supported by key competences

Plants for bright steel, wire rod, pipes and tubes, steel bars and for the manufacture of sections and all forging plants and presses are in the focus of SMS service workshop. The range of services includes three major areas:

- Short-term repairs
- Performance of scheduled maintenance shutdowns
- Servicing within the scope of predictive maintenance

Other tasks also include modernizations and the production of so-called high-value spare parts – i.e. spare parts providing particular know-how.

What is important when it comes to maintenance shutdowns and predictive maintenance

Maintenance shutdowns and servicing within the scope of predictive maintenance are among the main tasks of the ser-



“We have organized our workshop in such a way that as much flexibility and speed as possible are offered – with certified OEM quality.”

Filipe Martins Ferreira, Head of Service Workshop Europe, SMS group

vice workshop and are meticulously pre-arranged together with the customer.

In the case of predictive maintenance this involves preventive maintenance when most modern sensor technology and digitalization are applied. With predictive maintenance measures, plants can be serviced proactively so that downtimes are reduced significantly. Prior to a malfunction, maintenance work can be ideally initiated by an intelligent data analysis. Such action is more targeted than regular maintenance during scheduled downtime periods.

“The more information is available and the better the information provided beforehand, the more our maintenance assignments and the required parts can be specifically prepared. This is a prerequisite to make sure that downtimes are reduced considerably which applies to the scope of predictive maintenance as well as to scheduled maintenance shutdowns”, comments Filipe Martins Ferreira.

A second key factor for valuable time savings is overhauling complete assemblies. Thanks to a modulated machine

structure, complete assemblies can be removed and ideally replaced directly by an existing assembly. The assembly is then locally machined either by the Technical Service of SMS group or else by SMS group’s service workshop in Mönchengladbach, where stocked spare parts or provided semi-finished products adapted on the plant can be accessed by the shortest route.

For Thy Marcinelle S.A. (T.M.) in Belgium which is part of the Riva Group operating a two-strand wire rod mill SMS group’s service workshop has overhauled for example the gear unit of the loop laying head during a maintenance shutdown. The gearbox was delivered to the service workshop on December 18, 2019, and was returned to the customer on time on December 30, 2019. Thy Marcinelle’s head of maintenance was highly satisfied: “Proper maintenance work can only be ensured by good advance planning. We are pleased to have SMS group as partner guaranteeing reliability.”

How to optimally prepare for short-term repairs

Things always seem to happen when you least expect them – this proverb perfectly describes what it means when it comes to failures due to defective plant components. Then, repair measures have to happen very quickly.

It is a major strength of SMS group’s service workshop experts in Mönchengladbach to be perfectly prepared when unexpected cases of damage occur.

In Filipe Martins Ferreira’s words: “We have matched our machine capacities as well as our personnel resources with these special repair situations. This means, that our flexible shift planning enables us to be adequately prepared to handle emergency cases of the customers so that help can be provided immediately or even at night. For we know: almost each damage case means significant financial losses to our customers when operations are interrupted. For that reason, all repair orders are important for us. We look after each order with utmost priority – regardless of the contract volume.”

For repair parts manufacturing on demand is available in the workshop and service experts are able to manufacture required parts expeditiously.

How a repair assignment is executed in practice and how the deadline is met despite additional expenditure is shown in the example of a French customer. It dealt with the repair of six bevel gears and two finishing blocks of a wire rod mill. In only 14 days, SMS group has carried out the disassembly, damage analysis, reconditioning, replacement of antifriction bearings and wear parts and the quality test, the shop assembly and the packing including return shipment to the

customer. Within this time period, communication took place with the customer at the same time about the inspection results, recommendations and quotation approvals.

Why OEM upgrades are particularly worthwhile

Modernizations are also part of the workshop's scope of services. And it is an advantage that as-new solutions are virtually created from old installations at comparatively favorable conditions. Equally important advantages are also certifications concerning in particular plant operators who manufacture components for the aerospace industry or for automotive applications. Modernization solutions of SMS group as plant manufacturer ensure that costly new certifications or audits for their production processes are saved or significantly reduced.

Against this background, a general overhaul of a horizontal forging machine from 1978 should be mentioned. Following the planning, clamping and upsetting slides, overload protection and other assemblies were overhauled. The customer benefitted from a significant increase in efficiency and productivity.

But the example also shows which extensive experiences SMS group's service experts have gained. Although we live in the digital age and all data and plans of younger machines are instantly provided digitally for service orders this might be different for older installations. The machines of SMS group are often 30 years old or even older. Only old plans and drawings are available. Filipe Martins Ferreira: "Everything that has ever been manufactured by us can also be repaired by us!"

Why the focus is on experienced service staff members

Department Head Filipe Martins Ferreira regards his staff members as the greatest value and potential for the service workshop. "For our business including maintenance work, repairs and modernizations the know-how and the experiences of our experts are the most important basis. Everything will build on that – also the benefit for our customers. Only with excellently trained and experienced staff members I am able to provide perfect quality for very short-term enquiries. Everything should right away come up to the necessary standards", says Ferreira.



TURNING OLD INTO NEW
 Each installation ever built by SMS group can be repaired and upgraded in the workshops.



SECURING THE NEXT GENERATION

To make sure that workshop know-how is preserved, about 60 percent of the trainees are employed.

In order to ensure that this is also possible in the future, SMS group is intensively looking after suitable junior staff for the service workshop. Filipe Martins Ferreira: "We want to get young people enthused by the varied tasks, the technology, the individual liberties and self-responsibility. It is important that our experiences do not get lost and our knowledge is shared in good time. This is a great challenge which we nevertheless manage well." As a result, 60 percent of the trainees on average are employed in our workshops every year.

How digitalization has an effect on the service workshop

According to Filipe Martins Ferreira, digitalization is groundbreaking and future-oriented for the Technical Service. The Technical Service of SMS group offers already numerous innovative solutions such as predictive maintenance, Genius CM®, the electronic parts catalog eDoc or Smart Alarm.

For the service workshop, digitalization means that specialists are supported intelligently during their work with plant and machine data. Customers benefit from a transparency on the status of repair and maintenance orders available at all times and locations. This enables plant operators to adapt their own planning better and earlier.

Where is the service workshop going in future

For Filipe Martins Ferreira and his team a future vision is clearly mapped out: "We are working intensely to ensure that global expertise of SMS group's service workshops is brought together for customers' benefits, which means that expert knowledge is localized, linked and transferred. In doing so, we learn from each other, since we are working all over the world in different markets and cultures where the requirements on services differ from each other. We have to bear this in mind to make sure that tailor-made services contribute to solutions and high customer satisfaction in a more targeted manner. I believe that this is what our customers expect from us as Leading Partner in the World of Metals." ♦



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Maintenance meets new technologies

GERMANY

During the Cold Pilger Maintenance Staff Day in Mönchengladbach customers and experts of SMS group exchanged ideas and methods on products, services and technologies.

SMS group creates platforms regularly from which SMS exchanges ideas with its customers about current product developments and appropriate services and technologies. At the end of November 2019, about 20 maintenance experts from Europe, China, Russia and Canada attended a two-day Cold Pilger Maintenance Day in Mönchengladbach, Germany.

Talks and discussions focused on current everyday problems of maintenance experts

and central issues such as: what developments can be expected? How can we help to improve the performance of existing machines through modernizations? And how will digitalization affect our future cooperation?

Holistic concepts

Answers presented by SMS group were among others holistic service and maintenance concepts, practical examples of redesign and upgrades implemented as well as technical innovations. With contributions on the subjects of smart maintenance, Genius CM® and the presentation of SMS digital, SMS group additionally presented itself as partner for digitalization. Customers were able to practice hands-on navigation through the new service eShop, experience the Digital Classroom and make themselves familiar with the possibilities of Smart Alarm.



In our Digital Classroom the participants gained first insights in future-oriented training techniques and methods of SMS TECademy.



The event provided an opportunity for many expert discussions.

“Intensive personal interaction is an excellent basis to understand our customers even better and develop required solutions that help to master the challenges of the changing requirements of the market in an economic and sustainable manner. It quickly became clear that we had met the interest of the customers with our selection of topics. Already one day later some participants met for further discussions.”

Frank Jansen,
Division Head Service Long Products

A particular highlight was undoubtedly a guided tour of our service workshop and the production and assembly facilities in Mönchengladbach. In this context, not only repair projects of our workshop were visited but also construction units of the latest cold pilger mills ordered from us could be inspected.

Customers as well as SMS group staff members were highly satisfied with the active participation, new solution approaches and the discussions. ♦

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SMS group delegates at the Hyundai Steel Tech Show 2019.

Visiting Hyundai Steel Tech Show

KOREA

In October 2019, Hyundai Steel Tech Show has been held in Dangjin. The event lasted for three days and attracted about 5,000 visitors. SMS group had been invited to participate in the opening ceremony as VIP member and gave several lectures. In a paper entitled “Digitalization at SMS group and Industrie 4.0”, the company introduced the next major technology steps. Further papers concentrated on the Technical Service of SMS group. A major topic, in addition to presenting the range of services and latest information on oil film bearings, was the repair and overhauling options of core components.

Modernizations and repairs

Over the last few years, SMS group has carried out several modernizations and repair work in the plants of Hyundai Steel. In 2017, for example, the customer placed an order covering the gearbox repair of a CSP® plant pendulum shear. This was followed by an order to repair a drum-type shear of a cold rolling mill tandem line just one year later. In 2019, too, SMS group has been awarded a repair contract for the spur and mill-pinion gear unit of a cold mill. One further spur and mill-pinion gear unit of that plant is planned to be repaired each year until 2022. Carrying out such demanding repairs that may significantly prolong the life cycle of plants and equipment, the Technical Service of SMS group meets the customers’ requirements in these days. ♦

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Cold Rolling & Processing Technology Day

INDIA

The lectures presented by SMS group on occasion of the fourth Cold Rolling & Processing Technology Day focused on digital solutions.

On November 15, 2019, the fourth Cold Rolling & Processing Technology Day of the Steel Group association has taken place in the Indian capital New Delhi in cooperation with the Steel Users Federation of India and with the participation of



Torsten Seeger, Project Director in the flat rolling mills business unit of SMS group, gave a lecture on digital solutions for cold rolling mills.

SMS group. SMS group presented itself as a leading provider of digital solutions.

It has a certain tradition for SMS to accept the invitation of the Steel Group association, which was founded in India in 2010, and attend the annual Cold Rolling & Processing Technology Day, because the organizers offer a platform for information exchange and networking that is popular in the regional and emerging markets of Asia. The approximately 140 participants, including mainly cold strip manufacturers and suppliers of equipment as well as technical and investment advisors, met on November 15, 2019.

Digital solutions for cold rolling mills

At the conference, Torsten Seeger, Project Director in the flat rolling mills business unit of SMS group, gave a lecture on "Industrie 4.0 for cold rolling mills – Digital solutions". In his lecture he presented current digital solutions from SMS group for cold rolling mills and touched topics as intelligent components, assistance systems, Product Quality Analyzer (PQA®), Smart Maintenance, Smart Alarm and eDoc.

Atanu Dey, Associate Vice President Sales and Marketing, electrical and automation systems at SMS India Pvt. Ltd., also focused on the topic of Industrie 4.0 in his presentation. His lecture was entitled "Shaping the next industrial revolution with you – Industrie 4.0 solutions in quality and productivity from SMS group". Since the beginning in 1871, SMS group has systematically relied on technological advantages. In order to meet the requirement as Leading Partner in the digital field as well, the company SMS digital GmbH was founded in 2016. Atanu Dey reported about digital solutions that have been developed so far and launched on the market with the participation of the young company. This includes, for example, solutions related to quality-relevant processes, such as the Product Quality Analyzer (PQA®), and digital products focussing on the production or plant condition. Here, he highlighted the Production Condition Analyzer (PCA). This system enables the quick identification of process anomalies and helps the plant operator to eliminate the deviations.

Torsten Seeger summarizes the conference: "The solutions SMS group offered in the fields of digitalization and Industrie 4.0 met with great interest among the participants, who predominantly represented the Indian market. Compared to the Steel Group's events in previous years, this range of topics has enormously increased in importance." ♦



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Global focus on surface technology

GERMANY

At the beginning of November, SMS group held its annual Roll Coating Committee Meeting.

This year, the event was hosted by DUMA-BANDZINK GmbH in Mönchengladbach. The meeting focused on a detailed exchange of experience in the global development of services for roll processing and coatings. SMS group experts from Brazil, China, Russia, the U.S.A. and India participated in the event.

The meeting featured particularly in-depth discussions on field trials with new coatings for rolls in strip processing lines, process optimization at the individual service locations and differences in calculations and cost structures. Together, the international group visited the Institute of Surface Technology (IOT) at the Faculty of Mechanical Engineering of RWTH Aachen University. The IOT actively conducts research and development in the fields of physical va-



pour deposition (PVD), thermal spraying and soldering technology, as well as in the simulation and modelling of these processes.

Key to innovative products

“Surface technology provides a key to the ecological, technological and economical solution of current problems in the development of innovative products,” explains Dennis Bollien, Product Manager Coating at DUMA-BANDZINK GmbH. “In the Annealing and Galvanizing Lines business unit, our service workshops further increased their productivity in order to machine and coat over 1,200 rolls worldwide in 2019.”

Having taken all these new impulses on board, the SMS experts have returned to their respective locations and will act as multipliers to promote the joint strategy locally. ♦

SMS service experts from far and near came together at RWTH in Aachen: Tim Königstein (RWTH), Renan de Matos Silva (SMS group Brazil), Lukas Johann (RWTH), Dennis Bollien (DUMA-BANDZINK), Heinz Krings (DUMA-BANDZINK), Evgeny Bondarenko (SMS group Russia), Curtis Bish (SMS group U.S.A.), Ulli Oberste-Lehn (SMS group Germany), Dave Hodges (SMS group U.S.A.), Amol Khairnar (SMS group India) and Wen Chengliang (SMS group China).

“Surface technology provides a key to the ecological, technological and economical solution of current problems in the development of innovative products.”

Dennis Bollien, Product Manager Coating at DUMA-BANDZINK GmbH



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Bernhard Steenken, CEO of SMS digital GmbH, presented solutions to monitor plant status and production process.

Lively exchange in the Middle East

UNITED ARAB EMIRATES

Innovate technologies and developments in the steel sector have been in focus at the Middle East Iron & Steel Conference.

The Middle East Iron & Steel Conference, the largest iron and steel conference in the MENA region, has been held in December 2019 in Dubai. The event attracted some 600 top industry executives who exchanged on current trends, challenges and opportunities within the regional and global steel markets.

SMS group was silver co-sponsor of the conference and contributed to the event with a panel discussion on "Technology and Innovation Developments" and a paper entitled "Intelligent rolling at work".

During the panel discussion on technology and innovation developments, represented by Raman Handa, Managing Director of SMS Gulf FZE, SMS group's reference projects in the region were highlighted.

Al Gharbia Pipe Company has commenced commercial production in 2019. SMS group supplied a state-of-the-art LSAW pipe mill with an annual capacity of 240,000 tons for the production of pipes to be used as onshore and offshore line pipes, including sour-gas applications.

Another highlight was the minimill SMS group supplied to Moon Iron & Steel Company in Oman. It produces 1.2 million tons per year of billets out of which 1.1 million tons are rolled into straight rebars. The minimill operates to the CMT® concept. This means the cast material is directly fed to the rolling mill.

The advantages of this design and operating concept are major cost savings in production and reduced emissions thanks to integrated energy-efficient processes.

An eye on digital solutions

Bernhard Steenken, CEO of SMS digital GmbH, read a paper entitled "Intelligent rolling at work: Plant-based self-diagnosis and process supervision with digital solutions" presenting a broad variety of solutions to monitor plant status and production process in order to increase product quality, plant availability and production performance.

Besides these contributions to the event, SMS group had several meetings with existing as well as prospective customers. The latest success of securing an energy audit at customer SULB, Bahrain, was also highlighted during the conference. ♦

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 **Further information**
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PREVIEW

OUR NEXT NEWSLETTER ISSUE ...

... will feature hot metal production as a main topic. The magazine will include a comprehensive company profile of SMS group company Paul Wurth. Active as a technology and plant engineering supplier for all areas of hot metal making, Luxembourg-based Paul Wurth celebrates its 150th anniversary this year. Paul Wurth is market leader in the design and construction of complete blast furnace, direct reduction and coke oven plants. Environmental technology for metallurgical plants and waste recovery systems complete the company's comprehensive technology and equipment portfolio for primary steelmaking processes. Paul Wurth also holds a leading position as a supplier of systems that help operators reduce the CO₂ footprint of their plants and enable a climate-neutral liquid phase - a key requirement for green steel production.

Another important topic in our next Newsletter will be the upcoming ALUMINIUM 2020 trade fair held in Düsseldorf from 6 to 8 October 2020. In a preview of SMS group's presence at the trade show, we will feature our range of plants and technologies, and our Technical Service for the aluminium sector.



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