

SMS group

newsletter

THE SMS GROUP MAGAZINE
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Everything from one source

IN FOCUS

Thanks to innovative solutions such as performance-based business models, the service offerings provided by SMS group match changing customer requirements even more precisely.

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Highly flexible cooling process

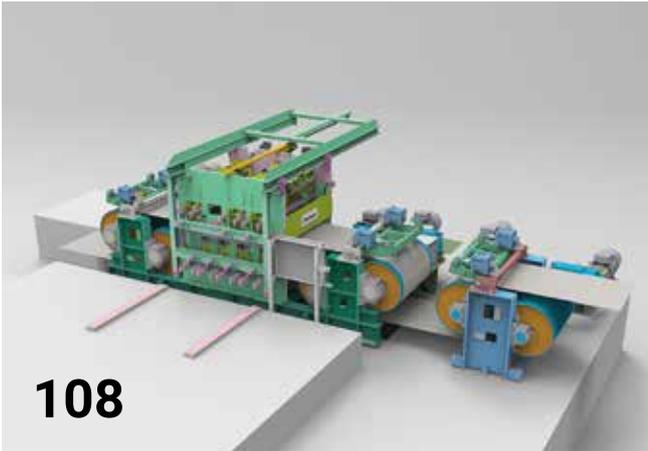
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The SMS group connect app is available in the App Store and at Google play.



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Focus on the future

Dear Readers,

The foundation of a forge in the German town of Siegen, which evolved into Siegener Maschinenbau AG (Siemag) and later on into SMS group, marks the beginning of our 150-year company history. Throughout this time, we have closely worked with our customers in innumerable major projects the world over, setting technological standards in many ways. Our dedication and commitment to innovation and permanent improvement will never ebb. We look forward to accompanying our customers as their life-cycle partner in many projects to come.

Green metallurgy

Currently, the decarbonization of industrial processes is one of our industry's main tasks. The buzzword is Green Steel. With the acquisition of the remaining shares of Paul Wurth, we have further strengthened our plant engineering competence in metallurgy and hydrogen technology. Our Luxembourg site will be expanded to become the research and development center for decarbonization and recycling within SMS group. To this end, we are pooling the research and development activities of SMS and Paul Wurth. Our joint range of services includes

all technologies for reducing CO₂ emissions in existing steel mills, hydrogen-based, CO₂-free direct reduction of iron ore and Power-To-X technologies for producing synthetic fuels and downstream products. We develop sustainable technologies for our customers enabling them to succeed in the economic transformation process.

Intelligent services and new business models

The services business, digitalization and automation are getting ever closer inter-linked, and they are often the key to our customers' economic success. The systematic integration of these three dimensions into classical plant engineering leads to increasingly more refined and intelligent business models, which create long-term added value for the plant owners. Our Technical Service experts share their insight about Equipment as a Service and other new business models on page 8 and the following pages.

Challenging major projects

In this Newsletter, we are featuring two exceptional major projects. Steel Dynamics, Inc. (SDI) in Texas, U.S.A., is erecting a new

complex with an annual steel capacity of 2.7 million tons. Being of the latest design, the facility will comprise the complete digitalized process chain from the meltshop to the CSP® NEXUS plant down to the rolling mill and the galvanizing line. The second major project is the modernization of the 2,500-millimeter hot-strip mill at MMK in Russia, which included the revamping of the finishing mill and the renewal of the electrical and automation systems. Read more about this project from page 60.



Yours,

A handwritten signature in black ink, appearing to read 'Burkhard Dahmen', written over a light grey background.

Burkhard Dahmen

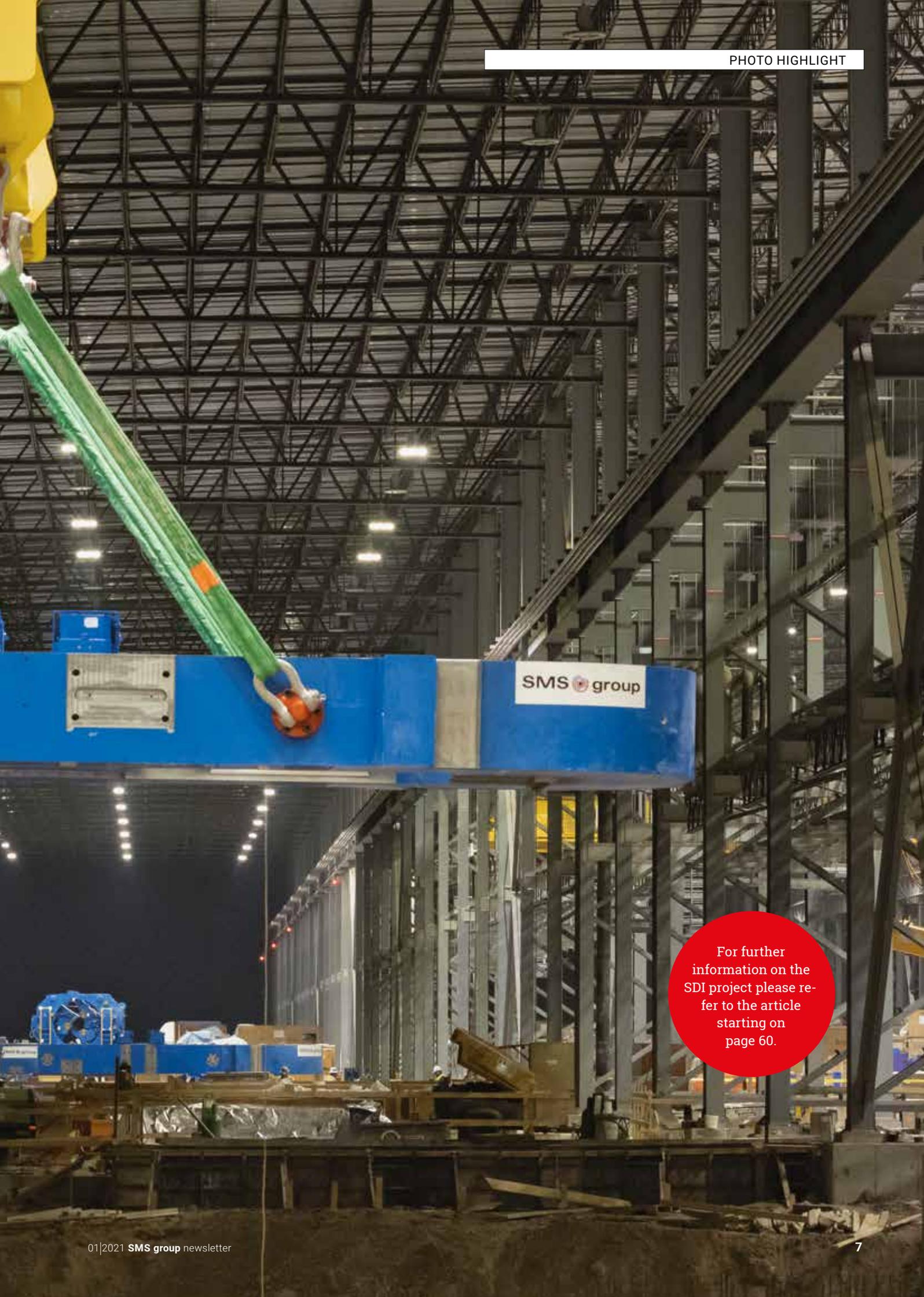
Chairman of the Managing Board
SMS group

Installation of mill housings

In Sinton, Texas, US-American steel producer Steel Dynamics, Inc. (SDI) will produce the latest generation of advanced high-strength steel. The Texas mill will have capabilities beyond existing electric arc furnace flat roll steel producers, capable of producing 100 kilopounds per square inch (690 megapascals). Whereas CSP® NEXUS mill will have capabilities to produce a maximum strip thickness of 1 inch (25.4 millimeters) with a strip width of 84 inches (2,134 millimeters). The facility will be commissioned still this year. Starting with the four mill housings for the two-stand roughing mill, all mill housings for the roughing and the finishing mills have been installed by now. The weight of a mill housing is approx. 172 short tons (156 metric tons).



Further information
www.sms-group.com



For further information on the SDI project please refer to the article starting on page 60.

From spare part to lifecycle companion

INTERVIEW

Jochen Burg and **Alexander Heck** are responsible at SMS group for the global service business. In an interview, they speak about the growing importance of services, changing customer requirements and new, performance-based business models. ▶

Over the last decades, services have strongly changed. Supplying a spare part was once considered already as a service, but today a broad portfolio of services is offered to the customer for the entire lifecycle of his plant. Services offered already start with the delivery of a plant and not only include mechanical equipment but also the field of electrics/ automation and over the last years increasingly also digital products.





How is the Technical Service integrated in the SMS group organization?

Jochen Burg: Our Technical Service comprises more than 3,000 employees at more than 50 service centers around the world. We have set up our service network with a focus on a strong – where possible, autarchic – regional presence. In this way, we can guarantee that we are close to our customers.

Our service is highly product-specific. That makes it a bit of a challenge. Our regional teams cover specific product areas. We have experts in metallurgy, forging, and flat and long products, for example, and even experts for specific product groups in our teams. The setup is different from region to region and depending on the installed base. We don't have the full range of product-specific expertise physically present in every region, but our comprehensive network enables us to draw on specific expert know-how whenever and wherever needed.

How important is the Technical Service for SMS group?

Alexander Heck: The service business has been playing an increasingly important role for SMS group for quite some time. We wish to support our customers during the entire lifecycle of their plants, providing them at all times with the best possible solutions. As Leading Partner, we supply everything from a single source. This is what distinguishes us from our competitors. Today, service business entails much more than the simple supply of spare parts. We have developed a comprehensive service portfolio that we continuously align to the current needs of our customers and which we continually expand by digital solutions. Thanks to our global corporate setup, we are very close to our customers in all re-gions of the world.

Jochen Burg: Historically, SMS group is a classical plant and mechanical engineering company. This is in our genes, and this used to determine our approach to handling – and completing – projects in the past. But we have been realizing that the final acceptance by the customer means that our job is far from being done. The service business closes the gap between different projects by successively ex-

REDUCING TIED-UP CAPITAL

Customers are increasingly focusing on their core activities. For these customer requirements, SMS group offers models under which the customers no longer buy components, machinery or ancillary plants, but provides those as a package together with other services. Models such as Software as a Service (SaaS) and Equipment as a Service (EaaS) have already been well received in the market.



panding the range and depth of our services up to and including full-line maintenance packages that we perform for our customers. We see that many customers wish to focus their recourses and attention increasingly on their core processes, resulting in maintenance and other services handled to a growing extent by service partners. These customers will rely only on partners able to provide the service in the most efficient and cost-effective way. Here, SMS group is in a very strong position: we are the designers of the plants, we commission them, and we know how to service and maintain them on a permanent basis. We are therefore able to combine technical and process-related competences for the benefit of our customers in a unique way. In short: we understand the plants and their underlying technology. On the other hand, we constantly gain new knowledge from our operative service business, which we use in the further development of our technologies and new plant designs.

When customers order new plants from us, the aspect of service is playing an important part. More and more often, we get involved in the planning phase of a project at an early stage and receive the order because we can score with our excellent service packages instead of the pure plant and technology, which may be compared with that of a competitor to some extent. Plant operators look more and more at the added value a plant can generate during its entire lifecycle.

Investments in new plants have been declining on a global scale. How important is the service business for the total turnover?

Alexander Heck: On the one hand, the decline in investments in new plants is opening up new service opportunities since old plants are replaced, and with increasing age of the equipment more services and repairs are required. On the other hand, we consider the rise of new multi-disciplined and digital service offers and the design of new business models as significant growth drivers for SMS group.

Our customized and cutting-edge technology enables us to compensate part of the slowdown in other business areas. Currently, our service segment, accounts for about a quarter of our corporate turnover, not including our modernization projects.

Our service segment mainly consists of maintenance, spare parts and repair services, and minor revamps.

Jochen Burg: As a matter of fact, we want to further increase the share of our service segment in the future. It is our vision to generate half of our turnover in services. In view of the basis of plants we have installed worldwide, the prospects are very good. A 50:50 ratio is an ambitious target, but it is realistic.

What classical service products does SMS group provide to customers?

Jochen Burg: Our range of service products contains a perfect solution for every phase of a plant's lifecycle. Thanks to our highly efficient spare parts and inventory services, to minimize the downtimes of our customers. Our solutions also cover logistics in order to make sure that a spare part gets as quickly as possible to the plant.

We are ready to support our customers 24/7 with our maintenance and repair service, guaranteeing maximum performance of their plants at all times. Repairs may be performed at customer's site or in one of our workshops, of which we keep a world-spanning network.

With customized modernization concepts, we are able to boost the performance of older facilities, providing our customers production increases, expanded product ranges and reduced operating costs.

Specialist knowledge and expertise are the keys to achieving optimum plant operation and maximum output. We offer dedicated consulting projects and provide training courses for our customers' personnel and hands-on training experience, at our TECademy and via our Digital Classroom, for example. Many of our customers ask in particular for training courses held by the commissioning staff of SMS, in other words by those who know the plants inside and out and are able to convey their knowledge in a practice-oriented way.

How does the digitalization influence the service business?

Alexander Heck: Already in 2016, SMS group together with SMS digital has established the digitalization organizationally and has been further expanding its

range of service solutions since then. For several years, we have been jointly developing digital products and solutions that are becoming more and more important now. Currently in the focus are predominantly those digital solutions that enable cooperation and communication over distances. Via our Remote Assistance tools, for example, a customer can concede us remote access to their plant data for troubleshooting or process optimization.

In addition, we use Augmented Reality to support our customers. This enables us to render remote support to our service technicians physically present at the customer's site or to our customer's personnel via video and audio signal. In a sense, our experts see through the eyes of the person at the customer's facilities to provide targeted support. Only thanks to this option was it possible under the Covid-19 conditions to implement certain revamping measures, for example.

We have also been intensifying our activities in the field of predictive systems which enable us to see how things will develop in the future and which can be used to indicate what would be the optimal time to replace a component. Even today, our Condition Monitoring system has already many more capabilities than just monitoring tasks. We have been linking processes and data to an increasing degree in order to get more and more insight into the condition of the complete plant.

Digitalization will bring fundamental changes to the service business and to maintenance practice so that our Technical Service also participates in the learning steel mill. SMS group set out on the journey to Augmented and Virtual Reality well before the Corona virus crisis, actually 15 years ago. The fact that we have had the corresponding technologies in place for such a long time has helped us a lot in the current situation. We are thus able, for example to guide colleagues in China, India or Germany through the digital twin of a plant, switch ourselves in on virtual goggles worn by customer personnel to provide support, without having to be at their facilities physically. We owe our capability of now making much more practical use of these technologies today to the fact that the underlying developments had taken place long in advance.

DIGITAL CLASSROOM

The digital classroom of SMS group has been inaugurated at the end of 2018 offering numerous individual training variations, e.g. maintenance processes can be studied in a virtual plant environment – while the real plant has not yet been installed. This is an enormous advantage for quickly starting plant operations.



At the end of 2018, you launched the Digital Classroom. What opportunities does this new training environment provide?

Jochen Burg: The Digital Classroom offers a great diversity of individual forms of training. The use of integrated touch screens, 3D shutter glasses, tablets and VR goggles creates an entirely new learning experience and enhances the learning success of the training participants. Maintenance routines, for examples, can be trained on the virtual replica of a plant, even before the real plant has been set up! Trained employees have therefore been optimally prepared with plant processes being an enormous advantage for quick and safe commissioning.

Alexander Heck: Many critical incidents which fortunately very seldom do happen are difficult to be trained on the plant itself. In an environment exposed to risks such as that of our industry the plant cannot be easily shut down. You easily forget what you don't repeat on a regular basis. Therefore we use a realistic virtual environment to simulate potential risk situations and prepare our customers to deal with the risks. The customers' personnel may even wear 3D goggles, for example, to enter a virtual space with a digital twin of their plant to train on. Just imagine a pump station set up in a virtual space, and virtual tools that you can actually grab and that you can see which working steps have to be performed at which place of the pump.

What kind of service products do you offer within the digital context?

Jochen Burg: The first goal of our service products within the digital context is to make the work of the maintenance crew as effective as possible. Furthermore, they are the basis to make predictive maintenance possible. Genius CM®, Smart Alarm and DataXpert™ as well as SMS DataFactory on request form the basis of our solutions. Alarms and threshold values are generated on the basis of machine learning algorithms and are then further processed via DataXpert™ in data analytics performance packages. DataXpert™/SMS DataFactory are connected to the IMMS® (Integrated Maintenance Management



“For the benefit of our customers, we are able to combine technical and process-related competences with each other in a unique way.”

**Jochen Burg, Executive Vice President
Technical Service SMS group**

System, Asset Management System). With the aid of messages from DataXpert™ maintenance tasks are initiated in the IMMS®. By means of eDoc (digital plant documentation) maintenance tasks are compiled and made available to the crew on mobile devices. The feedback of the maintenance experts then forms a verification of algorithm results which cannot be replaced. Consequently, the algorithms are permanently improved in a closed loop. In addition to the applications described focusing on the condition of the plant, the PCS (Process Condition Analyzer) is employed which is able to merge process signals from plant automation and other sources. These data may then be analyzed with freely definable rules – on the one hand, this may be classical engineering rules but on the other hand, it may also be AI (Artificial Intelligence) rules. Then, the results



“We wish to support our customers during the entire lifecycle of their plants, providing them at all times with the best possible solutions – from a single source.”

Alexander Heck, Executive Vice President
Technical Service SMS group

also run into the DataXpert™. Through this combination of equipment condition and the process with IMMS® we complete the circle for a holistic approach of a “Predictive Asset Optimization”.

Another digital product in our portfolio is the intelligent spindle, a digital drive spindle which, based on condition monitoring, and the measurement of torsion and vibration characteristics, indicates at a very early stage when service and maintenance measures should be performed. This is only one of the numerous digitalization products we have developed during the last few years.

These are only some examples of the numerous digitalization products we have developed during the last few years. SMS digital complements the know-how of SMS group by applying machine learning and artificial intelligence. In this way, smart intel-

ligent solutions are generated leading to noticeable cost efficiency and enhanced yield combined with high plant availability. SMS digital offers a comprehensive range of products to support companies on their way to a digital transformation.

In order to support our customers in becoming digital also in managing their maintenance programs, we have developed the digital fact-finding audit. Based on the results of this audit, we get a clear and comprehensive picture of the plant and can offer specific, target-oriented digital solutions to customer issues.

What kind of new business and billing models do you offer your customers?

Alexander Heck: We have been observing a growing demand for full-line maintenance services on the plants themselves and in the customers’ own workshops. We have responded to this trend with our Technical Outsourcing Services. Under this business model we take over comprehensive services, including full-line maintenance activities on plants right on the customer’s premises. Our service teams ensure with their know-how that the customers’ plants are at all times in an optimum state, while boosting availability and reducing maintenance costs – and while our customers can fully focus on the production process. Our service offer also includes performance-dependent billing models.

Another customer requirement is the reduction of tied-up capital and the focus on core activities. For these customer requirements, we offers models under which the customers no longer buy the components, machinery or ancillary plants from us, but use of the equipment is part of a service package. Our Software as a Service (SaaS) and Equipment as a Service (EaaS) models have become well accepted in the market and are increasingly implemented by us. For these service packages too, we offer performance-based billing models.

How do performance-based models work?

Jochen Burg: With our (performance-based subscription or Equipment as a Service) service providers, the amounts payable by the customer depend on how efficiently the agreed KPIs are achieved. Possible performance indicators are production volumes and

SERVICES FOR SPARE PARTS, REPAIR AND MAINTENANCE

SMS group provides spare parts and inventory services to minimize downtimes of customer plants. This also includes logistic processes to find solutions how spare parts are conveyed to the plants. Repair and maintenance services 24/7 ensure that plant efficiency is achieved.



plant availability, for example. We define the KPIs of the plant jointly with the customer and take all service measures necessary to take or keep the plant at that performance level. This provides the customer added value in the form of higher yield and quality – and in that added value we take our share. Without performance there will be no payment. Our packages integrate mechanics, electronics, services and digitalization. Availability, analysis and interpretation of data play a key role in the fulfillment of our performance pledge.

As we guarantee the attainment of the agreed performance indicators, our customers can concentrate fully on their core activities, while we take a share in the risk of the plant operation. This gives our customers the security that they have a partner at their side ready to support them in being successful. Such partnerships are based on mutual trust, transparency and frankness. Numerous references prove our competence in successfully implementing this model.

3D printing, hydrogen, logistics – what role does Technical Service play when investing in new business fields?

Jochen Burg: Under its New Horizon strategy, SMS group has become active in a wide range of different fields – from additive manufacturing to battery recycling, from hydrogen production to port logistics. And in all these areas we can bring to bear our full innovative power. We are excited about these topics and look forward to them becoming reality.

Alexander Heck: We are also eager to develop new business fields and to endeavor on disruptive technologies. Exactly for this we need partnerships and an intensive exchange with our customer – which is synonymous with good service. ♦

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

Growth and sustainability

WORLDWIDE

Whether in electrical engineering and electronics, in heating and air-conditioning technology or the automotive industry – it is impossible to imagine our everyday lives without the use of copper and copper alloys. An increased global demand is faced with higher environmental requirements for production. SMS group offers special solutions along the entire process chain and lifecycle of production plants.

- **Copper producers must satisfy the growing demand for a production with as low a carbon content as possible.**
- **With its high-performance CONTIROD®* plants, SMS group is one of the world's leading companies in this sector.**
- **The Technical Service provides diverse solutions for increased demands.**

One ton of copper brings the functionality into 40 cars, powers 60,000 mobile phones, enables 400 computers to be operated and supplies 30 households with electricity. Against this background, it is not surprising that the demand for copper is rising. Copper is far more than only an extracted metal, it creates jobs and contributes to a higher living standard. Particularly the high electrical and thermal conductivity makes copper indispensable for many applications. In addition, copper is characterized by its high durability and high environmental compatibility providing ideal recycling opportunities.

Cutting-edge plant technology meets tailor-made modernization and service solutions

Copper producers around the world are confronted with the task to satisfy increasing demands for high-quality and precision copper products – with as low a carbon content as possible. Particularly cast and rolled copper wire rod which accounts for half of the copper market demand is of decisive importance.

SMS group has decades of experience from the beginning to the end of the copper production process to be able to offer an almost unlimited number of creative solutions. With its high-performance CONTIROD®* plants, SMS group is one of the world's leading companies in this sector. However, these requirements are not only satisfied with new plants. SMS group's Technical Service has also set itself the task of setting up existing plants for increased requirements. The products of SMS group are developed on a modular basis to make sure that they can be replaced in existing plants with minimum effort. But these products can also be adapted individually to customer needs. This saves costs and is

still oriented towards customers' requirements. Here, SMS group goes beyond its original approach of improving the lifecycle of existing plants offering tailor-made upgrades and providing service packages according to customer's specifications: from a cost-effective standard solution to a product individually custom-built. This not only enhances product quality but also satisfies current environmental and safety requirements and thus provides the opportunity to save energy. At the same time, SMS group expands its product range with lower operating costs. "We make sure that the plants of our customers operate for decades – so that higher efficiency, reduced operating costs, higher productivity and better product quality are achieved than ever before. Moreover, we are permanently working on the further development of our technologies to continue to support our customers also as Leading Partner in the future", explains Florian Meller, Head of Service Copper Plants at SMS group.

When it comes to future-proof copper production, SMS group supports its customers with various modernization measures for copper wire rod plants, such as CONTIROD®*. The measures are not only clearly mechanical in nature but also encompass technological and digital solutions. SMS group offers also modular, machine-specific spare parts solutions according to customer needs, regardless of the specified modernizations. This results in customized measures ranging from rapid spare parts supply on request to regular spare parts packages up to complete warehousing.

Green copper

Particularly for the metals industry with its relatively high energy consumption it is a great challenge to bring sustainability in line with economic growth. The aim of low-carbon production also applies to copper production. To reach this goal and to meet the ecological requirements, SMS group works hand in hand with its existing customers.

In this case, SMS group views CONTIROD®* both as a whole and the individual plant components also for themselves. Starting with the furnace to be equipped with a frequency-controlled blower for the burner supply, energy consumption can be reduced successively. In the focus is, above

*CONTIROD® is a registered trademark of Aurubis Belgium

all, the new burner which reduces its exhaust emissions through admixing hydrogen and decreases previous gas consumption. Without risking copper contamination, CO₂ emissions are reduced by the enrichment of hydrogen. New gas and air measuring sections are employed for quick and individual burner control. The pressure level is realized by an inverter and a flow-optimized mixing chamber with high mixing quality and low pressure drop. By elevating the furnace which is also possible on the brown field the waste heat can be used for preheating the cathodes. In addition to that, there is great potential of reducing waste gas emissions, initiated by considerably risen prices for CO₂ certificates. In comparison with the three former years, a sixfold price increase per ton was the case – with upward tendency.

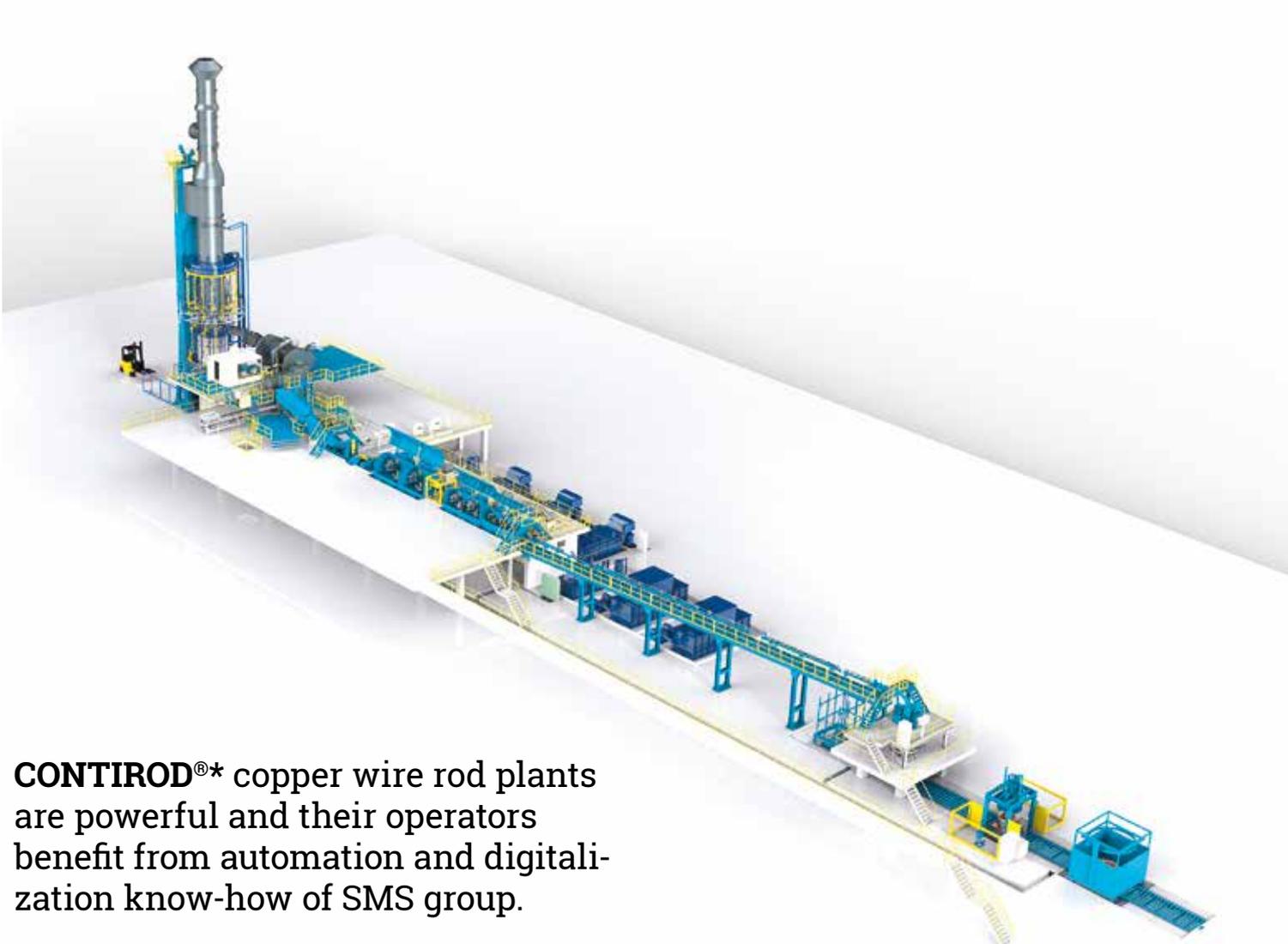
The new gas burner BB900 brings many functions directly to the shaft furnace. This includes among others an improved

flame pattern with full core flame with no cold spots with reduced temperature profile.

However, the furnace area is only the beginning. A “green thread” runs through the entire plant from the mill stand to the cooling line. Flow-optimized 3D printed nozzles enable a reduction of the compressed air demand by 30 percent and a bypass in the return flow reduces cleaner evaporation. “Thanks to our technology, service and continuous further development we assist our customers to make the “red gold” green,” said Florian Meller.

Consulting & training built on experience

It pays off to permanently find new ways of making production of customers’ plants more reliable and cost-efficient. SMS group offers training programs and consults its customers to reach their goals. These consulting services give



CONTIROD®* copper wire rod plants are powerful and their operators benefit from automation and digitalization know-how of SMS group.

plant operators the certainty that their decisions are the right ones and that the best possible combination of technology and process know-how is thus obtained. Whether it is a maintenance schedule, process consulting or a feasibility study: together with its customers SMS group creates a reliable solid basis for future decision-making. SMS experts evaluate each individual constellation and develop useful and constructive solutions.

Looking into the processes of CONTIROD®* plants

SMS group combines more than 150 years of process knowledge with automation and digitalization know-how. Operators of CONTIROD®* plants also benefit from this expertise in the field of digitalization which is particularly important when it comes to quality certificates for the produced copper wire rod or the energy consumption.

The largest consumer of energy on the CONTIROD®* line is the shaft furnace, because almost 300 kW are needed for melting one ton of copper. Many signals are generated by burners and various actors and sensors on the furnace so that it might be difficult to track each individual signal and process value. At this point, SMS Metrics comes into play enabling process deviations to be tracked. This allows you to determine whether one cathode type needs more energy than other types.

SMS Metrics is a digital solution of SMS group helping to visualize process and plant parameters for production and maintenance management. Measured values and parameters are provided by different sensors along the CONTIROD®* line. Other information including clear graphic evaluations can also be integrated in the dashboard. In addition to current measured values of the process, plant operators also receive trend charts and automatic messages in cases of previously defined events.

Advantages of using SMS Metrics

- Recognizing energy drivers
- High level of security
- Using data progresses instead of data points
- Integrating all machines
- Comparison between current and historical data
- Shorter repair times

SMS Metrics is providing a representation of the actual plant operating mode to the production management and additionally displays historical data. This enables you e.g. to track with a click how long a roll change lasted or how the shift progress developed.

The maintenance management obtains information on malfunctions and downtimes in real time contributing significantly to the identification of failure causes. The data are pro-

“Our service makes it possible that your copper wire rod plant is producing the desired quality in the required quantity – and all this in a reliable way. Besides a new plant, SMS group also offers corresponding services and support for operating your plants and keeping them always state-of-the-art.”

Florian Meller, Head of Service Copper Plants, SMS group

cessed and displayed via web tools. Within seconds, the user gets an overview of and gains insight into the state of the plant. The web-based implementation of the system enables access to each terminal.

Quality management benefits from recording all relevant data in connection with product quality. This means, that plant operators are able to not only gain a better insight into the process but are provided additionally with a tool for improving wire rod quality.

Digital equipment check

As Leading Partner, SMS group will assist its customers over the entire machine and plant lifecycle in the best possible way offering products suited for current challenges. To achieve this, a comprehensive product portfolio was developed in recent years which is continually further developed and particularly supplemented by intelligent and digital solutions.

Regular inspections and maintenance measures are thus the basis for safeguarding plant efficiency. To detect weak points and possible defects at an early stage, SMS group's Technical Service has developed machine-specific equipment checks.

In a first discussion, experts of SMS group develop a customized equipment check of customer's plant documenting all results digitally on a tablet. Immediately after the equipment check, the customer is provided with the initial results and after a short time of processing he obtains a complete report including clear information on the state of the plant. ▶

All inspection results are displayed on component level and a traffic-light system facilitates the overview. Based on this, decisions can be made on investments and future service, maintenance and repair measures be planned. All results are made available in PDF format. In future, the results can also be retrieved dynamically in the mySMS platform application in a time- and location-independent manner. Based on the results of the equipment check, customized offers are created for repairs, upgrades and spare parts. ♦



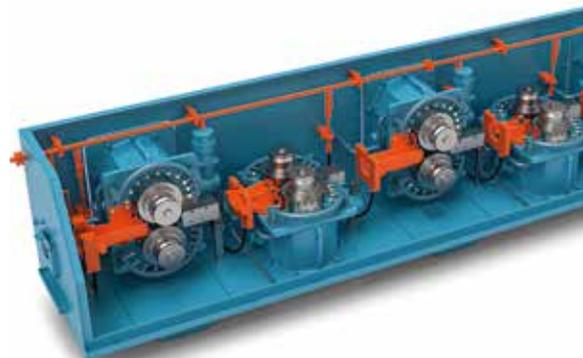
Roller guides

The SMS roller guide (similar to Meer guide) has been recently re-engineered for copper wire rod lines and it is indispensable for precise rolling in finishing mills. A uniform retainer and clamping system combined with a camera-based calibration system enables precise guide adjustments already prior to assembly. The calibration system enables easy, repeatable and precise adjustment of the roller guides outside the stand in a reproduced mill stand environment. The guide's easy operation ensures that the guide rollers are properly aligned to the rolled section and are symmetrically arranged around the guide center line – in vertical as well as horizontal direction. The accuracy during adjustment and alignment enables maximum service life and trouble-free production even when high rolling speeds prevail.



Plane

The new edge planer of SMS group provides everything required to replace the milling machine on copper wire rod mills. The fact that the seating of the foundation remains in an unmodified condition makes it possible that even uncomplicated retrofitting can be realized. The plane meets all requirements made for bar processing in front of the mill stand. An oscillation drive operates parallel to the running direction of the bar achieving short chips during oscillation due to chip breakage. The oscillation drive reduces the number of movable parts and thus decreases maintenance costs. Moreover, the new guide concept enables precise bar tracking.

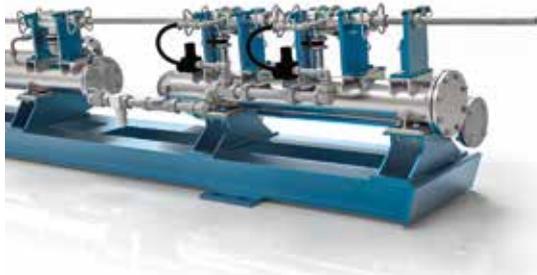


High-pressure descaling system

In the rolling mill area of copper wire rod production the positive characteristics of high-pressure descaling have the most impact on the quality of wire rod. The

high-pressure descaling system for a CONTIROD®* plant can be installed either in the roughing or the finishing stand. In this case, the system is integrated in the supply pipe of the emulsion system and includes a high-pressure pump with filter. An individual number of retainers are incorporated in the flat-jet nozzles in the area of the inlet and outlet guides.

High-pressure application of emulsion and alcohol influences the surface quality and the parameters of the guides significantly, as demonstrated by considerably improved values during the so-called “dust test”. Here, a reduced average value of 50 % is achievable. Furthermore, the oxide layer on the wire rod surface is reduced and surface flaws are avoided. The fact that a high-pressure descaling system can also be retrofitted on older installations is a major step towards better wire rod quality.



Cooling line

One of the final steps in producing high quality copper wire rod is the cooling line from our CONTIROD®* series. During the cooling process the temperature in the cooling section is reduced from 650 to the required 70 degrees Celsius. The cooling line of SMS group is characterized by two different cooling systems consisting of the cleaner, which contains alcohol, and water. Since the cleaner poses a health risk, the tightness of the cooling section has top priority. This is fully the case here and it is supported by the direct cooling in the return flow, as there is even less evaporation. Depending on customer requirements, up to three temperature measuring points can be installed.



The new cathode shaft furnace under construction.

Modernization of shaft furnaces

GERMANY

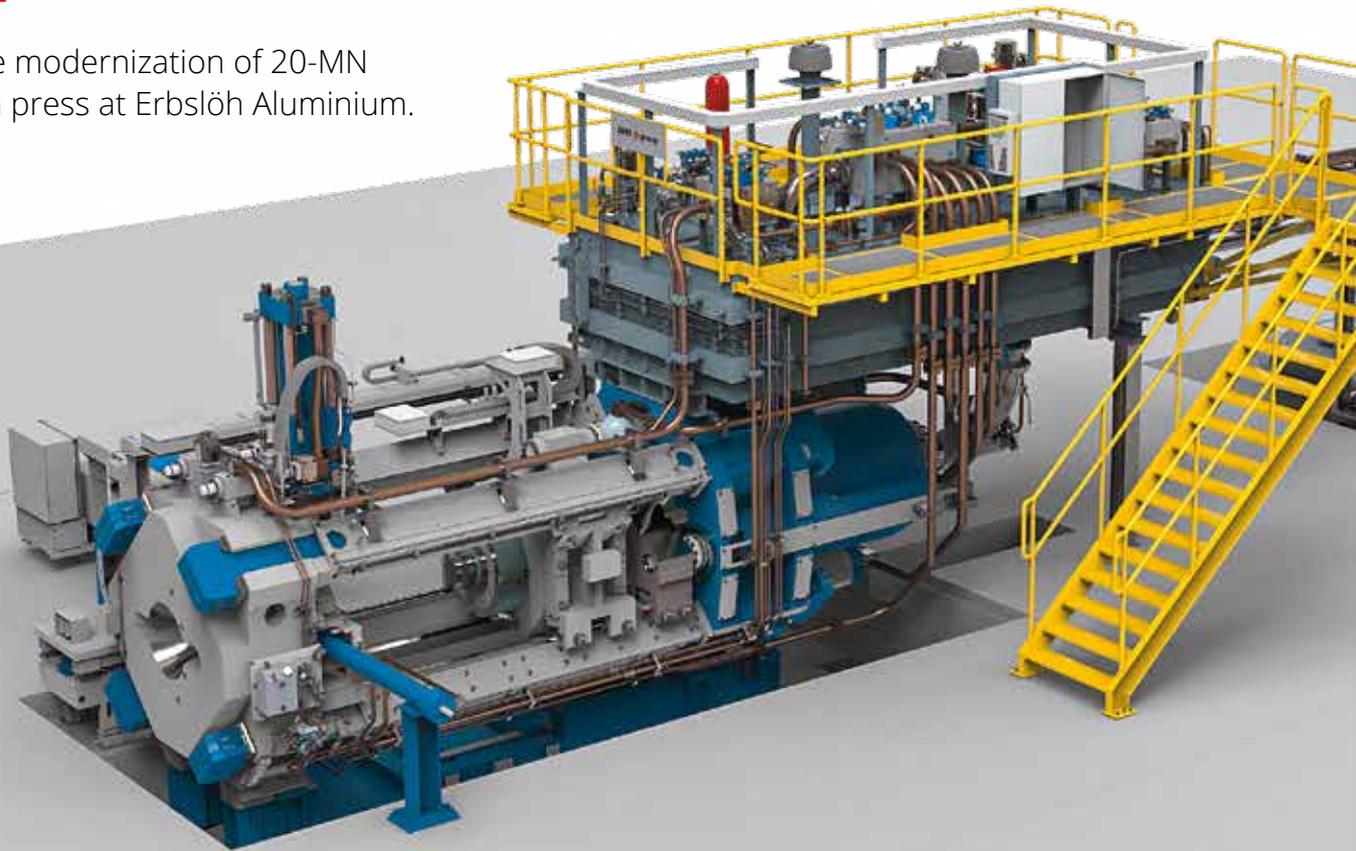
Deutsche Giessdraht GmbH, a company within the Aurubis Group Deutschland, faced the challenge of not only remaining its 40-year-old shaft furnace competitive but also to satisfy the increased requirements as regards environment, safety and emission.

In close cooperation, an unconventional concept was created which took customer-specific requests into account. Two construction stages made it possible to replace the old shaft furnace and realize the modernization in the course of usual downtimes. The state-of-the-art control system represents a noticeable simplification for the operator providing transparent data visualizations. The implementation within a certain timeframe could only be realized punctually and in full by close cooperation and cooperative partnership of all persons involved.

Product portfolio expanded

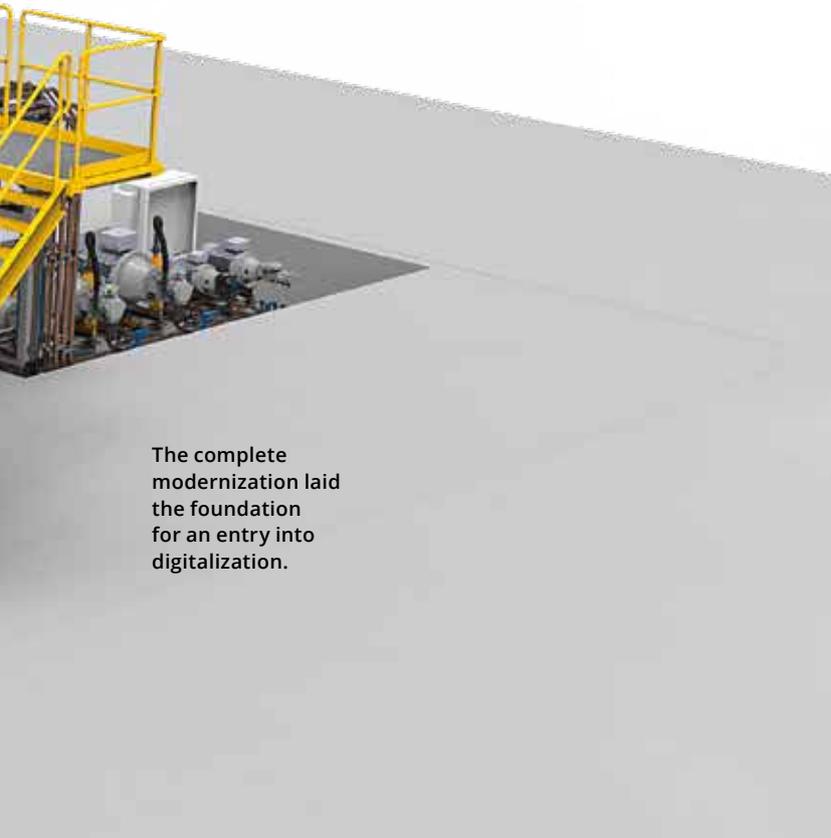
GERMANY

Complete modernization of 20-MN extrusion press at Erbslöh Aluminium.



“For safeguarding our competitive edge we have focused at all times on product quality, productivity and production reliability. By implementing the complete refurbishment we have made a large investment in the future and are now optimally equipped. We have invested considerable time and effort into an extrusion press which is individually customized to our needs and our highly complex products. In addition to plant technology, the focus was not only on energy efficiency but also on the technological design for digitalization.”

Bodo Klimm, Project Manager at Erbslöh Aluminium GmbH



The complete modernization laid the foundation for an entry into digitalization.



Together with the Technical Service of SMS group, Erbslöh Aluminium GmbH in Velbert, Germany, has implemented a complete modernization of its 20-MN extrusion press. The objective of the modernization was increasing productivity, expanding its product portfolio, safeguarding plant availability and improving energy efficiency. At the same time, the extrusion force was boosted to 22 MN.

For increasing productivity and expanding the product portfolio the press window has been enlarged. A movable shear for discards patented by SMS group, a new linear billet loader and a complete new hydraulic system were installed. Besides safeguarding spare parts availability, productivity could be enhanced with the new hydraulic system thanks to reduced non-productive times. Another development of SMS group, the ecoDraulic system, made it possible that a significant increase of energetic efficiency was achieved. With its intelligent automatic start-stop function, this system deactivates the hydraulic pumps not used in the extrusion process.

In this connection, the complete electrical equipment was installed and the latest visualization technology was employed which at the same time laid the foundation for an entry into digitalization. ♦



Ben Zander

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ERBSLÖH ALUMINIUM GMBH

Erbslöh Aluminium GmbH combines competency in handling the sophisticated material gained since the early days of aluminium processing with contemporary management methods. Since the company was founded in 2001, it represents the development, production and sale of extruded aluminium profiles for automotive and industrial applications.

To cover the entire range of automotive technology and modern industrial applications, Erbslöh develops and produces

tailor-made extrusion profiles made of aluminium.

With press equipment consisting of seven extrusion presses with an extrusion force of 12.5 to 44 MN, Erbslöh is able to meet customers' demanding requirements. Particular attention deserves the in-house gloss-alloy casthouse processing high-purity billet alloys. The resulting semi-finished products – in form of ALMINOX® products – enjoy highest reputation worldwide.

Close cooperation and reliable planning

WORLDWIDE

Services from a single source shorten repair times of oscillatory lifting tables for CSP® plants.

Oscillatory lifting tables in CSP® plants have to be replaced and generally overhauled after extended use. To make sure that indications for the appropriate time of replacing the lifting table are already received at an early stage, oscillation measurements on the plant are regularly performed on customer's demand. In this way, the lifting tables can remain in the plant for as long as possible. Close cooperation and reliable planning of SMS group's Technical Service with its customers therefore results in considerably increased re-availability of the lifting tables.

How such cooperation was implemented successfully can be shown e.g. for a CSP® customer.

Prior to a repair measure, the customer ordered a necessary repair kit from SMS group. The repair sets include all important exchange parts to be replaced in any case due to the experience of SMS service experts. Specific spare parts re-

quiring long delivery times are also included in the repair kit. For that reason, SMS group recommends its customers to order the kits always in advance to ensure that their component is staying in the SMS workshop for only a short time.

Cross-divisional cooperation

The on-site replacement of the lifting tables was accompanied by the Technical Service and the replaced lifting tables in need of repair were transported to Hilchenbach where they were disassembled and cleaned. Then, a detailed damage assessment was conducted. The actual repair measure could be carried out as planned since no parts for the repair kit were additionally required. This was followed by the set-up and alignment of the lifting tables in the test field where they were fully hydraulically and electrically cabled. In this way, all functions could be run through and tested.

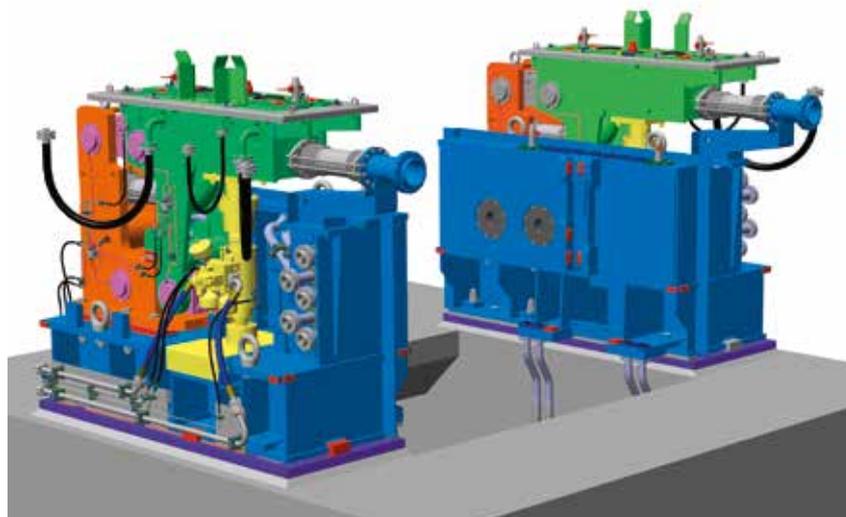
For simulating the functioning of the casting moulds with cooling-water filling a special 21-ton dummy weight is installed. Consequently, the oscillation amplitudes of the casting operation were run through and then tested and documented with specific measuring equipment. These measurements are exactly the same as usually performed directly on the plants. ♦



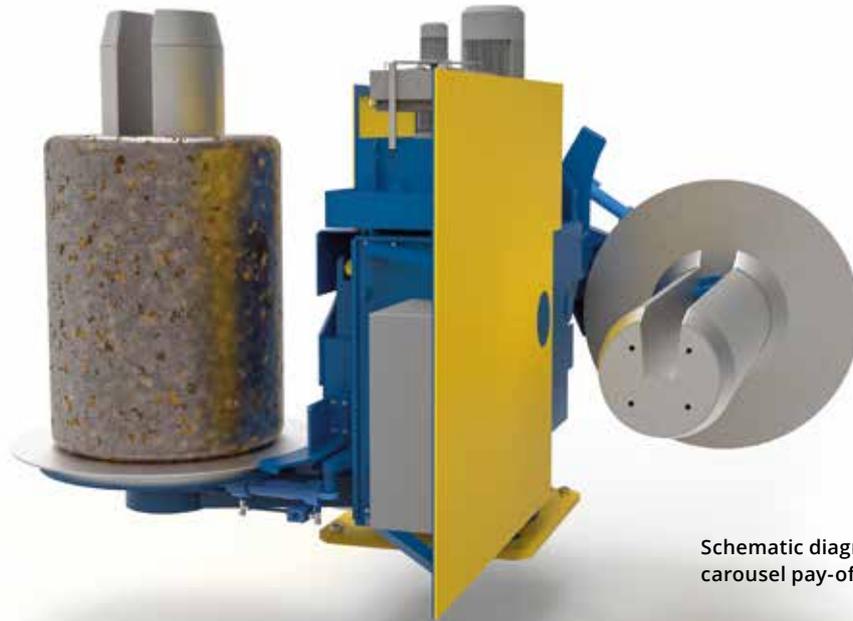
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Oscillatory lifting tables have to be replaced and generally overhauled after lengthy use.



Schematic diagram of tilting carousel pay-off reel.

Prototype in successful operation

GERMANY

A customer of SMS group has benefited for some time from the advantages of an upgraded pay-off reel which is part of a drawing line of the KZ R IIID type.

The scope of modernization comprised the disassembly of the old pay-off reel, the assembly and integration of a new reel and its commissioning.

The aim of the modernization was to increase the availability of the drawing line significantly. This could be achieved by installing the new pay-off reel type KiKaHa 3500S enabling plant operators to carry out the ring preparation at full production speed thanks to new safety functions. Consequently, productivity can be increased by an average of five to ten percent.

At the same time, easier maintainability and reparability plus the use of standard components was particularly emphasized for the new design. By using standard components, spare parts costs and procurement times of spare parts can be minimized considerably.

Due to two- or three-shift utilization of the drawing line it has been worn according to its age. Both the power supply and the hydraulic rotary distributor of the old pay-off reel were affected by wear so that the availability of the drawing line was restricted due to failures.

Project highlight

The design of the prototype was a special highlight because customer's proposals and ideas have also particularly been taken into account. This means that the customer was able to actively participate in plant optimization and that the prototype has been individually tailored to customer requirements.

Technical advantages

In addition to the tilting function of the reel crowns it is also possible to adjust the height of the tilted crowns making loading easier for machine operators. The advantages with regard to safety at work result from separating the loading and production area by means of baffle walls. The reel crown still in production can additionally move in drawing direction in a controlled manner when knots are formed until the drawing line comes to a standstill. By rotating the pay-off reel it is ensured that knot formation is mechanically prevented. Advantages from a maintenance point of view are the protected hydraulic valve blocks and the terminal box outside the scale section.

Within just 14 days the new pay-off reel could be integrated in the existing line and plant availability could be increased. Production volume could also be boosted by approx. five to ten percent and safety at work can be enhanced in the long term on the basis of new safety functions. ♦



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Maximum safety

GERMANY

Together with Ilseburger Grobblech, a project was implemented to increase occupational safety in repair and maintenance modes at the heavy-plate mill.

Ilseburger Grobblech, a wholly-owned subsidiary of Salzgitter AG, has realized a project to increase occupational safety in the repair and service modes at a heavy-plate mill together with SMS group. The existing safety concept from the 1990s no longer met today's requirements.

Christian Schön, Project Manager at Ilseburger Grobblech: "We are proud of the fact that people at Ilseburger Grobblech GmbH always come first and consider safety at work in a holistic manner. This means: we want to optimally protect our staff not only in ongoing operations but also during maintenance work. For that reason, we made considerable investments."

Risky procedure of replacing breast rollers

In the past, the replacement of housing rolls has always been particularly critical regarding repair and maintenance work. The rolls were fastened and lifted with steel wire ropes and disassembly was time-consuming and risky. In particular, communication via voice radio to the hydraulic cellar has been a weak point. All control commands for hydraulic operations during breast roller replacement had to be transmitted via voice radio and then manually adjusted in the hydraulic cellar. In the event that communication would have been disrupted maloperations could have been the result. Due to all of these uncertainties, the task was to develop a safe concept for replacing the breast rollers. ▶



Exit section housing rolls, prepared for lifting with four T-head bolts.

Three stages

A three-stage plan from the analysis to the implementation of the measures was the basis for the upgrade.



Hydraulic cellar
VK3 hydraulics:
left control
stand 3, center
control stand 4

“The annual replacement of the breast rollers which must be carried out by us due to wear is exemplary for an improvement and it becomes particularly evident how work operations in the maintenance mode can be enhanced,” said Christian Schön.

The three-stage plan of SMS group

The basis for the modernization project was a three-stage plan realized during a period of three years.

- **First stage:** on-site investigations and analyses for risk assessment
- **Second stage:** joint development of safety concept
- **Third stage:** implementation of measures

The jointly developed solution by Ilseburger Grobblech and SMS group encompasses new mechanical equipment such as four stepped levers at the top of the heavy-plate mill securing the backup roll balancing system in various positions. It comprised in addition new devices and drilled holes to insert modified T-head bolts instead of steel wire ropes. The optimization scope also includes the renewal of hydraulic components such as three new valve stands, a new tank with recirculation, the conversion on the existing equipment and the automation upgrade with new technologies, new functions and especially new safety controls.

Interaction of solutions

New and upgraded hydraulic equipment, new stepped levers and recent automation – all this interacts perfectly, now enabling safe repair and maintenance modes. The levers secure backup roll balancing for safe access during all servicing activities within the mill stand. The new positions secured by stepped levers are adapted optimally to various repair modes. The automation switches the entire mill stand to maintenance mode while all mechanical and hydraulic positions are safely monitored. Instead of a steel wire rope, the breast rollers are now lifted and retained by means of reliable T-head bolts. One of the most important innovations is the hydraulic control via radio remote control. All positions for the replacement of the breast rollers can be safely approached with the aid of a compact industrial radio control and maintenance specialists are no longer required in the hydraulic cellar. For disassembly and assembly, the entire maintenance team cooperates directly on the stand coordinating work operations in an optimal way. It is thus ensured that misunderstandings are prevented.

Reiner Stammberger, Project Manager at SMS group: “Blueprints do not exist for occupational safety in repair mode or maintenance work. Together with Ilseburger Grobblech, we have developed customized solutions ex-



“We are proud of the fact that people at Ilsenburger Grobblech always come first and consider safety at work in a holistic manner.”

Christian Schön, Project Manager
at Ilsenburger Grobblech GmbH

actly tailored to the needs of these plants. The achievements demonstrated here can also be transferred to many older plants. Consequently, we are able to create maximum industrial safety in repair and maintenance modes.”

Exemplary procedure

The procedure on valve stand No. 3 is exemplary for the execution of the project. Based on the analyses, the engineers of SMS group designed the new valve stand exactly according to these requirements. The digital design data were the basis to precisely manufacture the valve stand in the workshop of SMS group. Thereafter, comprehensive examinations took place in a modern valve test stand and the acceptance took place by experts of Ilsenburger Grobblech. Compared to the previous valve stand, the new stand is considerably more compact and nevertheless provides significantly more functions and more complex control options.

Only by renewing the hydraulic system and by implementing de-energizing circuits a reorganization of maintenance featuring safe functions could be realized. Interacting with the new automation, the new hydraulic system now enables a safe maintenance mode.

The result of a joint project

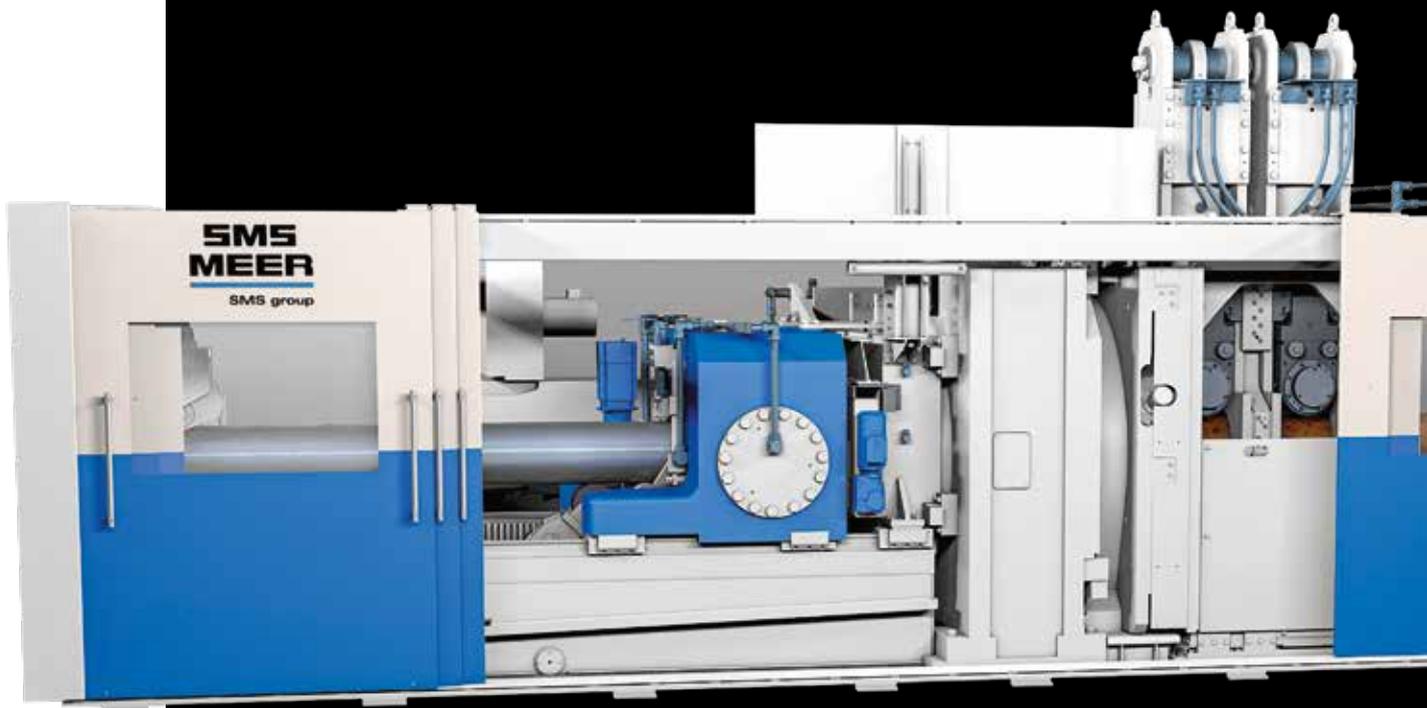
Not only the safety standards were increased significantly, but also the availability of the heavy-plate mill was boosted since a replacement of the breast rollers can now be executed faster. “As regards how a high degree of occupational safety can be achieved in repair and maintenance modes, this project is a good example also for other companies”, concludes Reiner Stammberger. ♦

 **Reiner Stammberger**
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New solutions boost availability

WORLDWIDE

With an expanded range of new services, plant availability of peeling machines can be enhanced.



“Maintenance staff, we have a problem!” This message is known to all plant operators only too well – the Technical Service of SMS group is available to its customers in such situations offering various options for problem solving and support – also in cases of emergency. The spectrum of solutions ranges from maintenance and servicing orders to overhauling assemblies up to complex modernizations and repairs.

Whether it is a standard spare part or a comprehensive digitalization package – SMS accompanies peeling machines throughout their whole life-cycle. Tailor-made services and offers are provided for the customers taking into account and satisfying customized needs.

Especially in the bright steel processing lines sector, SMS group has a high level of expertise for both new plants and technical services to maintain a competitive level also for older machines. SMS group has more than 80 years of experience in building machines for drawing, peeling and grinding of bright steel.

Because the aim is to make sure that the products of all machines – no matter how old they are – reveal the desired surface quality, dimensional accuracy and roundness of merchant bars.

High added value for plants

By repairing and maintaining the assemblies of their peeling machines, plant operators benefit from various advantages and achieve a high added value for their plants. Owing to carefully re-

More than 300 peeling lines have been delivered by SMS group under the names Kieserling, Schumag and SMS Meer.

PEELING LINES – A MACHINE FOR EACH APPLICATION

SMS group supplies both independent peeling machines and also complex and integrated peeling lines with a high degree of automation. This includes the operating modes bar-bar and ring-bar for cylindrical, conical and double-cone bars for ring-ring operation.

paired assemblies, a powerful and low-vibration machine performance can be achieved. Furthermore, the original quality level is restored, whereby top product quality, less rejects and increased availability can be attained.

For all components of the peeling machine the Technical Service of SMS group offers efficient replacements and overhaul of complete assemblies:

- Infeed unit
- Entry guide
- Turning tool adjusting device / Hollow shaft
- Exit guide
- Pull-out trolley

By replacing complete assemblies, the services of SMS group become easier, are more predictable, less expensive and more time-saving.

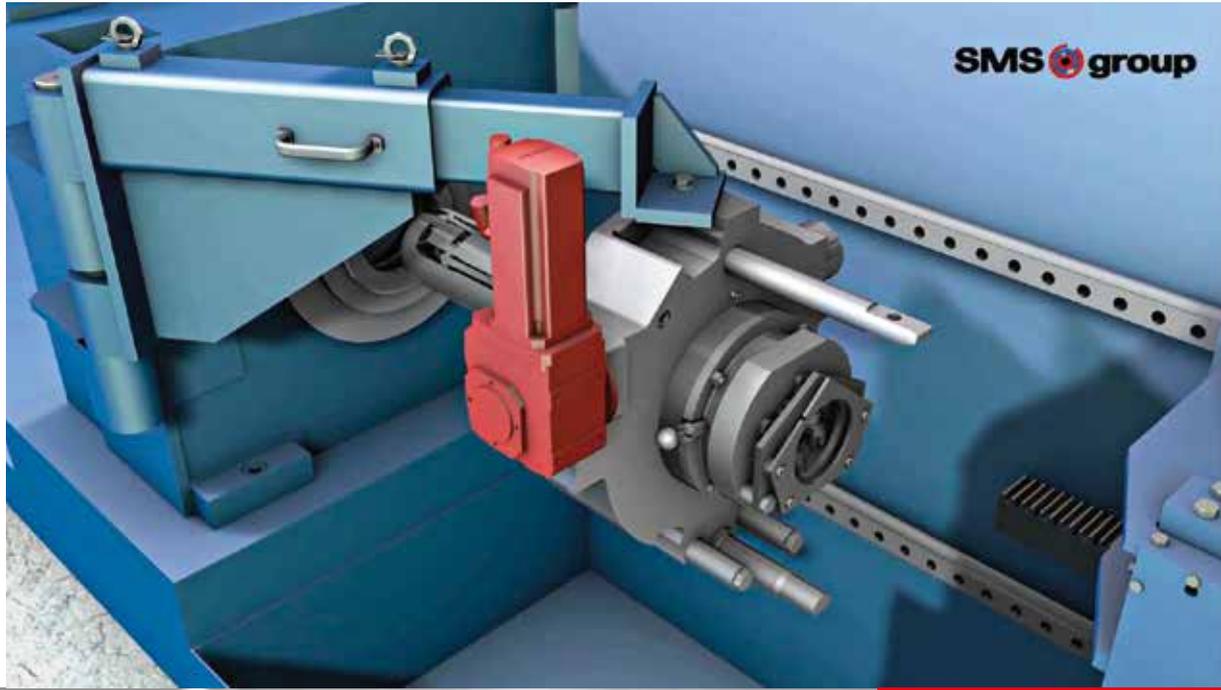
Increased occupational safety

The changing arm of peeling machines serves to maintain the exit guide in a safe and easy way. To achieve this, a mechanical swivel arm is mounted to the machine frame. The exit guide on the changer arm can be rotated by 270 degrees.

This not only improves accessibility and occupational safety since machine operators do not have to work inside the machine housing but

The changing arm of the peeling machines serves to maintain the exit guide in a safe and easy way.

The Technical Service offers an efficient replacement for all components of the peeling machine.



Scan for more information on Smart Alarm.



Scan for more information on Genius CM®.

it also reduces downtimes. On the other hand, this increases plant availability and the plant can be revamped within only two working days.

Industrie 4.0

Everything is possible when it comes to upgrading the machine control, i.e. from installing state-of-the-art control components in existing switch cabinets up to a complete renewal including control desks and operator islands, switch cabinets, sensors, cabling incl. variable displacement and drive motors.

In addition to that, the Technical Service can offer innovations with its own digital tools and solutions of SMS Digital. Technical Service applies Predictive Asset Optimization Performance Packages converted to real maintenance instructions by solutions such as IMMS®, Genius CM® and Smart Alarm. As a result, maintenance costs are reduced sustainably and plant availability is also increased. In addition, yield and product quality are optimized.

With Genius CM® all processes resp. line signals can be monitored and clearly displayed. Thresholds can be defined for each process step, permitting early overload identification.

Smart Alarm provides an improved monitoring of alarms and alerts triggered in the plant. With the intelligent prioritization of direct interlinking with solution proposals, automatic messages and intelligent analyses Smart Alarm does away with lengthy fault analyses.

“Maintenance staff, we have a problem!” is now a thing of the past. ♦



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Downtimes kept as short as possible

BRIEF INTERVIEW

Christian Mohr, Head of Repairs / Modernization Long Products, explains the challenges plant operators are faced with and how replaceable assemblies can increase plant availability.

Mr. Mohr, for which type of plants does SMS group offer services?

In recent decades, peeling machines of manufacturers Kieserling, Schumag, SMS Meer and now SMS group have been sold on an international basis. The long-lasting plants enable smooth and constant production on a very high level of quality, provided the plants are properly maintained.

How would you describe the key problems plant operators of peeling lines are faced with?

The most frequent problems are above all the insufficient quality of peeled material, an abnormal noise generation, too much clearance in the system or oil leakage and inadequate material guiding.

What challenges are you facing resulting from these problems? What kind of challenges is SMS in for due to these problems?

The ultimate aim is to keep downtimes as short as possible because this is where the customer loses a lot of money. For this reason, we start immediately with an assessment of the corresponding component status either on customer's site or in our service workshop. Then, we carry out the respective repair to make sure that a restart takes place very rapidly – we therefore only use OEM spare parts. Often, we recommend our customers to keep a replaceable assembly or spare and wear parts in stock to make sure that downtimes are further minimized and high plant availability is guaranteed. ♦

You can find additional information about replaceable assemblies on the following pages.

Time saved through replaceable assemblies

WORLDWIDE

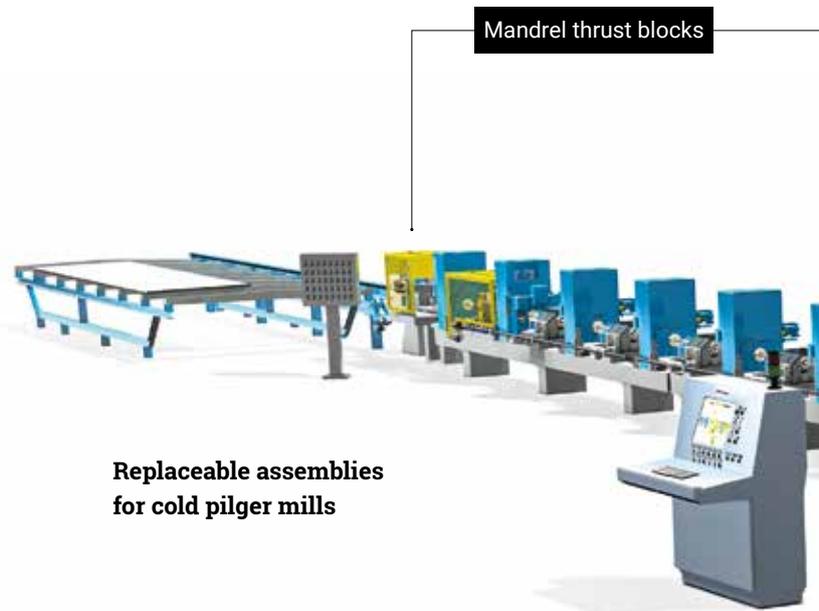
Through the use of replaceable assemblies the availability, productivity and profitability of plants can be specifically increased.

- By using replaceable assemblies plant operators are able to pool resources focusing fully on operating their plants.
- For the replacement of assembly groups SMS group offers a 360-degree service support.
- The service technicians therefore have specific know-how and many years of experience.

A replaceable assembly is understood as module which can be replaced in a custom-fit manner for an assembly to be repaired. The assembly is in new condition and will be provided by the Technical Service of SMS group according to all OEM specifications. By using all original parts and through implementing various quality tests prior to delivery full assembly operability is ensured and guaranteed.

In practice, the possibility to quickly replace an assembly and the resulting increase in flexibility through stockpiling of such a replaceable assembly means that plant operators are able to pool their resources and focus fully on the production process and the operation of the plant.

It goes without saying that the economic perspective is also playing a decisive role. By planned repair measures and by using a replaceable assembly the loss of profits is normally much less than a profit loss during unscheduled machine downtimes with for example emergency repairs. In



Replaceable assemblies for cold pilger mills



“With our concept of replaceable assemblies, you will profit not only from enormously reduced downtimes, a permanently high quality level of the plant parts and reduced unforeseeable risks, but also ensure the longevity and production capacity of your plant.”

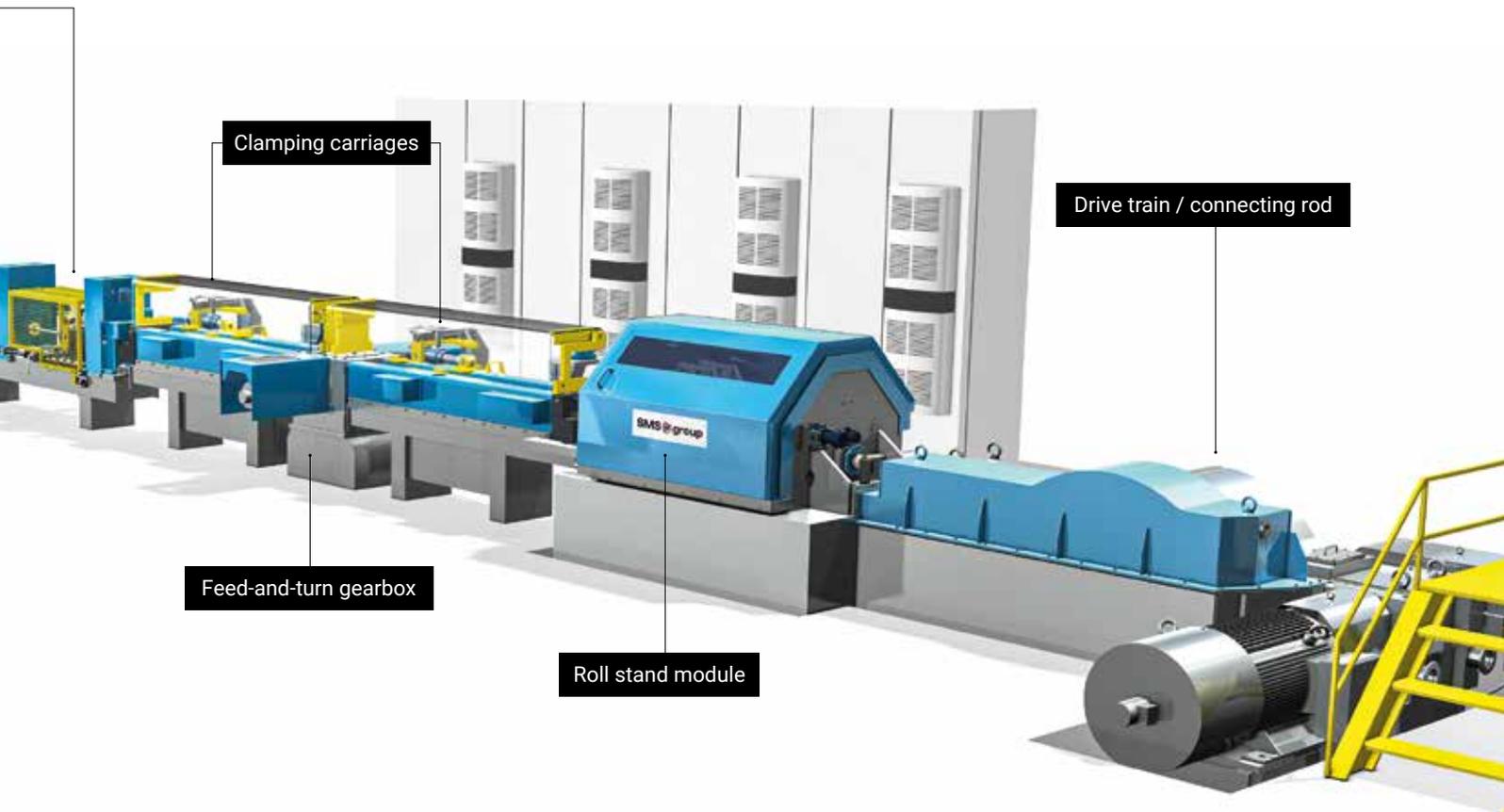
Filipe Martins Ferreira, Head of Service Workshop Europe

In addition to various product-specific advantages, a regular repair of core assemblies ensures the customer also a large economic benefit. With an OEM repair measure or the use of a replaceable assembly, the productivity level of customer’s plant can be enhanced, quality can be optimized, rejects be reduced and finally the probability of default be minimized. This may result in increased profitability and larger economic benefit.

For replacing assemblies, a 360° service support is also offered by SMS group. The comprehensive service portfolio along the entire value chain ensures that our customers are able to focus on their core activities.

Naturally, the concept of replaceable assemblies and the 360° service support are offered by the Technical Service on a cross-product basis – irrespective of whether cold pilger mills or bright steel lines are concerned. The concept developed by service experts of SMS group is the basis for this: maximum customer benefit from optimized processes and highly experienced staff.

For some plant types such as cold pilger mills, drawing lines or peeling and grinding machines, of which thousands have already been delivered by SMS group under the names Kieserling, Schumag and SMS Meer, service experts have successfully put together replaceable assemblies thanks to their specific know-how built up over the years.



Replaceable assemblies for cold pilger mills

Cold pilger mills of SMS group are characterized by their design featuring high productivity and availability which is essential for the competitiveness of our customers. In order to ensure that this remains in future it is important to draw on the concept of replaceable assemblies and to minimize the risk of failure by preventive assembly replacements.

Signs for a defective assembly can be insufficient quality of material put through the pilger mill, abnormal noise generation or intensified resp. increased vibrations. It is important to recognize these signs and exchange the parts by a replaceable assembly in good time. The assembly to be repaired is then disassembled in the service workshop of SMS group, where it is cleaned and subjected to a comprehensive damage analysis and tolerance measurements to make sure that dimensional accuracy of the components is achieved according to OEM specifications. To restore the original quality level all bearings, seals and wear parts are replaced.

The Technical Service offers the following replaceable assemblies for cold pilger mills:

- Roll stand
- Crank drive
- Connecting rod
- Clamping carriage
- Mandrel thrust block
- Feed and turning drive

Replaceable assemblies for bright steel lines

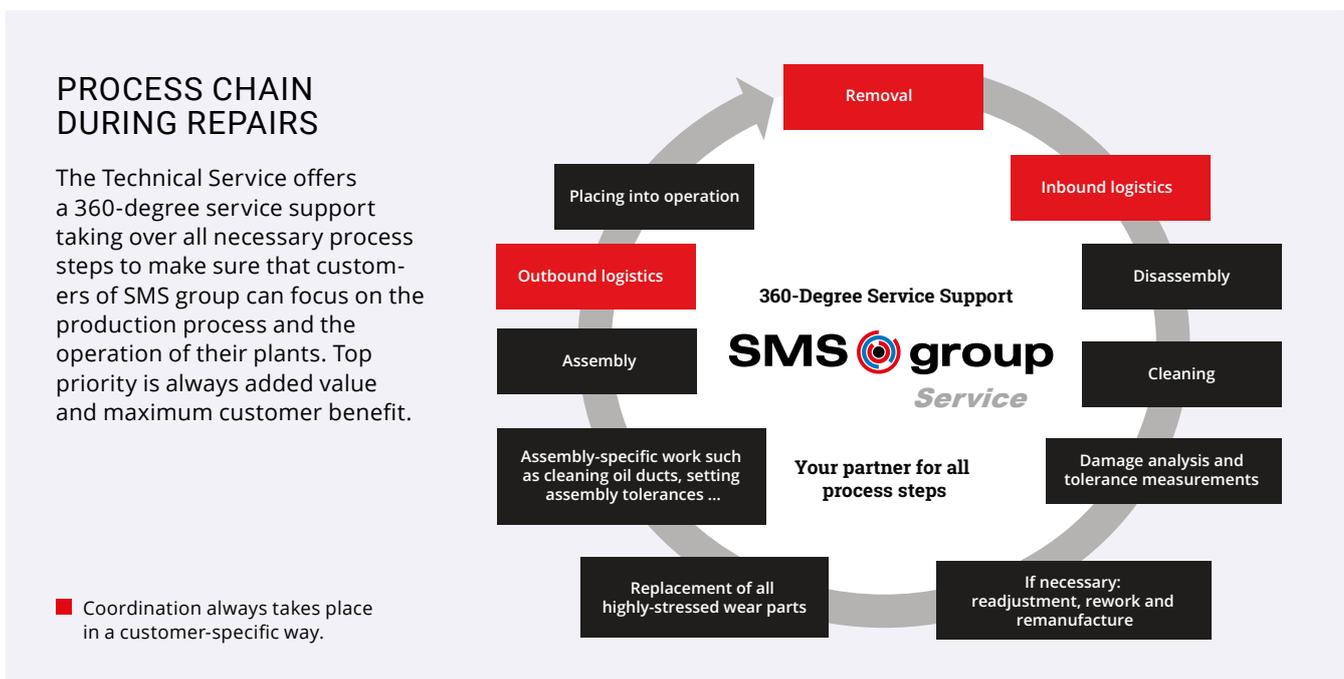
Clean and smooth surfaces, high dimensional accuracy and surprisingly cost-effective in production – these are the advantages why bright steel is valuable for many industrial sectors such as the automotive industry.

It is also elementary that possible risks are recognized and the failure risk is reduced by a preventive assembly replacement to ensure that the most cost-effective production is maintained.

The quality of drawn material and the straightness of bars are insufficient? Abnormal noise generation on the drawing unit is also detected. It is indispensable that these problems are ascertained at an early stage to make sure that a risk of failure is reduced by preventive replacement of the respective assembly.

For example, the repair of the drawing carriage may result in increased reliability and productivity of customer’s plant. The assembly is repaired in the service workshop, where it is first disassembled. Then, a comprehensive damage analysis is carried out and tolerance measurements are performed. In the course of comprehensive repair work the drawing carriage is cleaned, examined and reassembled. Thereafter, all functions of the complete unit are tested.

In addition, all wear parts are replaced such as sliding guides, inner wedges, cylindrical rollers, drawing and return rollers. The result is that the original quality level is restored, the availability of the plant is increased and less rejects are produced.



Technical Service offers the following replaceable assemblies for drawing lines:

- Drawing carriage
- Preassembled main shaft with drawing cams
- Impact cylinder for cut-off device
- Straightening roller set incl. mounting and roller support

Replaceable assemblies for peeling lines

SMS group's Technical Service offers the concept of replaceable assemblies also for peeling lines. Signs of a defective assembly are also insufficient quality of peeled material, abnormal noise generation and inadequate material guiding. You can also rely on a 360° service support.

Technical Service offers the following replaceable assemblies for peeling lines:

- Entry guide
- Infeed unit
- Turning tool adjusting device / hollow shaft
- Exit guide
- Pull-out trolley

For grinding machines the Technical Service offers replaceable assemblies for various grinding spindles. Since the Service provides a pool of as-new spindles and logistics and servicing processes are well-coordinated the response time is very short. The assembly of the grinding spindle takes place under optimum conditions with the corresponding devices and the measuring tool for adjusting the bearing clearance using OEM spare parts. The aim is to attain a most efficient and low-vibration machine by meticulously repaired assemblies.

Advantages at a glance

Repair measures planned at an early stage reduce unscheduled downtimes significantly ensuring fast and efficient handling. The processing time of inhouse repairs always depends on the damage analysis to be carried out.

Compared to internal servicing and external third-party providers, a 360° service support of the Technical Service offers different advantages. Processing and quality checking are based on original drawings ensuring and guaranteeing the accuracy of fit for all components. Moreover, customers of SMS group always benefit from OEM quality, whereby value, quality and production capacity are maintained in the long term.

You would like to learn more and get specific details for your machines and assemblies?

Our experts will be glad to answer your questions and further assist you. ◆



OEM quality secures that value, quality and production capacity are maintained in the long term.



By preventive assembly replacements the risk of failure is reduced.



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Performance optimization for wire rod mills

WORLDWIDE

Maximum output, reduced downtimes and long-term competitive advantages can be achieved with services of SMS group.

- **As lifecycle partner, SMS group is there for the customer for the entire service life of the plant.**
- **Both the business goals and strategies of the customers and the technological solutions are in the focus.**
- **As a result, customers can zero in on their actual core processes.**

Higher steel grades, increased coil weights, increased availabilities, better tolerances and less material losses. The requirements placed on companies operating wire rod mills are increasing worldwide. At SMS group, the Technical Service is well-positioned to face these challenges and continuously adapt its portfolio to fulfill any new requirements of plant owners and markets.

Customers want full-service lifecycle partner

- Digital monitoring of the plant condition with predictive analyses leading to increased availability and yield.
- Immediate availability and supply of spare parts, 365 days a year.
- Qualified maintenance and modernization concepts from a single source – also for third-party equipment.
- Well-founded advice and efficient solutions to achieve modernization goals and to give the plant a competitive edge.

These aspects are just a selection from the comprehensive range of services offered by SMS group's Technical Service for wire rod mills.

Marc Hamacher, Vice President Service Long Products: "We see ourselves as lifecycle partner for our customers, supporting them throughout the entire service life of their plant. In doing so, we focus both on the business goals and strategies of our customers and, at the same time, on the technological solutions. As Leading Partner in the World of Metals, we offer everything from a single source – anytime, anywhere."

Global service network for wire rod mills extended

To live up to these high standards, the SMS group Technical Service for wire rod mills is continuously expanding its service network. The close cooperation within a global network of qualified service specialists, supported by rolling mill experts in Germany and Italy, has enabled SMS group to expand its range of services and to increase the transfer of know-how for the customers. The Technical Service Division of SMS group is ready at 50 locations around the world.

"Our customers always have a dedicated contact person who coordinates and initiates all activities. Today, service business goes way beyond the mere supply of spare parts. That is why we have developed a comprehensive portfolio, which we continuously adapt and expand to include digital solutions," says Matteo Braggiotti, Executive Vice President Service Long Products. In line with customers' needs, SMS group's services for wire rod mills consist of four specialized areas: Spare Parts & Logistics, Upgrades & Modernizations, Maintenance & Repairs and Consulting & Training.

Significantly less downtimes through condition monitoring

One of our digital products is the Genius CM® condition monitoring system. It is an early warning system that monitors wear-prone plant components so that action to prevent them from failing can be taken at an early stage. By means of sensor technology and analyses, the intelligent software monitors vibrations, lubricants, water levels and other critical factors that indicate wear or failure. "We have the OEM expertise and know our machines down to the smallest detail. This expert knowledge is contained in our CM system. Genius CM® is able to detect the very first signs of damage well in advance. In this way, the plant owner can schedule a maintenance shutdown at an early stage and avoid expensive and time-consuming plant downtimes and consequential damage. Service experts from our workshop and our field service provide support when required. This means that downtimes can be significantly reduced compared to unscheduled standstill periods," says Frank Isken, Senior Product Expert.

Fastest possible availability of spare parts thanks to tried-and-tested concept

With the proven warehouse concept and the eShop platform for spare parts, SMS group has set new standards in terms of availability and supply logistics. Hannah Köllmann, Senior Product Manager: "We manufacture know-how spare parts such as roll shafts, eccentric bushes, rolling modules, housings, etc. and ensure demand-oriented warehousing of these parts in our service workshops. This enables us to supply our customers with OEM spare parts immediately in case of damage." In total, more than 60,000 spare parts are permanently stored in the Mönchengladbach warehouse to keep delivery times short and guarantee the desired OEM quality of the spare parts.

Efficient planning and execution of modernization projects

"In some regions of the world, we see a major need for catching up by updating older wire rod mills to the latest state of

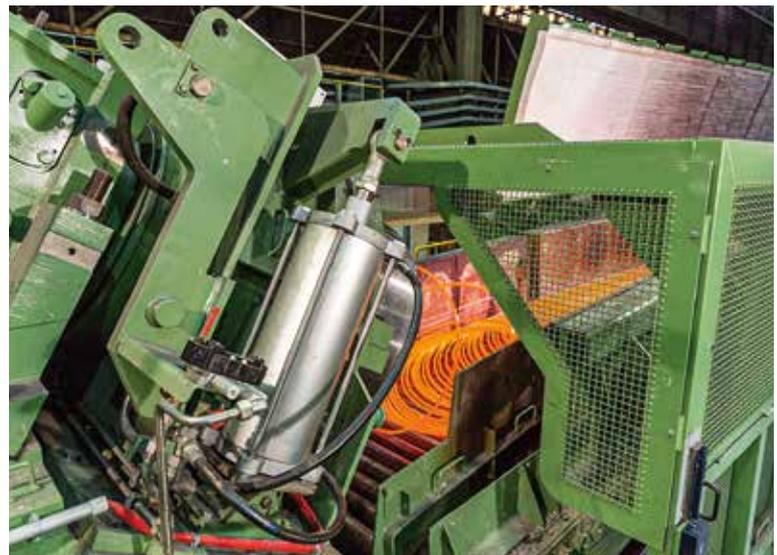
the art to make them competitive and ready for the future,” says Frank Isken. Modernization goals and requirements are determined in fact-finding audits and equipment checks together with our customers. The SMS group experts then prepare a modernization concept, which is coordinated with the customer and implemented with support from the workshops and our colleagues in the field. The results are convincing. “We achieve several goals of our customers. On the one hand, we reduce costs by minimizing energy consumption and using less feedstock and on the other hand, we significantly increase the quality within close tolerances – mostly better than 1/2 DIN. Thanks to these high-quality wire rod products, the customer is able to open up more profitable market segments. In combination, all of this sustainably increases plant owners’ competitiveness,” continues Matteo Braggiotti. “Particularly regarding upgrade and modernization SMS group is capable to implement proven and consolidated technological packages, which are reliable and fast payback solutions for operation improvement, as well as tailor-made solutions to satisfy any customer request regarding safety, technology and quality.”

CL stand repairs around the clock

The regular revisions of the conventional finishing blocks, MEERdrive® and FRS® are among the most requested services. Due to the high operating speeds, antifriction bearings and plain bearings in the CL-160 (6”) and CL-200 (8”) mill stands are exposed to high wear. “This example shows how we are optimally set up for services in our workshops. And that is what our customers appreciate,” Frank Isken explains. As soon as the components arrive at SMS group, they are unpacked, cleaned, measured and documented. In individual cases, all wear parts are replaced and, after consultation with the customer, repairs are carried out if required, e.g. on housing bores – also in shift work around the clock. Within a fixed time window of just two weeks on average, the complete revision will have been carried out in a reliable manner and the equipment will have been put back into operation.

Loop laying head upgrades increase yield

Repairs of the heavy-duty gear parts of the loop laying heads are also part of the everyday duties of SMS group’s Technical Service. Upgraded loop laying heads provide several advantages, such as less vibrations, improved winding layers and higher speeds.



The revamped loop laying heads are characterized by less vibration, improved winding layers and higher speeds.

Digitalization is gaining in importance in the industry

“So far, producers in the wire industry have been cautious when it comes to digital transformation, as the special know-how and all associated processes shall be kept in-house. But we now see that a change of thinking is taking place and that the significant prospects of digital transformation are being recognized,” Matteo Braggiotti explains. SMS group is the leader in digitalization. Whether virtual reality involving a digital twin of the plant, augmented reality using data glasses, applications using artificial intelligence to increase availability and reduce costs, or consulting, training and maintenance



In the Long Products Division, SMS group combines the know-how and experience of traditional companies such as Schloemann, Mannesmann, Siemag and S.I.M.A.C and has already installed more than 500 reference plants worldwide in the field of bar and wire rod mills.

For wire rod mills, SMS group continually expands its service network and range of services.

support with state-of-the-art digital tools – SMS group has been developing and investing in these solutions for more than 15 years. This commitment is reflected by a major competitive advantage and further benefits for our customers. Matteo Braggiotti: “Of course, we fulfill the highest security standards for all applications. As a manufacturer of plants and equipment, we ourselves have extremely high security standards. That is why we fully understand the concerns of our customers and develop reliable, trustworthy and successful solutions.”

Practice-oriented and digital training courses

To operate a wire rod mill optimally and to achieve the highest possible output, expertise is a key criterion. SMS group’s Technical Service transfers this knowledge to the customers in consulting projects or in the form of theoretical and practical training of customers’ employees. This is done for example in the SMS group TECademy and our Digital Classroom.

Increased performance that pays off

The SMS group Technical Service for wire rod mills has been proven to ensure increased performance – permanently, reliably and sustainably. Matteo Braggiotti: “The final accep-

tance of a wire rod finishing mill is where our job begins. The service business closes the gap between the different phases of the plant lifecycle and has developed up to a point where we can take over the entire maintenance service for our customers. We are increasingly finding that many customers prefer to concentrate on their core processes and have their maintenance tasks carried out by trusted partners. Furthermore, we see a growing demand for digitalization, Industry 4.0 and modernizations. We are ready for this challenge and look forward to the enquiries and projects of our customers.” ♦



Contact
service.longproducts@sms-group.com



More than 60,000 spare parts

WORLDWIDE

Concentrated spare parts know-how of SMS group for wire rod mills of all manufacturers.



SMS group is known for its commitment to quality and performance when it comes to the worldwide supply of spare parts for wire rod mills. Based on its long-term experience, services and spare parts for wire rod mills are offered from SMS group as well as for plants of other manufacturers.

More than 60,000 spare parts are available directly from stock – such as antifriction bearings, plain bearings, washers or double lip seals. Customers all over the world have their plants equipped with parts from SMS group and make use of its service support – regardless of whether the wire rod mill comes from SMS group or another manufacturer.

High-precision bearings for wire rod blocks

When it comes to spare parts, high-precision bearings are seen merely as small part of the big picture. But exactly these bearings installed in a finishing block or a sizing mill ensure long-term and smooth operation of the plant due to their safe and precise axis, shaft and bevel gear bearings.

When precision antifriction bearings are manufactured the focus is fully on quality. The special bearings are exclusively manufactured in Europe from Schaeffler for SMS group to safeguard a constantly high quality standard. Consequently, the bearings set standards as regards speed, accuracy and service life. In the development of precision antifriction bearings for SMS group, engineers of SMS group and Schaeffler closely cooperate.

The antifriction bearings are continuously improved, adapted to new market demands and the model series is constantly expanded. Bearings are designed such that outer dimensions and lubrication connectors correspond to bearing types of older assembly groups. A unique construction ensures complete compatibility with bearings of other manufacturers whose equipment design resembles the wire rod blocks of SMS group.

In this way, the customer benefits from the advantages of the bearings from SMS group, without having to carry out conversions on existing plant parts. This concept may also be transferred to other spare parts such as plain bearings, washers or double lip seals. For many years, customers all over the world have put their trust in the precision

bearings of SMS group. Because of their excellent quality, the bearings from SMS only require little maintenance and thus achieve a longer life cycle than standard components – which is reflected in lower operating costs and top quality wire rod. Since the bearings are in stock, SMS group is able to deliver them worldwide at short notice.

Extensive quality assurance

The manufacturing shop of SMS group in Mönchengladbach is uniquely qualified to carry out remanufacturing work and overhauls for a wide range of rolling mill equipment, such as eccentric bushes, roll shafts, housings and rolling modules. The workshop of SMS group is equipped with up-to-date turning, milling, boring and grinding technology. A highly qualified staff is additionally able to reliably produce close tolerances and demanding surface qualities typically required for these components. The components are assembled such that proper fit and functionality are ensured. SMS group offers comprehensive tests for quality assurance ensuring that customer demands are satisfied and that the plants are functioning correctly after they have been installed.

Spare parts management

Two important goals of spare parts management are to make sure that downtimes and reduction of capital tied up in spare parts stock are prevented. Here, spare parts management packages of SMS group are utilized which do not only create flexibility but also lead to lower maintenance requirement and attain significant cost savings. Increasingly complex production systems and shorter innovation cycles are also particularly challenging. There is a risk of an unscheduled plant standstill, when required spare parts are no longer available or a new spare parts generation is not totally compatible. Therefore, SMS group permanently monitors the availability of all parts providing modern alternatives on request – even for parts of third-party providers. ♦

Learn more:



Spare Parts
Management



Spare Parts &
Logistics



Matteo Braggiotti

matteo.braggiotti@sms-group.com

24/7

WORLDWIDE

X-Pact[®] Service

Customers expect from us not only holistic, efficient and future-viable automation solutions, but just as well proficient consultation and immediate support at any point in the lifecycle of their production equipment. Therefore, we are present the world over with our X-Pact[®] Service and always within easy reach for our customers. ▶

Always ready to support you, promptly and reliably – the world over

Richard Breuning, Jessica Kelka, Nabil Sifi, Luisa Thyssen, Hasan Günes and Daniel Starke support customers with X-Pact[®] Service along the complete process chain



365



The automation system is the beating heart of any production facility. It controls the production processes, assures smoothness of operation and generates data and reports critical for the performance of the plant. An automation system that does not work properly may result in costly downtimes, poor customer satisfaction and financial losses. Immediate and reliable technical support by an expert team and state-of-the-art automation systems are indispensable for companies to remain competitive. With its X-Pact® Service, SMS group supports its customers along the complete process chain – even beyond the commissioning of the customer's plant. This guarantees high availability and stability of the automation systems in the long run. "In addition to a full host of individual services, our customers may also choose from our range of full-line service packages. Under these customized service agreements, we guarantee reliable and efficient operation of our customer's facilities on a long-term basis and in close relationship with our customers as partners. 'Always ready to support you, promptly and reliably – the world over', this is the motto of X-Pact® Service," says Ralf Mackenbach, Vice President Services, Center of Excellence Electrics and Automation of SMS group.

X-Pact® The SMS group's proven electrical and automation solutions are summarized under the brand X-Pact® (Process, Automation, Control and Technology).



Service for automation systems over the complete lifecycle

In order to achieve a continuous high level of economic efficiency and Overall Equipment Effectiveness (OEE), downtimes need to be kept as low as absolutely possible. From an X-Pact® Service agreement, the customer may benefit in numerous ways, for example by:

- A 24/7/365 hotline
- A service expert who is familiar with the customer's system
- remote support via the X-Pact® Service portal
- Expert know-how available worldwide

The customer's staff can call on us for individual expert support on their automation system 24/7 on 365 days of the year. They will benefit from SMS group's unparalleled know-how and expertise in plant automation.

The SMS service experts know all technical details and have a deep understanding of the factors that may affect the automation system and the production process at the customer's facility. The customer can avail himself of a permanent point of contact with expert knowledge and a global service network - over the complete lifecycle of their automation systems. Even today, SMS group's international branches in China, India, Italy, Russia and the U.S.A. support customers in their respective regions directly with electrical and automation service.



X-Pact® Service Portal – our platform for expert diagnostics

Whenever required and requested by the customer, the automation experts can promptly log in on the customer's plant and equipment via the common X-Pact® Service Portal and even invite specialists from other disciplines to join in. This makes it possible to solve many issues right away, reducing overall costs and boosting performance. No effortful, time-consuming troubleshooting, but proficient support by experts and efficient just-in-time cooperation. Even before the repercussions of the COVID-19 pandemic, this type of digital solutions in place at SMS group, including remote support services, had proved highly successful and efficient.

The X-Pact® Service Portal uses SSL (Secure Socket Layer) technology with 128 bit encryption. Highly efficient firewall and single-port technologies guarantee high security of the Internet connection. A relay server, operating as facility gateway, organizes the equipment behind the gateway. Additionally, it is possible to admit other specialist department to the interactive process.

The customer sets up the connection, and without his permission it is impossible for the service specialists to access the plant system. The connection is stopped as soon as the support mission ends. Without a new service request, any external access to the customer's network is precluded.

The benefits at a glance: :

- Front-end software with Point2Point encryption assures secure data exchange
- Prompt support in trouble shooting and during scheduled service activities
- The customer has full connection authority
- Full traceability of all service activities
- Transparent workflow
- Access exclusively for authorized specialist users

“In addition to a full host of individual services, our customers may also choose from our range of full-line service packages. With these customized service agreements, we guarantee reliable and efficient operation of our customer's facilities on a long-term basis – in close cooperation with our customers as partners.”

Ralf Mackenbach, Vice President Services, Electrics and Automation of SMS group



Proven service modules can be combined into a comprehensive service package.

For more information on the X-Pact® Service portfolio, please visit:

www.sms-group.com/x-pact-service

Remote services: Far away, but yet close by

INTERVIEW

Remote support is used not only to resolve urgent issues, but also to perform scheduled maintenance activities.

Mr. Mackenbach, in which way has the service on electrical and automation systems changed due to the COVID-19 pandemic?

Ralf Mackenbach: BEven before the pandemic, we had made intensive use of remote support as an option to assist our customers promptly and effectively in their daily production routines. In order to guarantee utmost safety of our customers and employees during these extraordinary times, we decided to expand our remote activities even further. Especially, minor revamps that had originally been planned to be performed on site were increasingly handled remotely. I can't think of a project where this did not work out fine. At the same time, we have been able to reduce travelling to an absolute minimum. ▶

In the test center

Ralf Mackenbach (left), Vice President Services, Electrics and Automation of SMS group, and Helmut Beckmann-Lenneper, Head of Execution Services, Electrics and Automation of SMS group.





In concrete terms, how does remote support work?

Helmut Beckmann-Lenneper: Let me give you some examples. A German customer called our 24/7 service hotline one day before Christmas 2020 because there was an issue with a hot strip mill. The rolling of certain strip thicknesses was unstable, even leading to production stops. The customer granted our technician remote access to the system. The technician first checked the diagnostics records of the strips concerned. He quickly found that the values measured by one of the position encoders of the screwdown system for the roll gap adjustment were not plausible. As an immediate measure, the encoder was deactivated. Production was resumed and no problem occurred. During the next regular maintenance stop, the defective encoder was replaced with a new one. All steps of that service mission were documented in our CRM system. This means that other service technicians can now access the case and view the findings. In December 2020, we received another hotline call from a customer in America. His plant had automatically stopped all of sudden (emergency stop). Our technician checked the log files and other available data via remote access. He quickly came to the conclusion that there were communication problems within the internal network systems. He recommended that the customer should replace a network switch – and, indeed, this solved the problem.

Does this mean that in most cases you use remote support to help customers in emergency situations?

Helmut Beckmann-Lenneper: Oh no, we use the possibility of remote access also for scheduled service measures and during commissionings. Just recently we received a request from a Turkish customer who wanted to have additional sensors installed in its plant. In this case, we planned the necessary expansion of the hardware of the field-bus system jointly with the customer, the customer installed the new hardware and then our experts integrated the new signals into the automation system via remote access. And now, with the restrictions in connection with the pandemic, we have been implementing even more complex revamps in this way. This has avoided



“We use the possibility of remote access also for scheduled maintenance measures and during commissionings.”

Helmut Beckmann-Lenneper,
Head of Execution Services, Electrics
and Automation of SMS group

quite some travelling, and we have been able to support our customers in implementing the measures as planned.

What is the focus of the modernizations that you perform with your service team?

Ralf Mackenbach: We are active in both software updates and hardware upgrades of a wide range of different automation systems. We plan modernizations for all types of automation systems in line with the requirements of our customers and with short installation and commissioning times, always with a view to an optimal combination of remote and on-site service.

Helmut Beckmann-Lenneper: For 25 years, SMS group has used the modular X-Pact®-ProBAS automation system as standard for the basic automation and the technological controls in rolling mills. We upgrade X-Pact®-ProBAS to the latest hardware generation in one to two days, independent



“Even before the pandemic, we made intensive use of remote support services.”

Ralf Mackenbach,
Vice President Services, Electrics
and Automation of SMS group

of the year in which the existing system was first commissioned. After completion of such an upgrade, production can be immediately restarted at 100 percent.

Which customers can benefit from the remote service?

Ralf Mackenbach: The use of the 24/7 hotline and the possibility to call on SMS group experts - 24/7 - for assistance are available free of charge to customers who have concluded a corresponding service agreement. We usually conclude one- to three-year contracts with our customers. These contracts also form the legal basis for the implementation of our remote services. The contracts cover the access rights for on-call assistance and the agreed number of hours for cost-free service activities, and they may even include additional X-Pact® Service modules. Also the conditions for planned and unplanned on-site assignments are defined. Basically, every new plant and equipment

that we supply comes complete with the technical features enabling the use of our remote support service. Currently, we have far more than 100 active connections in place worldwide with our customers. Internally, we use the X-Pact® Service portal as early as during the engineering phase, the Plug & Work integration tests and during commissioning. Within the global network of SMS group, both software experts and technologists from our development and engineering departments are available to assist our customers.

What digital tools are available to the X-Pact® Service experts?

Ralf Mackenbach: For many years, SMS group has pursued a digitalization strategy that has seen the successful use of the X-Pact® Service portal during commissionings and in the after-sales service. During the past year, we have enhanced the communication possibilities significantly as well as the digital functionalities of the portal. We now even use AR goggles for the direct exchange of information about the facility with the customer's specialist personnel per chat function, audio, video or whiteboards securely connected via the X-Pact® Service portal. In addition, a mobile version of the X-Pact® Service portal enables staff at the customer's facility to send out a service call directly from their smartphones. Further mobile applications are to come soon.

What role does your team play in the implementation of Equipment-as-a-Service projects?

Ralf Mackenbach: Electrical and automation systems and their specified performance play a significant part in Equipment-as-a-Service (EaaS) models. Consequently, also our X-Pact® Service experts get involved here, as our remote service is critical to the successful optimization and the resulting high performance level of production equipment operated as EaaS. ♦

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 **Further information**
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Automatic converter tapping

WORLDWIDE

The X-Pact® Leading Automation module is successfully in use in many converter shops the world over.

SMS group's X-Pact® Leading Automation system is scalable and consists of an extensive range of modules. An X-Pact® Auto Tapping module can be an integral element of automation solutions right from the beginning or it can be integrated at a later stage into existing systems as an autonomous add-on. This approach allows the plant operator to achieve great savings with an affordable investment.

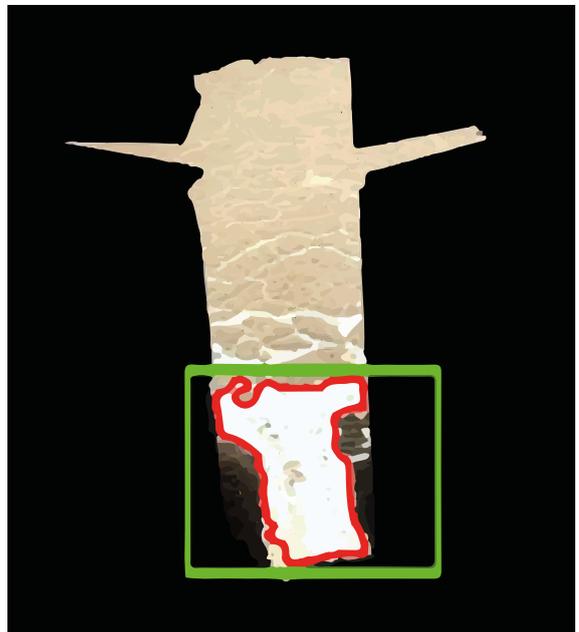
Smart steel production

Many converter plants operated by SMS group customers are equipped with an X-Pact® Auto Tapping module. This feature out of the X-Pact® portfolio enables automatic converter tapping. Its use optimizes process control and makes steelmaking smarter. In order to meet the growing demand for increasingly higher-grade steels, it is indispensable to reduce slag carry-over from the converter into the steel ladle.

In conventional converter tapping, the operator must permanently watch the converter position, the tapping stream and the position of the ladle under the tap hole. Slag detection systems indicate any imminent slag carry-over. Subsequently, slag retention systems are activated automatically or by the operator. Tapping times are dependent on how the operator performs the converter tilting.

Any irregularities occurring during tapping have negative effects on the production, safety, quality and equipment stability. The use of X-Pact® Auto Tapping leads to a much smoother and more reliable tapping process. The tilting angle of the converter vessel is optimized based on the ferrostatic head at the tap hole. Tapping time minimization is performed by means of a camera watching the bath surface through the converter mouth. The Auto Tapping feature has proved to perform very reliably. The high repeatability of the tapping process leads to shorter and operator-independent tapping times and to less slag carry-over into the ladle, resulting in an increase in productivity. ♦

X-PACT® AUTO TAPPING: CAMERA AT THE CONVERTER MOUTH



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 **Further information**
www.sms-group.com/x-pact

Synergies from a new partnership

GERMANY

elexis AG acquired a minority share in LASE Industrielle Lasertechnik GmbH effective January 1, 2021. Joint future opportunities and complementary technological know-how – especially with a view to the fields of activity of EMG Automation GmbH, a subsidiary of elexis AG – are the strong supporting pillars of this successfully concluded strategic partnership.

EMG Automation GmbH and LASE Industrielle Lasertechnik GmbH have joined forces to develop products for the steel and non-ferrous metals industries – tapping synergetic effects from their complementary technologies. The partnership will give LASE access to elexis' and EMG's worldwide sales and service network. Via LASE's subsidiaries in Singapore and Australia, elexis will in turn be closer to the container ports and the mining industries - and the respective markets - in those areas.

Who is LASE?

LASE was founded in the German town of Hünxe in 1990 by the current managing director Dipl.-Ing. Achim Klingberg. At that time, he was a pioneer in the development and use of laser-based measuring systems specifically for use in the extremely harsh operating environment of the heavy industry. One of the first projects in the company history was the supply of laser-based distance measuring systems to Hüttenwerke Krupp Mannesmann in Duisburg, where the systems were used for bath level measurements in steel ladles. The challenge was to use laser technology that would be able to take measurements on hot surfaces while coming with an

effective protection against the extremely high temperatures in a steelworks environment. In 2001, LASE added 2D laser scanners to its product portfolio and, in 2005, the first 3D laser scanners. LASE's proprietary and user-oriented software, developed for the processing of the highly complex data from the 2D and 3D applications, is one of the company's unique selling proposition.

The product portfolio today ranges from spot distance measurements up to and including complex high-end laser measuring systems. LASE systems are in use the world over in ports, crane handling applications, for profile and volume measurements of stockpiles and in hoppers, and dimension measurements of steel products. Industries as diverse as steel, mining, road construction, power generation and timber use these systems.

Synergies in product development

EMG Automation has its traditional focus in the field of flat rolled metals, in cold strip rolling and finishing, in particular. However, a few years ago, EMG launched EMG hotCAM, a strip position measuring system for hot rolling mills. EMG hotCAM measures the lateral position of the strip between the rolling stands in hot strip mills in an inline process. The main purpose of the system is to detect irregularities in the strip run early on and avoid cobbles and other critical incidents. The use of this system can save the mill operator significant repair and collateral costs.

Recent developments have made it possible to feed the data captured by the EMG hotCAM system directly into the mill's control system - enabling the implementation of a closed-loop system. Thanks to this capacity, EMG hotCAM is now a member of the SMS group's X-Pact® Sense family.

More than strip position measurement in hot forming processes ...

Exactly at this point, LASE comes in. While EMG has BREIMO, a high-precision optical width measuring gage for cold-rolled and finished strip in its portfolio – a technology that has





KNOW-HOW

Under the umbrella of the strategic partnership, the technologies of the three partners can now be combined to the joint development of products that provide added value to steel and metals producers.

proved highly successful and robust in applications the world over – LASE's product range includes a laser-optical width measuring system for slabs. These 1D laser measurement systems capture the side faces of slabs. The slab width is determined based on the distance between the gages and the distances to the slab measured by them.

In addition to width measurement, LASE offers a profile measuring gage for slabs. This system consists of two 2D triangulation laser scanners - one installed at each side of the roller table - scanning both side faces of the slab. This arrangement enables both the width and the profile of slabs to be determined based on the distance between the scanning units and the values captured by them during the measurement.

Precise slab length measurement by means of a velocimeter makes it possible to relate the information from the slab width and profile measurements to the exact length position of the slab. It is even possible to calculate the slab's cold dimensions, if – in connection with a temperature model – these measurements are complemented by pyrometer measurements of the slab temperature.

EMG iSCAN - Slab width and profile measurements

The above described dimension measurement system will from now on be marketed and supplied by EMG Automation GmbH worldwide to companies in the metals industry under the product name EMG iSCAN. Use will be made of the described LASE 1D and 2D laser measurement systems, fitted within a frame adapted to withstand the challenging conditions in the continuous casting shop. It is planned to develop further enhancements of the system.

EMG iSCAN can be used at the continuous casting machine before or after the slab has been separated from the strand and before feeding the slab into the furnace. This means, its place of application is significantly further upstream than that of the EMG hotCAM strip position measuring system in the rolling mill.

These are just two of many examples of how solutions from EMS and from LASE complement each other, enabling plant operators to acquire key quality data and implement value-adding quality control solutions along their entire production chains.

Bottom line: The EMG iSCAN slab width and profile measuring systems from EMG Automation GmbH can now also be used in hot strip production, creating even more added value for the user. Even more synergies can be expected from the LASE range of technologies for applications in the various industries elexis AG serves, especially in bulk material measurement in the mining industry, for example. Customers of EMG and elexis will benefit from the expanded product portfolio available from a single source to achieve consistent measurement of quality-critical data and maximize resource efficiency. ♦



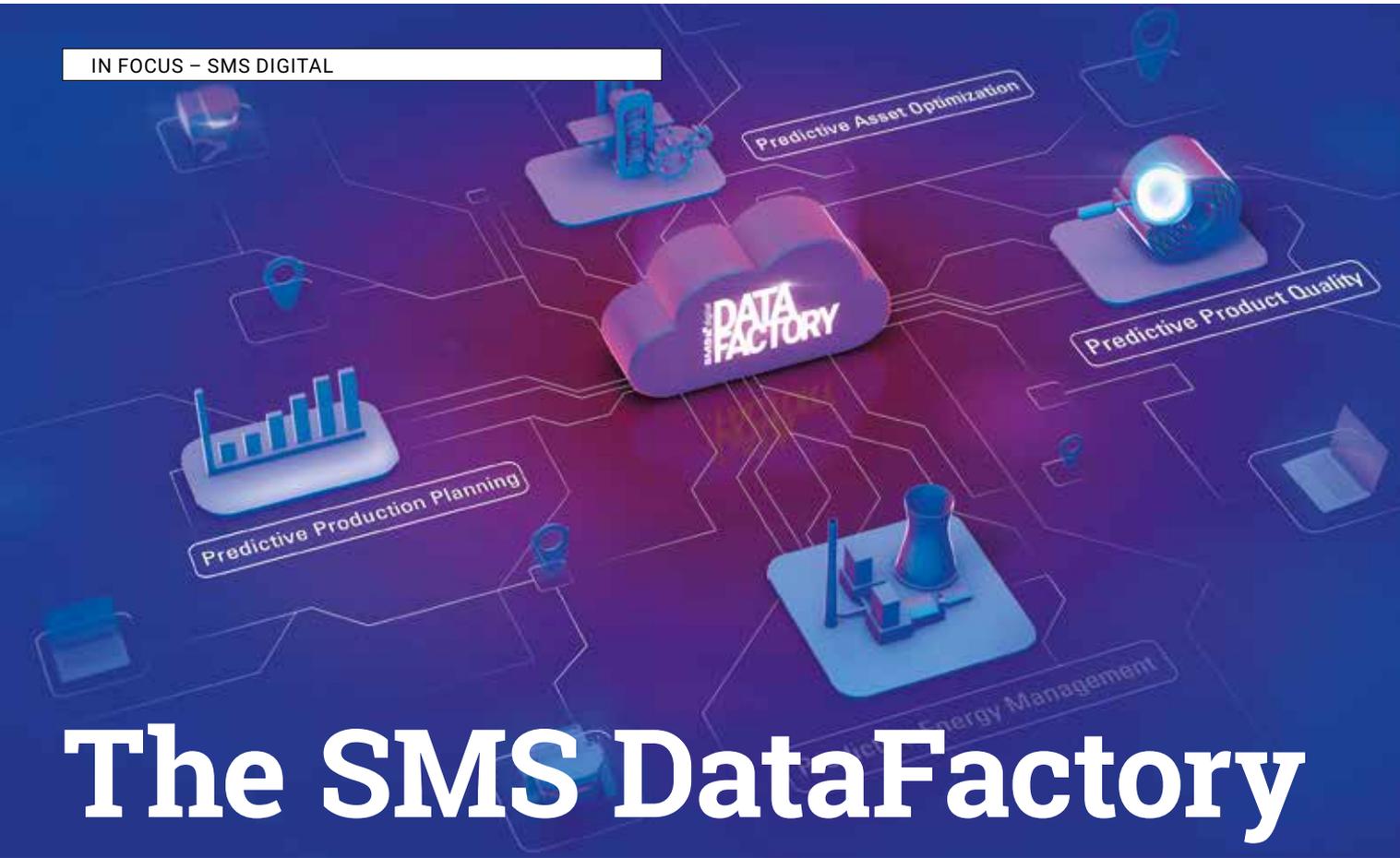
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Further information

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The SMS DataFactory

WORLDWIDE

Providing a holistic view of the process by enriched data.

Businesses in the steel and aluminum industry generate huge amounts of data in their production lines, often only available in a heterogeneous form and scattered across multiple systems and databases. Only by tearing down these data silos and extracting the crucial information for value creation can data be turned into information and information into added value. However, extracting the information needed is a time-consuming task. The SMS DataFactory is the basis of the Learning Steel Plant and makes the data from the plant automation available for planning, maintenance, or quality assurance applications. In this way, fully comprehensive preparation and analysis of all plant data take place.

The concept of the learning steel plant: Generating added value from data

The learning steel plant has one goal: using data to enable production that is as sustainable and resource-efficient as possible. Software collects data from a plant, transforms it into information, and finally into added value using artificial

intelligence and machine learning. This allows essential findings to be gained for later implementation in practice – thus saving costs and resources. Predictive algorithms help to detect a plant's condition, predict the product quality, redirect production routes and minimize downtimes. That is why companies need solutions that process large volumes of data and analyze it in real-time to identify new correlations. In the era of digitalization and Industry 4.0, it is crucial to obtain maximum performance from both plant and processing routes. But how do you first bring the enormous amounts of data into an orderly structure?

Experts prepare the data

Key ingredients in contributing added value to a business are the advanced analytics teams comprising data engineers and data scientists. A large proportion of their work is often spent on data engineering tasks to clean, gather, and combine the data from various data sources into a consumable format. The actual problem to be solved loses prominence to the boilerplate work (work that is repeated in an unchanged form) that needs to be done over and over again. In many cases, only the automation experts can select and understand the available data. This is due to the fact that the operational technology (OT) systems store their data in a format that meets their own requirements but not the purpose of analyzing and merging it with other data sources. A lack of documentation of the data sources creates an additional barrier to utilizing the data. Depending on the problem that needs to be solved, the data must be available in different

formats. The data are typically viewed from a condition, quality, and planning perspective. For the maintenance view, the data are often retrieved using certain events in time. The data must therefore be addressable and selectable via a time range.

Genealogy comes into play here

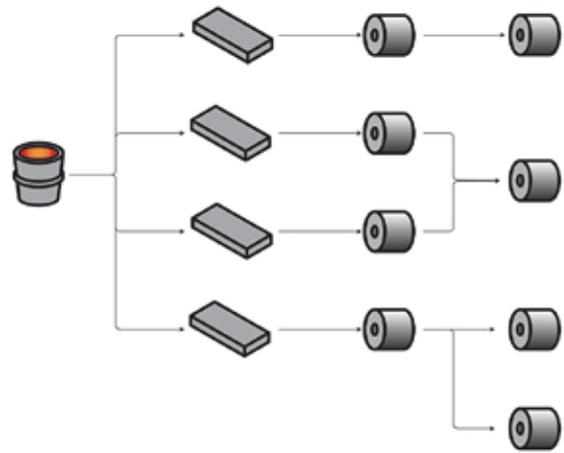
Quality engineers have a strong focus on the product. They track the material through the various intermediate steps of the process route. The problem of data silos is only one of the challenges to be overcome here. Another is tracking changes in the metal during the production process. Metal is converted from a liquid phase into a solid state. Slabs, blooms, and billets are transformed with every roll pass into new geometrical shapes and dimensions. Coils are cross-cut, welded and rolled. This makes it almost impossible to trace causes through the upstream or downstream processing steps. Genealogy is the term used to denote those parent-child relations of the material and is a key piece of information that enables the quality to be tracked across lines.

Within a platform like the SMS DataFactory, genealogy makes it easier to identify where the data come from and how to transform them. Data analysts can immediately start working on the data and select any available signal from an arbitrary line along the process route. The SMS DataFactory ensures that any available sensor- and time-series data are mapped to their position on the slab, bloom, billet, coil, tube, or wire with minimal errors if the automation system has not already performed this. This offers new insight into the transformation and enables the semi-finished products to be analyzed across lines by anyone within a concise time.

For planning purposes, the condition and quality data must be considered to allow systems to decide whether certain products are able to be produced with the current status of input material and maintenance.

Technology meets domain know-how

Having the data available in the appropriate format enables the learning steel plant to analyze data and process it via IT systems. The data is then enriched with metadata: it becomes discoverable and meaningful. Here, it is now necessary to combine technology know-how with domain know-how. Within the SMS DataFactory, the Data Dictionary enables data analysts to gain deep insights into the available data through interlinked data elements based on their origin, purpose and type. Within the DataFactory, the Data Dictionary provides information on domain-specific correlations like the interaction between mold level and stopper rod position in the continuous casting machine. Furthermore, it is crucial to distinguish between the calculated nominal and actual val-



Genealogy The SMS DataFactory provides the so-called Full Material Genealogy, which allows the user of the data to seamlessly combine data of a length-based product with each of its ancestors and descendants.

ues of a physical quantity. A standardized naming scheme supports those differences even more, regardless of the various naming schemes offered by different vendors and found in a steel plant. The filterable, full-text search of a Data Dictionary cuts the time required to find the appropriate information among tens of thousands of data. This helps to ensure a faster implementation by data analysts and thus to the successful realization of the learning steel plant.

The need for an overall data platform that speaks the metals industry's language has never been greater. It allows unified access to the process, production, quality, planning, and maintenance data. The SMS DataFactory tackles the problems mentioned by combining homogenized and standardized data access for data scientists, algorithms and other data consumers. That makes it one of the many key enablers of the Industry 4.0 revolution. ♦

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Energy-efficient steel production enabled by digitalization

BAHRAIN

SULB and SMS digital join forces in optimizing energy efficiency in integrated steelworks in Bahrain.

SULB and SMS digital, a company of SMS group, cooperate in identifying and tapping potentials for energy savings in SULB's integrated steelworks in Bahrain. Alongside SMS group Brazil-based SMS group company Vetta and Midrex Technologies, Inc., based in North Carolina, USA, are partners to the project.

SULB operates an integrated steelworks in Hidd, Bahrain. This steel complex covers the complete production chain from direct reduction to finish-rolled products. A key asset of the mill is the flexible combi-caster, designed to produce a wide range of cast formats and sizes, ranging from billets to heavy beam blanks. In 2011, SMS supplied

the complete equipment for the steelworks on a turnkey basis as a minimill with an annual capacity of 850,000 tons of steel. In 2012, a 1.5 million tons-per-year MIDREX® Direct Reduction Plant was added to the complex.

In 2020, SULB initiated the Energy Audit project with the support of Tamkeen, a public authority helping industries and businesses in Bahrain. The objective of the project is to improve energy efficiency through increasing plant operational efficiency and making full use of secondary energy and residual heat. The long-term strategy for reducing GHG emission will also be outlined. In order to achieve these objectives and to secure successful positioning in the global market, SULB has entered into a consulting project with the above-mentioned SMS companies.

Holistic solutions

SMS has set up a consulting team made up of its top process and metallurgy specialists from its various plant technology areas, energy experts and specialists in AI-based digitalization. Other partners in the project – alongside SMS digital and SMS group – are Vetta, an SMS group company specialized in energy management and related solutions, and Midrex Technologies, the world leader in direct reduced iron technology. Only this unique, concerted approach by all partners involved and their in-depth and highly focused expertise enables a holistic investigation and implementation of solutions that will allow SULB to tap the full scope of energy savings opportunities.

As early as in spring 2020, when the "Quick Assessment" (Module A of the cooperation agreement) was performed, SULB took a first key step in making its operations more efficient and, as a result, more cost-effective. The aims of that first phase of the project were to identify the focus areas and specific measures to reduce the energy consumption, including natural gas, electricity and process gas. Along the complete production chain, fifty measures were identified. A full host of levers were proposed, from the use of smart management systems via adaptation of processes to an im-



SMS supports SULB on the path to energy-efficient steel production with a holistic optimization project.

proved product mix. For every identified measure, a comprehensive and detailed description, a qualitative assessment of the underlying energy savings potential and the associated implementation effort were provided. An implementation plan was set up, including the milestones on the path to SULB's strategic energy-efficiency goal.

Smart energy management

With Module B "Deep Dive Analysis and Implementation", the second phase of the project has been kicked off. This phase will see SULB and SMS digital draw up a strategy to achieve a fast and significant Return on Investment. Module B concentrates on four areas: direct reduction plant, electric arc furnace and ladle furnace, heavy-section mill and integrated energy management. Vetta, for example, will play a key role in the analysis and proposition of an integrated energy management system. The company will evaluate the energy-related key performance indicators (KPIs) of the complete works, derive conclusions and make recommendations as to how energy efficiency can be improved. This analysis will form a key element for the implementation of a digital solution for intelligent energy management. For the direct reduction plant, Midrex will show how the MIDREX H2 technology can help reduce the carbon footprint via the use of green hydrogen, paving the way for a step-wise transition to emission-free steelmaking. Midrex will support SULB via remote-monitoring of the MIDREX plant via the Remote Professional Services (RPS) option to help make operation of the MIDREX direct reduction plant more energy- and cost-efficient.

All Module B activities will be performed via real-time data transfer connections by requesting data via remote access. First measures will be completed in early February 2021, while others will be implemented successively until mid-2021. After completion of all project measures, SULB will be able to achieve significant cost savings as a result of lower natural gas and electricity consumption and will be a pioneer in the region with its smart and highly efficient steelworks.

The project cooperation combining various competence areas of SMS assures that SULB can work with a partner of broad-based competence and expertise in the technological domain, in digitalization and in energy management. This powerful combination enables SULB to meet the growing challenges of the market successfully. ♦



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Preventing defects in continuous casting.

Revolution in process optimization

WORLDWIDE

The Cracks Preventer, a ground-breaking Predictive Quality application developed by SMS digital, combines artificial intelligence, metallurgical expertise and data know-how. Thanks to this smart combination of knowhow and latest digital technologies, the application can predict defects and associated strand breakage that may occur during the casting process and suggest countermeasures in real time. This makes the Cracks Preventer part of the Predictive Quality suite for process optimization aimed at a defect-free production. Predictive Quality includes the aspects of product surface, product geometry and product properties. Addressing the surface quality, the Cracks Preventer helps continuous caster operators save on valuable resources and costs. Often, defects occurring during the casting process - and strand breakage that may result from these defects - entail significant financial loss. The Cracks Preventer application is an innovative solution designed to reduce the occurrence of a wide range of defect types. By analyzing data from the entire process chain in real time, the Cracks Preventer can suggest specific countermeasures in good time to prevent defects from occurring.



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Everything for the customer

U.S.A.

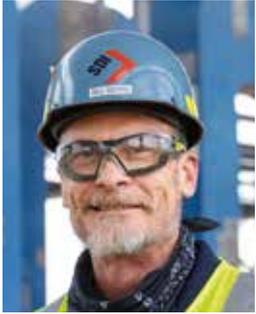
In Sinton, Texas, US-American steel producer Steel Dynamics, Inc. (SDI) will produce the latest generation of advanced high-strength steel. The Texas mill will have capabilities beyond existing electric arc furnace flat roll steel producers, capable of producing 100 kilopounds per square inch (690 megapascals). Whereas CSP® NEXUS mill will have capabilities to produce a maximum strip thickness of 1 inch (25.4 millimeters) and a maximum strip width of 84 inches (2,134 millimeters). Operations are expected to start still this year. For its new facility, SDI relies on SMS group, a strong partner who has much to offer. ▶





“In our global manufacturing workshops, we produce the high-tech equipment for our customer SDI that will be used in Sinton. Despite the Corona pandemic, we were able to deliver even the heaviest plant components, such as the mill stands, to the construction site. Now we are looking forward to the commissioning phase, in which we will once again prove that the SMS group is the Leading Partner in the World of Metals.”

Roger Smith, Project director SDI, SMS group



“We are just all extremely excited to be able to bring this plant up to full production and show the rest of the industry what we are capable of doing here with the partnership between SDI and SMS.”

Bill Seres, Hot Mill Manager,
Steel Dynamics, Inc.



“The SMS international concept benefitted SDI greatly, especially during the worldwide pandemic. Being able to pull experts from all across the globe has certainly been very beneficial during this time.”

Glenn Pushis, Senior Vice President –
Special Projects, Steel Dynamics, Inc.





**UNDER
CONSTRUCTION**
The new steelworks
complex will be
a world leader
when completed.



“The SMS group has been active in the U.S. market for more than 75 years now. During this time period, our North American customers have established a long-standing partnership with us based on trust and cooperation. And this is particularly true for Steel Dynamics, Inc. For the Sinton project, we will jointly set new standards in the production of steel. The CSP® NEXUS Mill is capable to produce up to 3.0 million short tons (2.7 million tons) per year of flat products out of one caster.”

Prof. Dr. Pino Tesè, SMS group Inc.



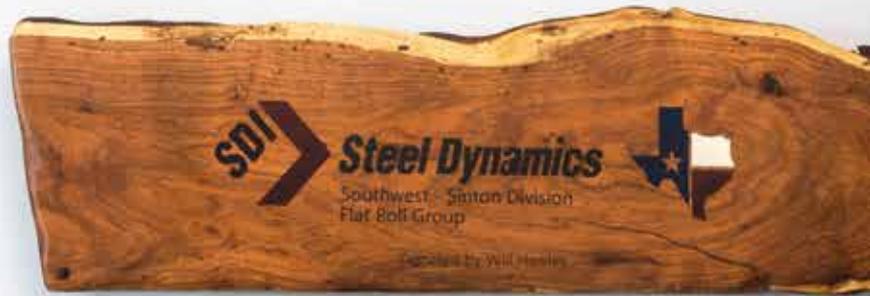
“The cooperation is excellent and based on trust with all team members working hard to ensure the success of the project. We support SDI in a spirit of partnership.”

Steve Marzina, Key Account Manager,
SMS group Inc.

A strong partnership

INTERVIEW

Mark Millett, CEO, Steel Dynamics, Inc. about the fruitful cooperation with SMS group, which ensures, among others, the schedule for the steelworks complex is kept despite the COVID-19 pandemic.



Mr. Millett, what is the significance of SDI's new steelworks complex for the Sinton region?

Eventually, we will employ roughly 600 people there, plus all the ancillary businesses that support us. So, in total that would probably be close to 1,000 people. And then we are also developing a campus, and we have steel-consuming businesses actually there right next door to us. And that would be another probably four or five hundred people. So, that will have a massive economic impact, positive impact on the community.



Burkhard Dahmen,
CEO of SMS group,
meeting Mark Millett.

SMS group is the main equipment supplier for the new steelworks complex. How satisfied are you with the cooperation in this project?

I think, that the relationship, the partnership between SDI and SMS on this project is absolutely phenomenal. SDI tends to do things on a very, very fast track. If you look at the progress of the project today, ten months and we are already coming up with the crucial foundations and we are already starting to install some of the finishing line equipment. For an equipment provider staying current with that task, that speed, is incredible. And SMS actually has the major equipment parts for the whole facility. To stay on schedule, supporting our engineering teams, to get over the installation packages, has been absolutely phenomenal. Then, of course, I don't think anyone of us has ever built a project of this size in a pandemic before.

What challenges does the coronavirus pandemic impose on such a large-scale project?

In a project of this size, you have equipment in hundreds of machine shops all over the world, and obviously the world has been impacted by COVID-19 quite severely. And so, I think our teams are working incredibly well to make sure that equipment deliveries stay on time. It hasn't been easy. It's been a lot of innovation and creativity ahead to make that happen, but up to this moment in time, we are still on track, still on schedule. And I don't think you could achieve that unless both teams are working very, very closely together in great cooperation.

How long have you been associated with SMS group?

I am associated with SMS since 1987, so only a short period of SMS's history. But it is a quality organization, quality people. And that's what it takes to be creative and to meet the challenges of the day. From our perspective, SMS is steeped in tradition and they have a very long history of engineering and equipment building, obviously. And obviously they have been around for 150 years. You are not around in the machine building business for 150 years unless you know exactly what you are doing. ♦

Plug & Work for SDI

Integration test established for many years

WORLDWIDE

To make sure all functions are in perfect harmony and to optimize the production process right from the beginning, the complete automation system is tested and optimized in the test centers of SMS group under near-reality conditions long before it is installed at the customer's site. This integration test has been known as Plug & Work test for many years. Plug & Work helps to significantly shorten the period of commissioning and to accelerate the ramp-up phase. Additionally, the integration test offers the opportunity for the future operating staff to be trained by SMS group experts on the original control desks.

 Alfred Metzul
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“The integration test is great. Everything is available. Everything is open to us. Everybody is very forthcoming. It’s good. Pretty good. So, I would recommend the integration test. Processors are all available. Everything is available and all the codes are open to us to look and see. Yeah, I am looking very much forward getting to the commissioning, seeing how the equipment actually works on site.”

Nathaniel Lesley,
Cold Mill Electrical Engineer, SDI



“It is really nice to be here in this test center with the SMS experts working on this project. Nice to work on the original equipment in 3D simulation and testing every function. Can’t wait, until it is starting in Sinton.”

Kyle Flattery, Project Engineer, Steel Dynamics, Inc.



“Simulation is very good, which means we can visually see so much which we normally do not have the capability for. So, it helps to move the project forward and very, very well.”

Lee Firth, Automation Engineer Casting, Steel Dynamics, Inc.



“What I expected is what I am seeing. We have got our key-boards in front of us that we can press to move the equipment. We can see the reaction of the equipment on the 3D model being displayed and the simulation being displayed on the wall, and we have the ability to manipulate the HMI to make the equipment move. I am excited to see the equipment making real steel in our works in Sinton.”

Christopher Eiteljorge,
Electrical Project Engineer, SDI

Christopher Eiteljorge (right), Electrical Project Engineer, SDI, will benefit from the integration tests for his future tasks in the operating mill.



Expert know-how directly from the plant manufacturer

INTERVIEW

Karsten Weiß, Head of SMS TECademy, talking on special features of the training academy for customer personnel. To its client SDI, SMS group offers a wide range of training courses in addition to the integration testing.

Mr. Weiß, numerous plant operators from all over the world use the training services offered by SMS TECademy. What makes the academy so unique?

SMS TECademy is an internationally active training academy for the staff of our customers. Apart from organizing training courses for new plants, the academy also offers a number of specialized training courses on selected topics such as technology, servicing and plant engineering. Individual training tailored to the needs and wants of our customers complements the

range of services. With our training concepts we are able to train the plant personnel at an early stage. SMS TECademy provides a wide array of training courses, also as refresher trainings, and in modern formats such as e-learning or live webinars.

Steel Dynamics, Inc. is using the SMS TECademy offer for its new steelworks complex in Sinton, Texas.

This is true. For the period from November 2020 to May 2021, almost 400 courses have been scheduled to train SDI's staff, also in our Digital Classroom. Here, virtual maintenance operations can be practiced before the real plant has been set up, which is an enormous advantage for rapidly starting plant operation. To SDI, we are additionally providing our proven classroom training. For this purpose, SMS TECademy operates four recording studios that can be used in parallel. The special feature here is that our coaches and experts teach from Germany or other SMS locations worldwide while the SDI participants sit in the U.S.A. and experience the training live. As requested by the customer, all training courses are additionally being recorded to have them available for future use. Thanks to an excellent communication infrastructure, the transmission quality of these trainings is consistently good.

Which further advantages does this type of classroom training offer?

Here, I would like to particularly emphasize the cost factor. Selecting this type of classroom training, the customer saves time and expenses for travelling. ♦

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Transfer of global business

WORLDWIDE

SMS group takes over the global copper furnace business, including the related service activities, from ANDRITZ Maerz.

ANDRITZ Maerz GmbH, based in Düsseldorf, and SMS group GmbH have entered into an agreement to transfer the global copper furnace business, including the related intellectual property (know-how, references, patents, etc.) and service activities, from ANDRITZ Maerz to SMS group. This acquisition further strengthens the position of SMS group as a system supplier in the field of non-ferrous metals production.

SMS has been supplying equipment for the copper industry for decades – ranging from smelting and rolling equipment to presses and forging equipment for the production of bars, tubes, wire, sheet, slabs and other shapes. During the last few years, under the New Horizon initiative, SMS has markedly expanded and intensified its activities in supplying holistic solutions to the non-ferrous metals industry. The integration of the copper business of ANDRITZ Maerz into SMS is a significant milestone in becoming the leading partner for full-line solutions in non-ferrous metals production.

SMS continues the traditional copper business of ANDRITZ Maerz with a team of highly experienced specialists and engineers. ANDRITZ Maerz brings 60 years of experience and more than 70 references of smelting and refining furnaces for primary and secondary copper production, including tilting refining furnaces, elliptical furnaces, shaft and hearth-shaft furnaces,



The integration of the copper business of ANDRITZ Maerz into SMS group is a significant milestone in becoming the leading partner for full-line solutions in non-ferrous metals production.

drum-type furnaces (including Peirce-Smith converter and anode furnaces), bath smelters as well as Top Blown Rotating Converters (TBRC). The tilting and drum type furnaces enable high-quality wire, tube and section production, as well as production of anodes for electrolysis.

Expansion of service activities

SMS's recently developed innovations such as BlueControl (dynamic process control simulation), H₂-ready systems (solutions for carbon footprint reduction using innovative burners and refining technologies based on hydrogen) as well as various performance-enhancing modules (as equipment and instrumentation upgrades) will be integrated into the products of the ANDRITZ Maerz copper furnace business.

Furthermore, SMS is going to expand its service activities, building on its existing strong international network of 3,000 specialists and over 50 workshops, which provide modular, machine-specific spare parts solutions for any customer requirements. The SMS service encompasses everything from on-demand supplies of individual spare parts, the supply of spare parts packages right up to complete warehousing service. SMS provides warehousing service complete with planning, procurement and logistics. SMS service technicians are available at any time to support customers with troubleshooting and necessary repairs. Active around the globe, SMS guarantees short reaction times and readily available support. This means customers can rely on their plants being up and running again in next to no time.

With the important know-how transfer from ANDRITZ Maerz, SMS is further expanding its strong position as a supplier of complete solutions for the non-ferrous metals industry. With its wide product portfolio, SMS offers complete solutions for primary and the growing number of secondary metals production lines – including for the recycling of electronic scrap (BlueMetals Process), batteries (BlueBattery Process) and catalytic converters (BlueCAT process). ♦



Further information
www.sms-group.com



On October 1, 2020, Gerold Keune (Dipl.-Ing.) joined Hertwich Engineering GmbH as the new managing director.

New Managing Director at Hertwich Engineering GmbH

GERMANY

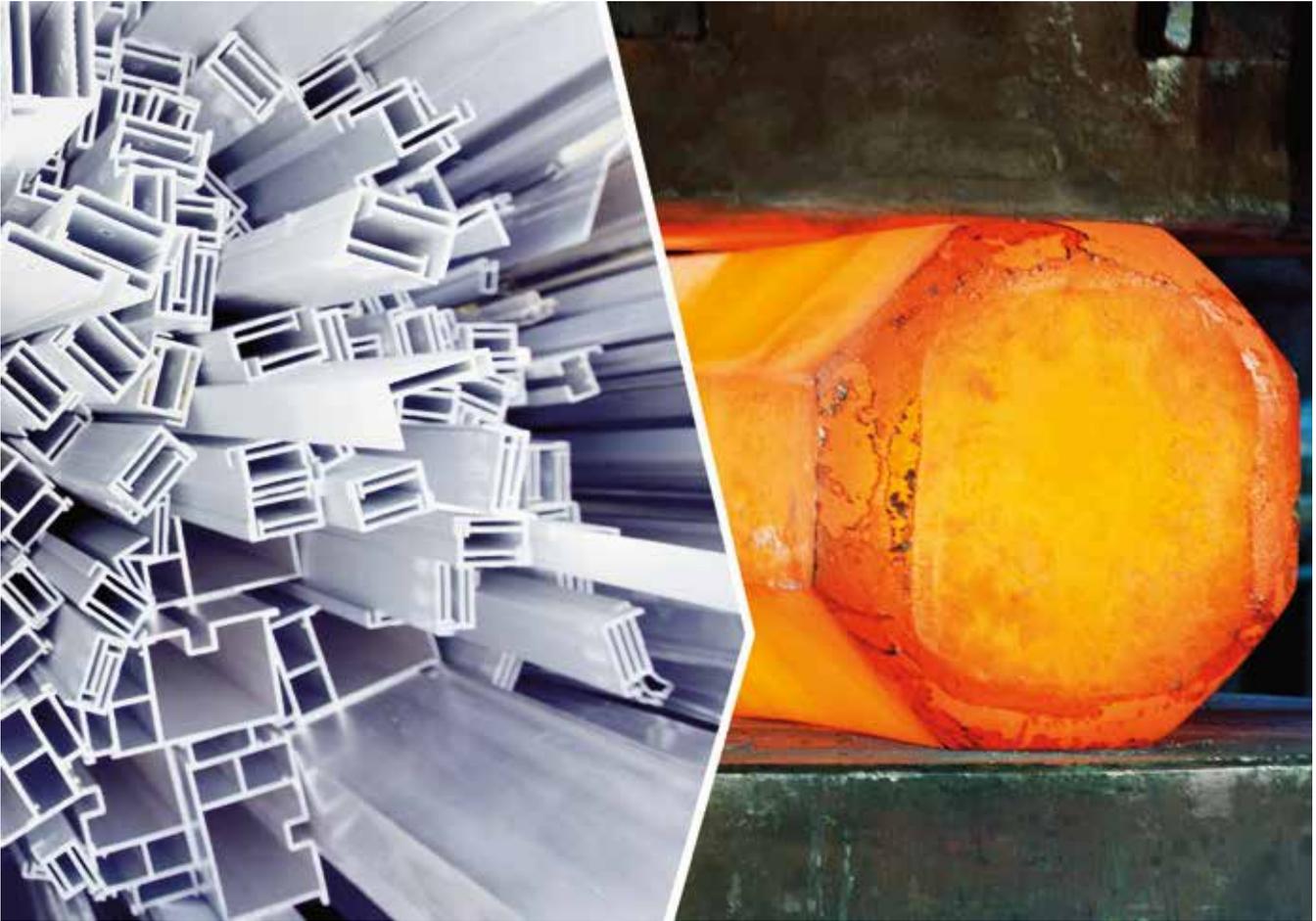
As a global innovation leader in recycling technologies for aluminium scrap and other machinery and plants for the aluminium industry, Hertwich Engineering regularly presents new developments and improvements to existing products. A strategy the new managing director also lives and drives.

With over 25 years of experience in international mechanical and plant engineering, Gerold Keune will place particular emphasis on expanding the technological leadership of Hertwich Engineering as well as on increasing internationalization and service activities.

"I am looking forward to provide even better products and services to our global customers in future and to contribute to environmentally friendly, resource conserving and cost-efficient solutions with our highly motivated and experienced team," explains Gerold Keune.



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Welcome on board

ITALY

SMS group expands its product portfolio in the field of extrusion and forging presses and strengthens itself by taking over OMAV and Hydromec.

The acquisition of OMAV and Hydromec strengthens the position of SMS group as worldwide operating technology leader in plant and mechanical engineering.

With the acquisition of the Italian companies OMAV S.p.A. and Hydromec S.R.L., SMS group further extends its product range in the field of extrusion and forging presses. Both OMAV as supplier of aluminium extrusion press lines and the press constructor Hydromec represent a high standard of quality offering great expertise in their areas of activities. In this way, they strengthen the position of SMS group as globally operating technology leader in plant and mechanical engineering. With the extended product portfolio, SMS group is able to supply complete extrusion press lines and forging plants with all up- and downstream units and process technology from a single source – with a high level of automation including integrated digitalization solutions. The two new subsidiaries of SMS group headquartered in Brescia operate globally under their own names.

Technology transfer

“We welcome all staff members of OMAV and Hydromec on board and are very much looking forward to our future cooperation. A mutual technology transfer, an efficient utilization of globally well-structured capacities with a strong sales network of SMS group increases our competitiveness. Our customers will benefit from a joint offer of existing products as well as from innovations and developments and worldwide services of SMS group,” says Dr. Thomas Winterfeldt, Executive Vice President Forging Plants, SMS group.

OMAV, founded in 1952, has extensive expertise and gained a solid reputation in the extrusion press sector. Already since 2011, OMAV and SMS group have cooperated as strategic business partners for the supply of complete extrusion press systems for aluminium. The entrepreneurial participation of SMS group in 2017 confirmed the success of this productive partnership and now led to a complete takeover. Since the end of September, OMAV has become a wholly-owned subsidiary of SMS group.

“We welcome all staff members from OMAV and Hydromec on board and are very much looking forward to our future cooperation. Our customers will benefit from a joint offer of existing products as well as from innovations and developments and from worldwide services of SMS group.”

Dr. Thomas Winterfeldt, Executive Vice President Forging Plants, SMS group

Soon afterwards, the acquisition of the press constructor Hydromec has been finalized. OMAV acquired 70 percent of the Italian company. Hydromec, founded in 1980, has specialized on the engineering and the construction of forging presses and ring rolling plants for hot forming of brass, aluminium and steel. Up to now, Hydromec has operated predominantly on the European market. OMAV and Hydromec are now able to increasingly market their extended product portfolio also worldwide through the network of SMS group.

“With a staff of altogether about 245, OMAV and Hydromec provide a strong know-how to SMS group and together we have now become even more efficient for our customers around the world. All components of our turnkey press lines are optimally harmonized, operating highly efficient thanks to innovative automation and digitalization solutions,” says Massimo Marinelli, CEO of OMAV/Hydromec. ◆

OMAV S.P.A.

The supplier of aluminium extrusion press lines founded in 1952 provides extensive expertise and has gained a solid reputation in the extrusion press sector.

HYDROMECC S.R.L.

Hydromec, founded in 1980, specializes in the engineering and construction of state-of-the-art forging presses and ring rolling plants for hot forming of brass, aluminium and steel.

For more information on Hydromec portfolio, please turn to pages 132–133.



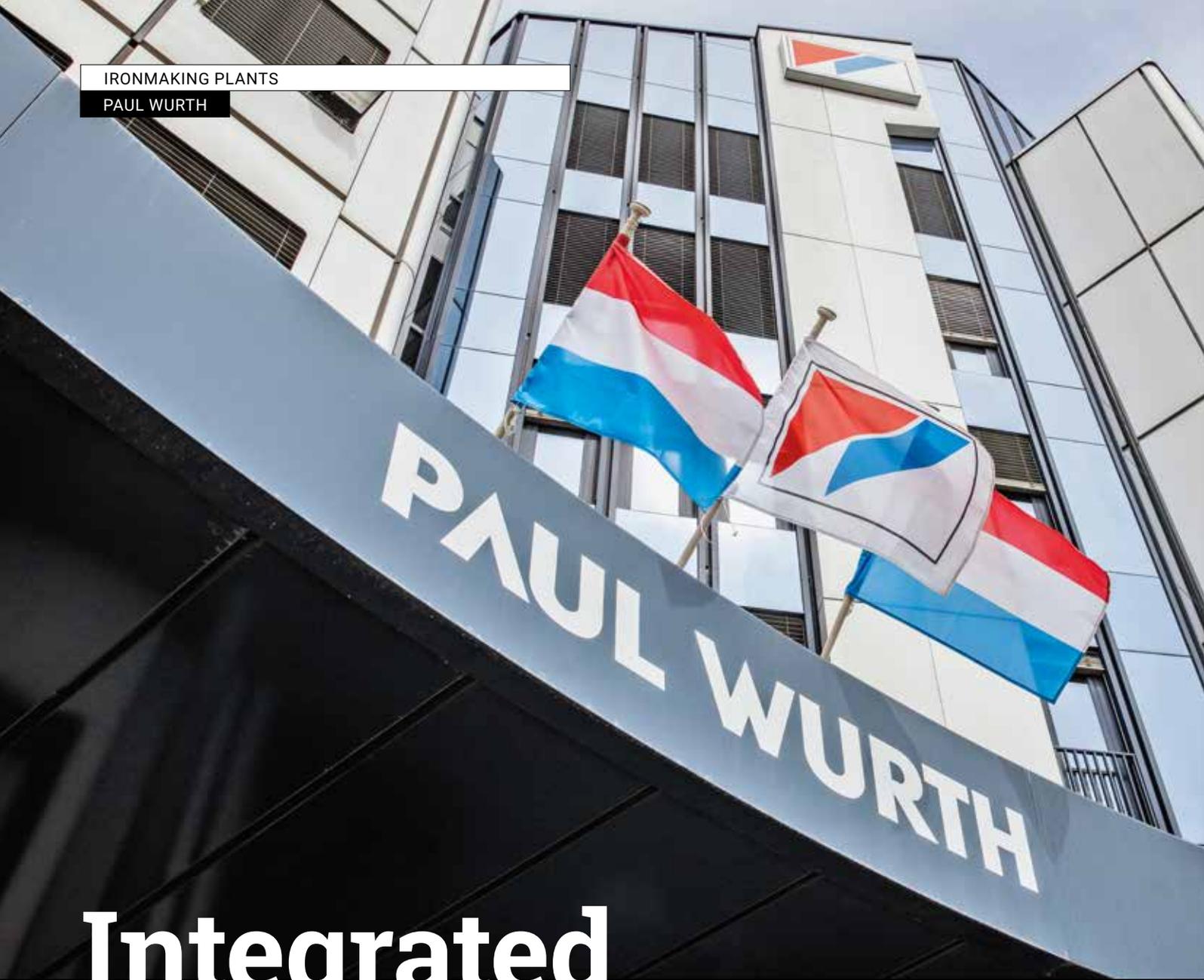
Contact

forgingplants@sms-group.com



Further information

www.omav.com
www.hydromec.it

A low-angle photograph of a modern, multi-story building with a glass and metal facade. In the foreground, a curved white sign with the name 'PAUL WURTH' in large, bold, black letters is visible. Several flags, including the Luxembourg national flag (red, white, and blue horizontal stripes) and the Paul Wurth corporate flag (white with red and blue geometric shapes), are flying from poles in front of the building. The sky is clear and blue.

PAUL WURTH

Integrated solution provider

LUXEMBOURG

Luxembourg to become a global innovation center for metallurgy and hydrogen technology within SMS group.

End of April saw the signing of the contracts on the acquisition of the remaining shares of Paul Wurth by SMS group. Those shares were previously held by the Luxembourg state and state-owned banking organizations. As a result, SMS is now the sole owner of Paul Wurth's plant engineering business, strengthening its competence in metallurgy and hydrogen technology.

With this step, the Luxembourg site will be expanded to become the research and development center for decarbonization and recycling within SMS group. To this end, SMS and Paul Wurth are pooling their research and development activities with the common aim of continuing to set technological standards in these forward-looking fields. The future range of services in-

“For our customers, Green Steel means a landmark in their transformation process. By pooling our competences, we ensure that SMS and Paul Wurth continue to be synonymous with innovative and sustainable solutions.”

Georges Rassel, CEO of Paul Wurth S.A.



Franz Fayot, Minister of the Economy, Luxembourg; Georges Rassel, Paul Wurth S.A., Chief Executive Officer, Michel Wurth, Paul Wurth S.A., Chairman of the Supervisory Board, Edwin Eichler, SMS group GmbH, Chairman of the Supervisory Board (from left to right).

“In the coming decades, decarbonizing technologies will replace the traditional blast furnaces and coking plants in integrated steel plants. This disruption in the global steelmaking market means the time is right for Paul Wurth and SMS to combine their expertise in metallurgy and form a single solution provider.”

Edwin Eichler, Chairman of the Supervisory Board of SMS group GmbH

cludes all technologies for reducing CO₂ emissions in existing steel mills; hydrogen-based, CO₂-free direct reduction of iron ore; and Power-to-X technologies for producing synthetic fuels and downstream products. In addition, the international teams of experts from SMS and Paul Wurth will continue to work on expanding the product and service offering across the entire metals industry process chain.

As part of the transaction, a strategic partnership was also agreed with the University of Luxembourg to strengthen scientific research and development of hydrogen technologies at the Luxembourg site. With financial support from Paul Wurth, the university has already established a chair for energy process technology. ◆

Low-carbon iron production

CANADA

Rio Tinto, Paul Wurth and SHS - Stahl-Holding-Saar to cooperate in a feasibility study into low-carbon iron production in Canada.

Rio Tinto, Paul Wurth S.A. and SHS-Stahl-Holding-Saar GmbH & Co. KGaA (SHS) have signed a Memorandum of Understanding to explore the production of a low-carbon steel feedstock. This partnership brings together a leading global miner, an international leader in the design and supply of engineering solutions for integrated steelmakers and one of Europe's best-known steelmakers.

The partnership will explore the viability of transforming iron ore pellets into low-carbon hot briquetted iron (HBI), a low-carbon steel feedstock, using green hydrogen generated from hydro-electricity in Canada.

Iron Ore Company of Canada (IOC), in which Rio Tinto holds a majority interest, will supply high-grade iron ores and expertise in mining, processing and pelletizing. Paul Wurth brings expertise in plant building and process knowledge in the field of highly efficient hydrogen generation and Midrex® direct reduction plants. SHS brings deep iron and steel making expertise.

Rio Tinto's significant presence in the Canadian provinces of Quebec and Newfoundland and Labrador makes Canada a natural location for the project. Canada provides access to cost competitive hydro-electricity, and proximity to key markets in Europe and North America. Transforming high-grade iron ore pellets into a low-carbon steel feedstock using green hydrogen, when processed in an electric arc furnace with carbon-free electricity, has the potential to reduce significantly the carbon emissions associated with steelmaking.

The parties will conduct a feasibility study into the potential development of industrial scale low-carbon iron production in Canada, utilizing the combined expertise of the three partners across the entire steel value chain. The feasibility study is scheduled for completion in late 2021, with an investment decision on a hydrogen-based direct reduction plant at industrial scale expected to follow thereafter. ♦



Further information
www.paulwurth.com



“This collaboration reflects Paul Wurth’s strategy to support our customers from the very beginning of their projects as a reliable and trusted partner. By associating the different players of the metal production chain, we are confident to develop the most appropriate and efficient solutions for this challenging transition towards a carbon-neutral industry.”

Georges Rassel, CEO of Paul Wurth S.A.



Photo: CSH

Compañía Siderúrgica Huachipato (CSH) steelmaking location in Chile.

Efficient solutions

CHILE

CAP and Paul Wurth join forces to decarbonize iron ore mining and steel-making operations in Chile.

Compañía Siderúrgica Huachipato S.A. (CSH) and Paul Wurth have signed a Technological Cooperation Agreement to explore the viability for transitioning CAP steel-making operations towards the production of low carbon steel in Chile along the complete value chain.

This partnership joins Chile's leading mining and steel-making companies affiliated to the CAP Group and Paul Wurth. The parties undertake to jointly conduct a feasibility study for a technological roadmap towards low carbon

steel feedstock. The transition plan aims at setting up immediate measures to reduce the CO₂ footprint of CSH's operations by introducing the use of renewable energy and hydrogen combined with highly efficient technologies. This transformation process will thus lead to a product portfolio for green steel grades.

Thomas Hansmann, Chief Technology and Operations Officer of Paul Wurth, says: "Chile is likely to offer perfect conditions for the use of renewable energy and hydrogen to be introduced into the value chain of both mining and steelmaking operations. With the combined expertise of our groups in operations and technology, I am convinced we will develop highly efficient solutions for carbon-neutral operations".

Rodrigo Briceño, Chief Executive Officer of CSH, says: "As CSH, following CAP Group's strategy, we are continuously pursuing many innovative adaptations in our company's business model, with the aim of setting up a sustainable growth strategy where decarbonization, safety, operational excellence and social development are our milestones. From this perspective, CSH will foster initiatives to produce green steel using renewable energies and hydrogen throughout its production value chain". ♦



Further information
www.paulwurth.com

CSH

Compañía Siderúrgica Huachipato (CSH), is the largest steel complex in Chile. Located in the region of Biobío, the company supplies mining, industry, metal mechanics and construction sectors with high-quality long steel products. Throughout its 70-year history, CSH has contributed to Chile's development being a key player in the mining, metal-mechanical and construction industries in the country.

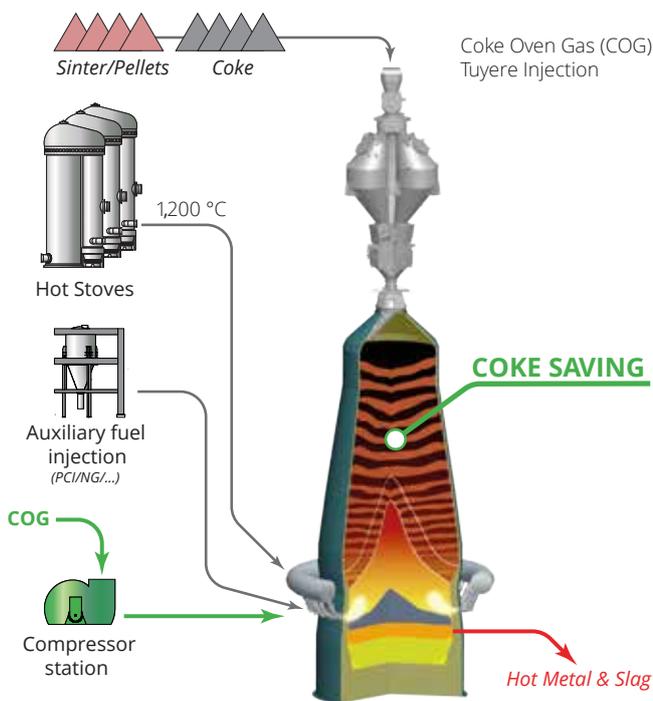
CAP

CAP Group is the leading producer of iron ore and pellets on the America Pacific coast, the largest steel producer in Chile, the most important steel processor, and the third largest port operator in the country. The group, with various operations distributed throughout Chile, as well as in Peru and Argentina, covers the complete value chains in iron and steel production.

Reduction of carbon footprint

GERMANY

Paul Wurth books new order for coke oven gas compression and injection technology at HKM.



Concept of COG injection into the hot blast tuyeres.

With the aim to improve the CO₂ balance of their steel plant operations located at Duisburg-Huckingen in the Ruhr region in Germany, Hüttenwerke Krupp Mannesmann GmbH (HKM) has chosen Paul Wurth S.A. for engineering and construction of a coke oven gas (COG) compression and injection system for their two blast furnaces "A" and "B".

The new injection system will complement the already existing natural gas (NG) injection system, which was taken into operation in 2003 respectively in 2005 as well as the existing pulverized coal injection (PCI) system, which was commissioned in 2009. The new COG injection system will provide up to 30,000 Nm³/h of COG per blast furnace. Injection of mixed COG and NG of up to 60,000 Nm³/h per blast furnace will be possible.

Confirmation of leading position

The corresponding plant will be installed in a brownfield area in the existing steelworks. Aside of all engineering, the order foresees supply, erection and commissioning of two compressors of geared turbo type, an appropriate noise insulated housing for the compressor station and all process piping for the supply of the COG up to the (2 x 30) hot blast tuyeres of the blast furnaces. Civil works will be executed by HKM. Start of commissioning activities is envisaged for the last quarter of 2022.

HKM operates an integrated steelworks consisting of a sinter plant with a design capacity of 6 million tons per year, two coke oven batteries for a design capacity of 2.32 million tons per year, blast furnaces "A" and "B" with a combined design capacity of 5.2 million tons per year of hot metal, and a BOF steelmaking shop with continuous casters. With around 3,000 employees, HKM produces about 4 million tons of steel per year, which comes in the form of slabs and round blooms for the tube and pipe industry. The level of savings may vary depending on the availability of coke oven gas and the price of CO₂ certificates within the European carbon emissions trade scheme. In any case, HKM will significantly reduce the carbon footprint of their integrated steelmaking plant.

For HKM and for Paul Wurth, the present project is an important confirmation of both company's leading position in readily available technologies for CO₂ emission reduction from blast furnace operations. ♦



Minister for Higher Education and Research, Claude Meisch, surrounded by representatives of University of Luxembourg, Paul Wurth and SMS group.

Cutting-edge research

LUXEMBOURG

University of Luxembourg and Paul Wurth create Chair in Energy Process Engineering.

Paul Wurth and the University of Luxembourg have entered into an agreement to create and finance the Paul Wurth Chair in Energy Process Engineering. The chair will be hosted at the University's Faculty of Science, Technology and Medicine (FSTM) in the Department of Engineering. It aims to conduct cutting-edge research in the field of hydrogen processing and related aspects of carbon-neutral industrial processes. The team attached to the chair will also engage in teaching existing study programs at Bachelor, Master and doctoral level. In addition, the chair will participate in outreach activities to stimulate interest in key challenges in the field of engineering.

The partnership supports Luxembourg's ambition to develop a center of excellence in fields surrounding the emerging hydrogen economy, to stimulate industrial development in process engineering and hydrogen and low carbon emission technologies, and to increase the output of skilled engineers.

Focus on sustainability

The chair ties in with the University's strategy to develop research and an educational offer with a focus on sustainability. Hydrogen is considered a crucial factor in future energy systems and energy transformation and in the transition to greener energy sources. One game-changing solution lies in Power-to-Liquid applications for the production of synthetic fuels and downstream products. Hydrogen also promises to become an alternative to coal – both as a reducing agent in steelmaking and as a driver of the large-scale transformation of the steel industry, which today is a large emitter of CO₂. This cooperation will be instrumental for Paul Wurth to become a global innovation center for metallurgy and hydrogen within the SMS group and to continue the technology-driven initiatives already started by dedicated taskforces. By bundling their respective expertise, Paul Wurth and SMS group strive to lead the transformation of the industry towards carbon-neutral production processes. ♦



Further information
www.paulwurth.com

Using coke oven gas as a source of energy

SPAIN

Recently, Paul Wurth has supported ArcelorMittal Asturias in commissioning the coke oven gas injection system at its blast furnace B in Gijón, Northern Spain. Reusing gas generated in coke oven batteries is only one example of how efficient metallurgical use can be made of off-gases from the steel production process. Because of its high calorific value due to a hydrogen concentration of more than 55 percent, coke oven gas is a source of energy that has the potential to replace some of the coke used in the blast furnace. The aim of this new system is to reduce CO₂ emissions by expected 125,000 tons per year and decrease operating costs thanks to a lower consumption of coke. Paul Wurth is proud to have been ArcelorMittal's partner in designing and planning this project.



Further information
www.paulwurth.com



Founded in 2017 as a spin-off company from SnT/University of Luxembourg and hosted since then at Paul Wurth InCub, DataThings develops intelligent software systems based on its main technology GreyCat®. Being at the core of the company's products and R&D services, GreyCat® is a next generation data analytics and machine learning (ML) platform that transforms data into actionable and valuable insights. Over the last years, early adopters from various sectors have successfully tested the technology platform by integrating data analytics and ML in different fields of application, such as automotive, steel, finance, electricity, transportation, and smart irrigation systems. Under the label "Made in Luxembourg", DataThings first focused on the Luxembourg market. Today, the company is ready to expand into new markets on the international scale.

This funding round as well as the industrial guidance of its two new strategic partners will enable DataThings to accelerate its growth, develop its R&D services and bring its Grey-Cat® technology as well as its two flagship products AIXpert™ and Alva™ to the next level.

Data management solution

AIXpert™ is the result of an open collaboration with Paul Wurth. It is a prediction tool for industrial production processes and offers a complete data management solution, from



Paul Wurth and Encevo invest in DataThings

LUXEMBOURG

As industrial investors, Paul Wurth S.A. and Encevo S.A. have taken a stake of 10.3 percent each in DataThings S.A.

storage to artificial intelligence, to visualization, and automating industrial operations. As part of Paul Wurth's DataXpert™ digital solution, it has recently been selected as ML solution of choice by SMS digital for predictive maintenance in the steel industry.

Alva™, developed in collaboration with Creos, an Encevo Group company and the largest electricity and gas network operator in Luxembourg, is a monitoring and simulation tool for grid operators. It supports grid operators in managing, planning and troubleshooting smart electricity grids by taking advantage of new technologies, like big data analytics, visualization, machine learning and artificial intelligence. The solution takes advantage of the smart metering recently deployed, which is an important part of the digitization roadmap of Creos towards the smart grids of the future. ♦



Further information
www.paulwurth.com

Experience and expertise boost performance

WORLDWIDE

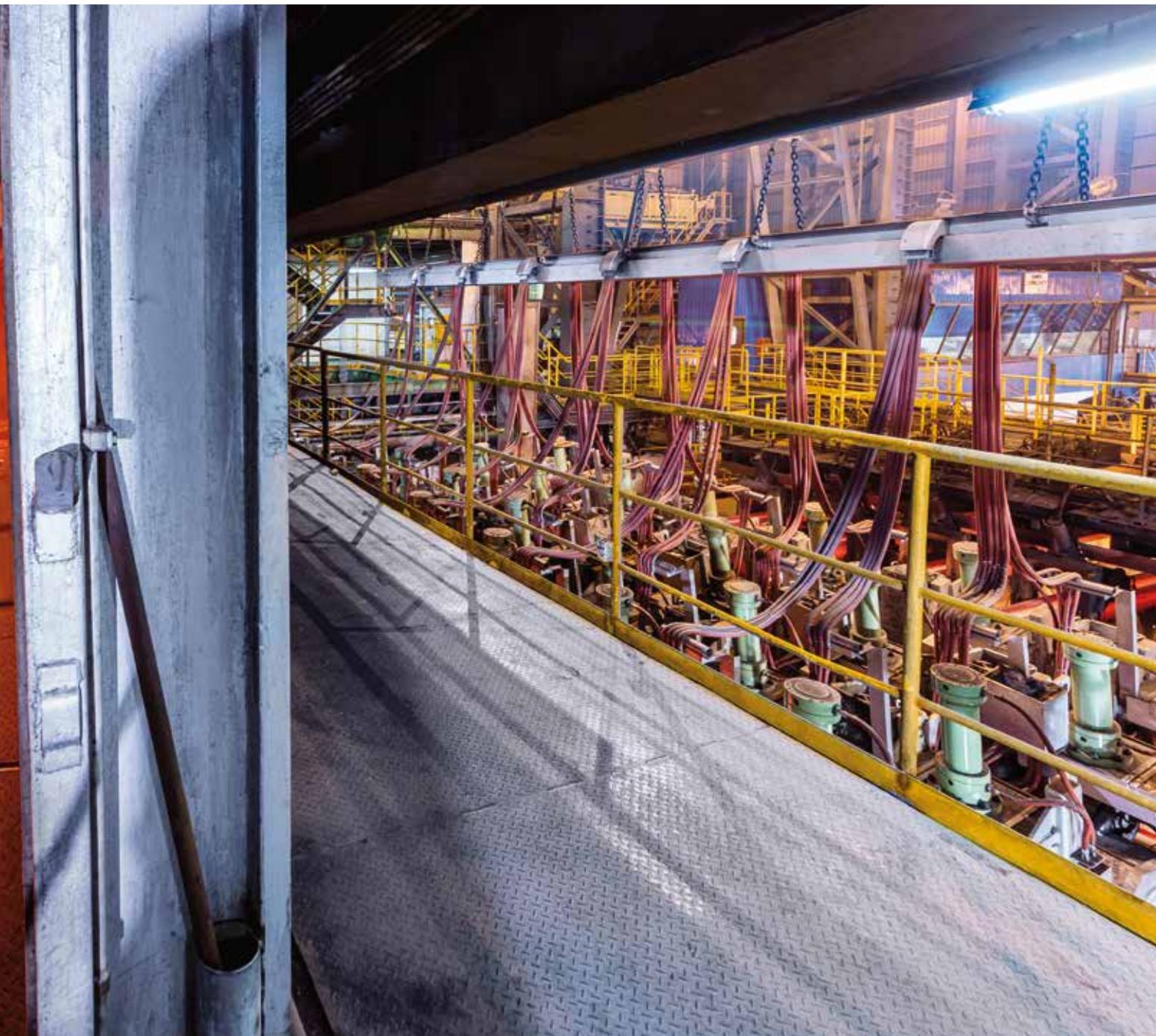
Game-changing caster upgrades and modernizations in the long-products sector.

Over time, markets change, and continuous casters become older. SMS Concast and its employees have vast experience in designing and commissioning continuous caster modernizations and upgrades. Comprehensive metallurgical expertise and advanced, in-house developed simulation tools enable best support in caster checks and the design of customized solutions. In addition, thanks to their wide range of technological and digital solutions, SMS Concast can make even small upgrades have a great positive impact on the performance of a continuous caster. Apart from worn equipment being a reason for revamps, SMS Concast has identified five additional main drivers of modernization projects:

- **Market opportunities** – responding to market opportunities by introducing new section sizes or shifting to higher-value steel grades, for example
- **Productivity improvement** – mainly aimed at increasing the yield by optimizing the casting process
- **Quality enhancement** – by identifying the root causes of quality issues and optimizing process parameters
- **Operational health and safety** – includes measures such as stabilization of process parameters, remote monitoring of processes and use of robotics
- **Environmental aspects** – measures aimed at making the equipment more energy-efficient and reducing noise emissions and pollution



**BEST PRACTICE
SMS CONCAST**



SMS Concast provides technological and digital solutions that boost caster performance.

As a matter of course, the above-mentioned issues may be considered separately or all at the same time. This means, modernizations may come in the form of metallurgy-improving measures or as minor equipment modifications, software updates and even a redesign of the complete casting plant. ◆

 **Markus Hogenschurz**
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MODERNIZATIONS THAT MAKE THE DIFFERENCE:

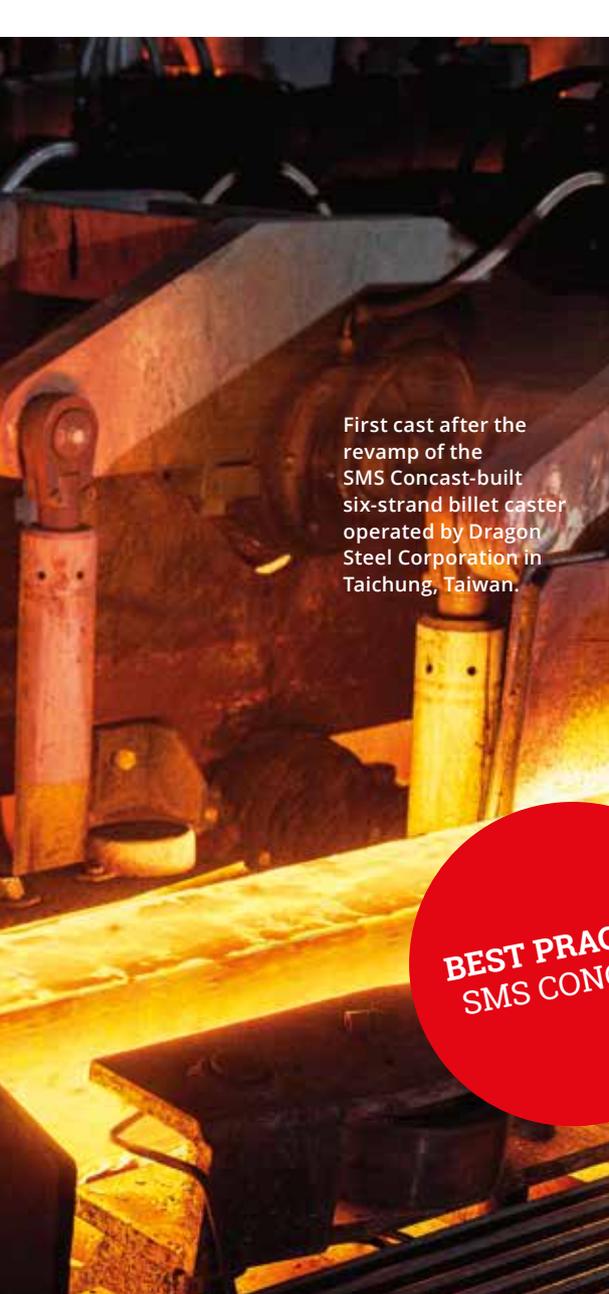
- Optimization measures based on prior metallurgical studies
- Customized solutions that guarantee maximum performance with minimum investment costs
- Project management characterized by dedication and open communication
- Fast and productive project execution
- Minimum downtime during implementation



Upgrade achieves highest steel quality

TAIWAN

Dragon Steel Corporation grants FAC to SMS Concast for the modernization of their six-strand billet caster.



First cast after the revamp of the SMS Concast-built six-strand billet caster operated by Dragon Steel Corporation in Taichung, Taiwan.

**BEST PRACTICE
SMS CONCAST**

Dragon Steel Corporation, Ltd., a subsidiary of China Steel Corporation located in Taichung, Taiwan, has granted SMS Concast the final acceptance certificate (FAC) for the modernization of their six-strand billet caster. The objective of the revamp was to enhance the quality of the billets to meet the growing requirements of the local high-end market for fasteners, welding rod, mechanical components and other applications.

The project, which comprised essentially the automation upgrade and introduction of dynamic secondary airmist cooling (COOL-DSC), has achieved a distinct improvement in product quality in terms of a better internal structure and less surface cracking.

“With a comparatively small modification to our caster, we have achieved a clear improvement in product quality, efficiently reducing our billet rejection rate. The cooperation with SMS Concast was excellent: together, we kept the tight schedule and achieved our project goals. All in all, a very suc-

cessful modernization project which has strengthened our business relation even further”, says Ting-Yun Lin, project engineer at Dragon Steel Corporation.

The nine-meter-radius six-strand billet caster of Dragon Steel was built in 2000 by SMS Concast. In 2014, it was upgraded with final electromagnetic stirrers (F-EMS). The caster produces 145-millimeter square billets at a production rate of about 600,000 tons, depending on the market situation. The steel grades processed include cold-heading, low-alloy, free-cutting, hot-forging and welding-rod steels.

Introduction of the COOL simulation package

The automation upgrade mainly involved an upgrade of the Level-1 system and the introduction of the COOL simulation package for homogenous secondary cooling. The package includes the COOL-DSC (Dynamic Spray Cooling) feature which uses SMS Concast Airmist nozzles. COOL is a proprietary solidification model developed by SMS Concast for on-line visualization of the solidification process along the strand. The COOL-DSC function of the system regulates each spray zone’s water flow according to specified billet temperature values. In this way, DSC optimizes the billet temperature along the secondary cooling zone, enhancing the surface quality of the cast billets.

The COOL software can also be used offline for metallurgists and process engineers to fine-tune the casting parameters by running various “ghost casts”, avoiding expensive trial casts. COOL-offline includes functionalities to compare steady-state conditions of various casting parameters and simulate sequences with pre-defined casting speed variations and grade changes.

Shifting production to high-grade steels made it necessary to upgrade the existing CONFLOW stopper controls and replace the standard nozzles with airmist spray nozzles. The CONFLOW stopper control system is of a very robust design. It assures a precise and well controlled steel flow from the tundish to the mold. The Airmist nozzles designed by SMS Concast provide homogenous spray cooling that improves the secondary cooling process and reduces surface cracking. ♦

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 **Further information**
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Enhancing steel quality and stabilizing productivity

WORLDWIDE

Electromagnetic stirrers are used to improve the steel quality and stabilize the productivity of continuous casters. More than one thousand CONSTIR stirrers designed and manufactured by SMS Concast are successfully in operation in continuous casting plants over the world.

- Every stirrer is designed based on internal simulations and with a view to plant-specific requirements.
- SMS Concast has developed a dedicated simulation software specifically for this purpose.
- This assures that the stirrers achieve a maximum metallurgical effect in the liquid steel.

**BEST PRACTICE
SMS CONCAST**

Metallurgical effect of stirring

Electromagnetic stirring makes slag, entrapped gas and other contaminants move away from the solidifying shell of the billets, resulting in improved surface quality. In addition, stirring causes the dendrite tips to break off as the billet solidifies. This leads to the formation of new solidification nuclei and further improved billet quality. Stirring also promotes the convective heat transfer between the liquid core and the shell – another significant quality-enhancing effect.

SMS Concast designs every stirrer on the basis of its own simulations and the requirements of the customers and their specific plants. To assure that the electromagnetic stirrers achieve a maximum metallurgical effect in the liquid steel, SMS Concast has developed its own dedicated simulation program.

While building on the well-known and proven SMS Concast electromagnetic stirrer technology, the latest generation of CONSTIR stirrers comes with a series of new options





SMS Concast provides electromagnetic stirring solutions always perfectly tailored to the specific casting machine design and operating practice.

that make these stirrers an ideal solution for steel producers. Apart from the stirrer units themselves, SMS Concast provides:

- Dynamic final-stirrer solutions for additional quality improvement
- Stirrer maintenance service (CONSTIR ReNew)
- CAPEX-to-OPEX solutions

Dynamic final stirrers

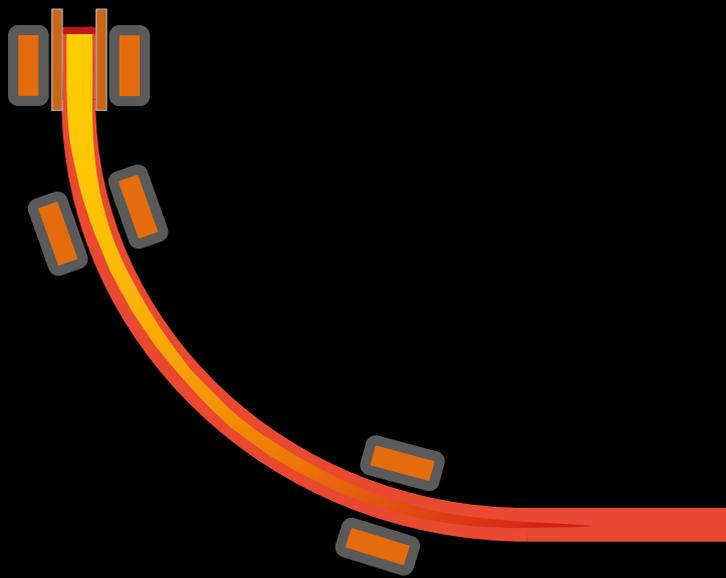
Final stirrers (F-EMS) are positioned at the lower end of the solidifying billet. They improve the quality of billets – mainly of high-carbon steel billets – by reducing carbon segregation and center porosity. The stirring effect is maximized when the stirrers are positioned at an optimum position relative to the point of final solidification. The final solidification point in turn depends on many factors including section size, steel grade, casting speed and cooling intensity. Dedi-

cated thermal simulation models, such as the COOL system developed by SMS Concast, can calculate the exact position of the final solidification point. Instead of installing the stirrer at a fixed position, the idea of dynamic F-EMS is to be able to move it to the optimal position for the specific steel grade processed and the section size cast. Several options are available to achieve a “dynamic” solution:

- **“Averaging FEMS”**: Installation of two final stirrers to average the best position.
- **“Movable FEMS”**: The final stirrer is mounted on a rail system which can be moved by hand or by a drive between two casts.
- **“Dynamic FEMS”**: A final stirrer mounted on rails is automatically moved during casting.

The best solution depends on the caster’s specific design and individual operating practices. ▶

Typical applications of mold, strand and final stirrers



M-EMS mold stirrers

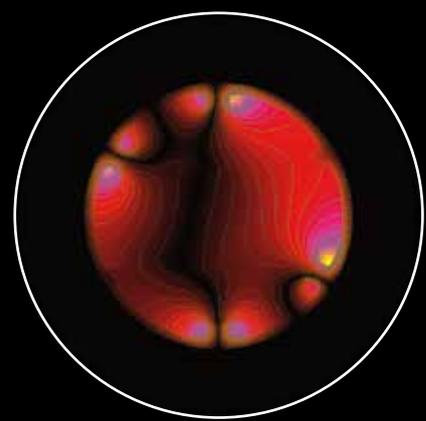
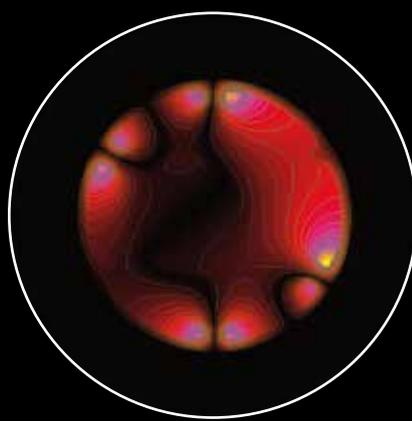
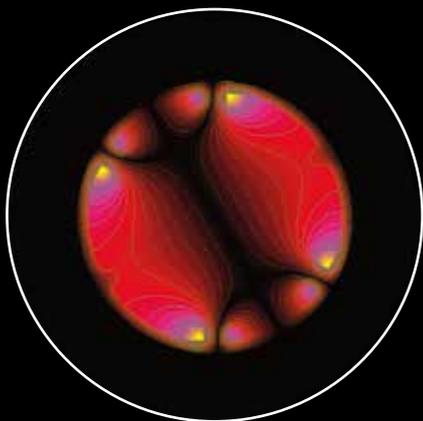
- release entrapped slag
- reduce sub-surface inclusions
- reduce segregation and porosity

S-EMS strand stirrers

- expand the equiaxed zone
- reduce center porosity and segregation

F-EMS final stirrers

- reduce center segregation and porosity



Photos by **SMS Concast's simulation software** guarantee optimal stirrer design and arrangement

A new life for electromagnetic stirrers

Under the name CONSTIR ReNEW, SMS Concast provides a broad range of services for electromagnetic stirrers. Basically every caster operator using SMS Concast stirrers can benefit from CONSTIR ReNew. The stirrers can be restored to their original specifications or even be upgraded to the specific requirements of the customer.

Depending on the condition of the stirrer and the production requirements, the CONSTIR-EMS ReNew services may include:

- Electrical testing and evaluation
- Mechanical repair of physical damage
- Preventive epoxy re-impregnation
- Full rewinding and repair

SMS Concast offers this service out of Europe, and since 2019 also out of North America.

CAPEX-to-OPEX solutions

SMS Concast provides customized solutions that enable the conversion of capital expenditure into operating expenditure. It is possible, for example, to lease the CONSTIR-EMS units on performance-based payment or monthly remuneration schemes. In this context, SMS Concast also provides integrated stirrer condition monitoring options. ◆



CONSTIR ReNew turns old into new: worn coils (top), and newly installed coils as part of a complete renewal (bottom).



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Further information

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Product innovation

GERMANY

ESR-pREmier® - electro-slag remelting with an oscillating rotary electrode provides many benefits.

Electro-slag remelting (ESR) is a metallurgical process used to produce steels of high cleanliness, with a directionally solidified, and therefore flawless, microstructure. The following parameters are critical in achieving an optimum process result and high accuracy of crystallization:

- Degree of filling
- Slag composition
- Quality of the electrode and the ingot
- Cooling rate of the crucible
- Thickness of the slag skin between the remelting crucible and the already remelted ingot
- Number of droplets on the electrode face and depth of the liquid pool

These factors closely depend on the design and layout of ESR facilities.

Research project

In order to compare and study how the behavior of the remelting parameters changes when a rotary electrode is used instead of a fixed one, SMS group converted the conventional fixed-electrode ESR unit at the IME Institute for Metallurgical Process Technology and Metals Recycling at the University RWTH Aachen into an ESR unit using an oscillating rotary electrode.

The objective of this research project was to explore the influence of the rotating electrode on the key quality parameters in the electro slag remelting process. In the project, the following process conditions and resulting effects were

examined: different flow pattern of the slag bath, flatter liquid pool, different slag-metal reactions in the slag, earlier detaching of smaller droplets from the electrode as a result of the horizontal centrifugal force, improved oxide cleanliness and inclusion formation, lower electricity consumption and higher remelting rate.

Oscillating rotary electrode provides convincing results

After remelting ingots of structural, tool and high-speed steels in the 60-kilogram ESR test unit, the following results were obtained:

- Reduction of liquid pool depth (> 50 percent)
- Increase in remelting rate (> 5 percent) relative to the nominal remelting rate
- Reduced electricity consumption (> 5 percent) relative to the nominal remelting rate
- Finely distributed primary carbides and ultra-small grain sizes in compliance with DIN EN ISO 643
- Thickness of the slag skin between the ingot and the ESR crucible < 1 millimeter

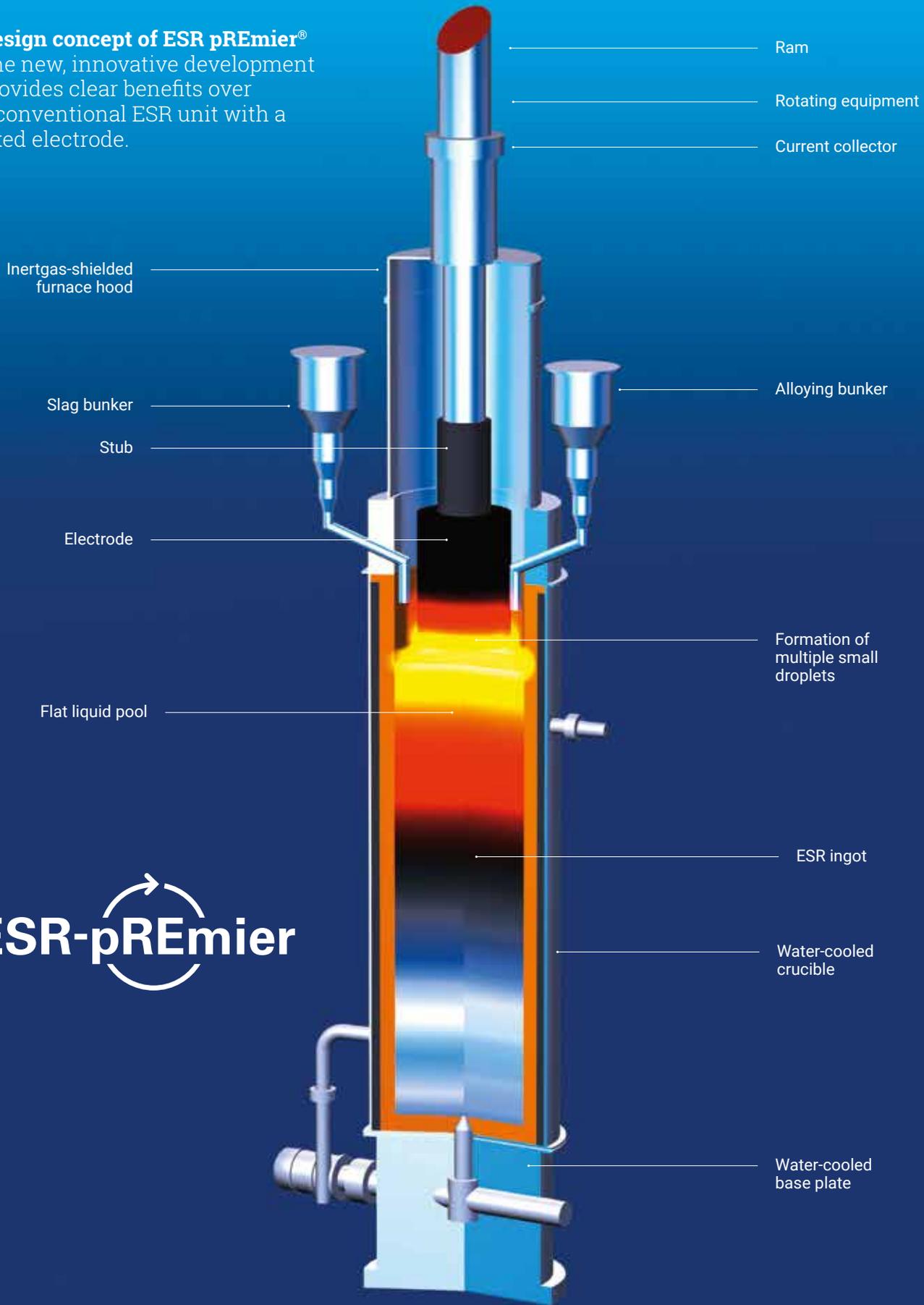
These results show that the innovative ESR design with an oscillating rotary electrode is a development with clear benefits over a conventional ESR unit with a fixed electrode. ♦



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Design concept of ESR pREmier®

The new, innovative development provides clear benefits over a conventional ESR unit with a fixed electrode.



Increased productivity

TAIWAN

At China Steel Corporation, Kaohsiung, Taiwan, SMS group has successfully completed the modernization of the vacuum pump and received the Final Acceptance Certificate (FAC) in February 2021.

With the 800,000 ton-per-year RH facility (Ruhrstahl-Heraeus process), originally supplied by SMS group in the 1980ies, China Steel Corporation produces a wide range of steels, including higher-strength structural steels, higher-strength steels for shipbuilding, Cr-Mo-alloyed steels, tool steels and concrete reinforcing bars. As part of the upgrade, which was aimed at increasing plant availability and enhancing steel quality, SMS supplied a powerful four-stage vacuum pump and revamped the vacuum lock system. Thanks to the modernization of the vacuum system, China Steel Corporation is now able to use the plant without interruption at significantly higher condensate cooling-water temperatures of up to 38 degrees centigrade.

 **Matthias Oesterwind**
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View into a coil high-bay warehouse.

Perfectly coordinated logistics

GREECE

ElvalHalcor relies on storage technology from AMOVA and orders another high-bay warehouse for aluminium coils.

As part of a strategic investment plan, Greek aluminium producer ElvalHalcor S.A. is continuously expanding the production capacities of its Oinofyta plant near Athens. A key factor in the planning is the optimization of logistical processes. For this reason, ElvalHalcor has awarded AMOVA, a company of SMS group, a contract to connect the tandem hot-strip mill to the cold rolling mill and to build a state-of-the-art high-bay warehouse for aluminium coils, where the hot-rolled coils will be stored and cooled in a gentle and controlled manner.

The order placement was preceded by an intensive planning phase in which all technical challenges were evaluated and analyzed with the aid of simulations. When engineering the plant, there had to be taken into account that, due to the geographical conditions and possible earthquakes, the steel structure had to be designed for higher loads.

AMOVA will supply an intelligent, fully automated storage and transport system. The new high-bay warehouse with around 360 storage locations will be connected to the various process lines by appropriate conveyor equipment. Major differences in

height within the plant will be handled with the help of a proven lifting and tunneling system.

Warehouse management software offers numerous features

The existing high-bay warehouse, which was supplied by AMOVA twenty years ago (at that time under the name of SIEMAG) and has been in full operation up to now, will be integrated into the overall logistics concept. A proof of high quality and durability, which has again convinced the customer to choose AMOVA as a partner.

The new storage system will be equipped with the warehouse management software developed by AMOVA. In addition to material tracking and visualization, this software offers numerous other features, as for example temperature-curve simulations - an essential function to monitor and ensure material quality for the further processing of the aluminium strips. Commissioning of the plant is scheduled for mid-2022. ♦

 **Dennis Tanyer**
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Highly flexible cooling process provides wider product range

GERMANY

X-Roll® MultiFlex-Quench successfully processes “first plate” at Ilsenburger Grobblech GmbH.

On November 23, 2020, Ilsenburger Grobblech GmbH has efficiently heated the first heavy plate in its heat treatment furnace No. 1, followed by subsequent cooling in the new X-Roll® Multi-Flex-Quench (MFQ) from SMS group. Thanks to the closely coordinated and targeted cooperation in the installation and cold commissioning phase the “first plate” could be processed eight days before the originally scheduled ambitious deadline.

The important milestone of “operational readiness”, with the heat treatment line providing more than 50 percent of its output, was reached on February 12, 2021 in the course of hot commissioning after a short ramp-up phase.

The X-Roll® MultiFlex-Quench is part of a new, energy-efficient heat treatment line SMS supplied to the subsidiary of Salzgitter AG.

Commissioning of the X-Roll® MultiFlex-Quench, which is designed to implement extremely flexible cooling strategies, now permits Ilsenburger Grobblech GmbH to expand its product portfolio by particularly demanding heavy plate grades, among others.

With the X-Roll® MultiFlex-Quench, SMS has established in the market an innovative cooling technology that provides distinctly more options than conventional cooling lines and allows any cooling strategy from extremely slow cooling to quenching with freely selectable cooling-stop temperatures to be implemented by means of switchable pressure ranges. Thanks to the variable settings, the MFQ can handle a much wider product range than conventional quenches can. The

plates are hydraulically clamped by roller guides thus ensuring optimal flatness, especially of thin plates.

This is confirmed by the excellent results of manual flatness measurements at Ilsenburger Grobblech, which are based on flatness measurements of a plate taken at different measuring points in the process. Plate data: thickness 20 millimeters, width 3,513 millimeters, length 12,400 millimeters.

Benefits of the X-Roll® MultiFlex-Quench

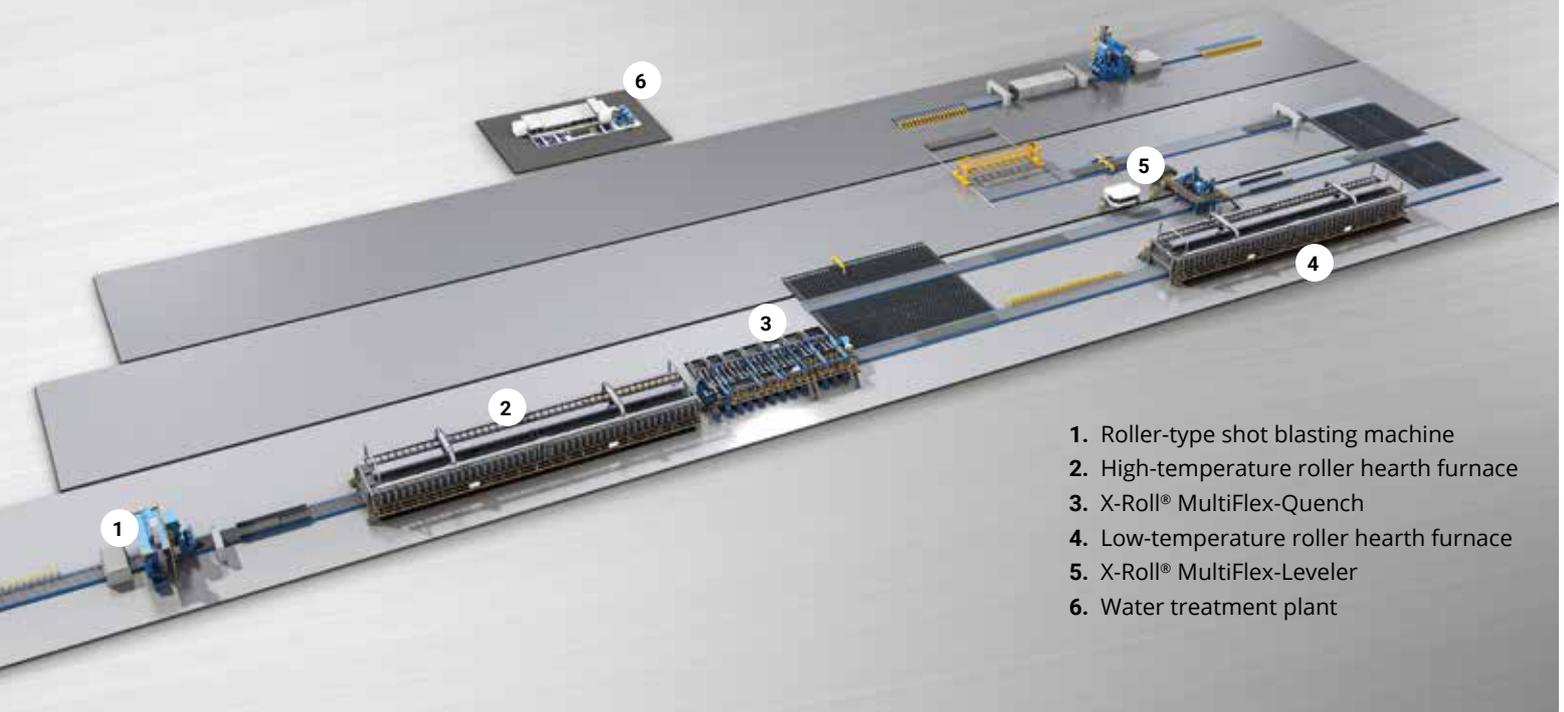
- Optimized design of the cooling header with large cooling areas and finer nozzle distribution
- Special, safe and robust nozzle design, with nozzles in subsurface arrangement, large impingement zone, identical design for HP and LP sections
- Width distribution of the cooling headers
- Uniform self-cooling mode of the bottom distributor at low pressure in standby mode to prevent nozzle clogging
- High-pressure section switchable to low-pressure mode
- Proven cooling model by SMS group including all functions (for example cooling patterns and cooling-stop temperature)
- Different cooling strategies possible (selective speed change within a sequence)
- Individual cooling-stop temperature
- Robust frame design for tight tolerances
- Optimum flatness through active hydraulic plate clamping over the entire length by means of pressure rollers





Plate featuring an excellent flatness result.

The main units and systems of an ultra-modern, energy-efficient heat treatment line for heavy plate from SMS group are:



1. Roller-type shot blasting machine
2. High-temperature roller hearth furnace
3. X-Roll® MultiFlex-Quench
4. Low-temperature roller hearth furnace
5. X-Roll® MultiFlex-Leveler
6. Water treatment plant

“The X-Roll® brand describes the products of the Flat Products Business Unit of SMS group. The “MultiFlex” attribute characterizes proven and innovative machine functions. This new generation of machines assures the economical and energy-efficient production of a wide variety of production ranges, featuring extremely high flexibility and system availability. The machines offer the potential of developing new and innovative steel grades for the future and of strengthening Germany as a location for the steel industry.”

Frank Werner, Project Manager of SMS group, responsible for the heat treatment line put on stream at Ilseburger Grobblech GmbH



X-Roll® MultiFlex-Leveler T from SMS group.

→ Easy maintenance thanks to using identical components in the HP and LP sections

The most important requirement for homogeneous cooling and optimum product properties of the plates is high temperature uniformity during both plate heating and the tempering process that follows quenching. For this purpose, SMS supplied two state-of-the-art roller hearth furnaces equipped with energy-efficient heating systems and modern low-NOx burners for low-emission operation.

SMS also supplied an X-Roll® MultiFlex-Leveler T for the heat treatment plant. While providing proven functions, this latest type of leveler sets new standards in terms of final flatness and residual stress distribution in the material. Among other components, new back-up rolls for maximum load transfer were developed specially for this machine type and tested on SMS group's own test stand. In addition to variably selecting the strategy to remedy even complex flatness deviations, the quick-acting leveling roll adjustment system offers the advantage of E-mode operation (Extended Roll Mode) which greatly increases the leveling range of the machine. A bending system suited for specific leveling gap adjustment, a load balancing system for the individually driven main drives and a highly dynamic main adjustment system complete the machine profile of the X-Roll® MultiFlex-Leveler T.

Benefits of the X-Roll® MultiFlex-Leveler T

- Leveling of standard materials, special and future grades through flexible implementation options
- SMS group leveling model with full range of functions (automatic leveling strategy, overstretching and threading specifications) for handling a wide variety of complex flatness deviations
- Convenient selection of different leveling strategies for each leveling pass
- Enlarged leveling range due to single roll adjustment, basic gap shifting and smoothing pass
- Adaptation of adjustment system and data storage options for subsequent products
- All leveling rolls provided with individual drives with load balancing control
- Special threading modes for transport-critical, especially thin, plates
- Cleaning device to quickly clean the leveling roll surface without need for roll set removal, in order to ensure optimal plate surfaces and plate transportability



Drive side view of the X-Roll® MultiFlex-Quench with entry on the right side.

Besides the X-Roll® MultiFlex-Quench, the X-Roll® MultiFlex-Leveler T and the two furnaces, SMS group supplied a shot blaster, a primer line and a water treatment plant, all complete with X-Pact® electrical and automation systems. Powerful X-Pact® process models, including a material model, ensure the correct setting of the equipment and the achievement of the desired material properties. The scope of supply also includes ancillary equipment such as plate conveyor system, cooling beds and plate feeding and centering equipment.

The new heat treatment line will process more than 200,000 tons of heavy plate per year, with the main focus on the production of wear-resistant and high-strength quenched plates. The line is designed for plates with thicknesses between 5 and 175 millimeters and widths of up to 3,550 millimeters. With plate lengths between 4 and 26 meters, the plates have a maximum weight of 32 tons. The material grades to be

processed include high-strength carbon steels, highly wear-resistant steels, steels for offshore and pressure vessel applications as well as case-hardened and quenched/tempered steels. ♦

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 **Further information**
www.ilg-quette.de

New standard in plate turning

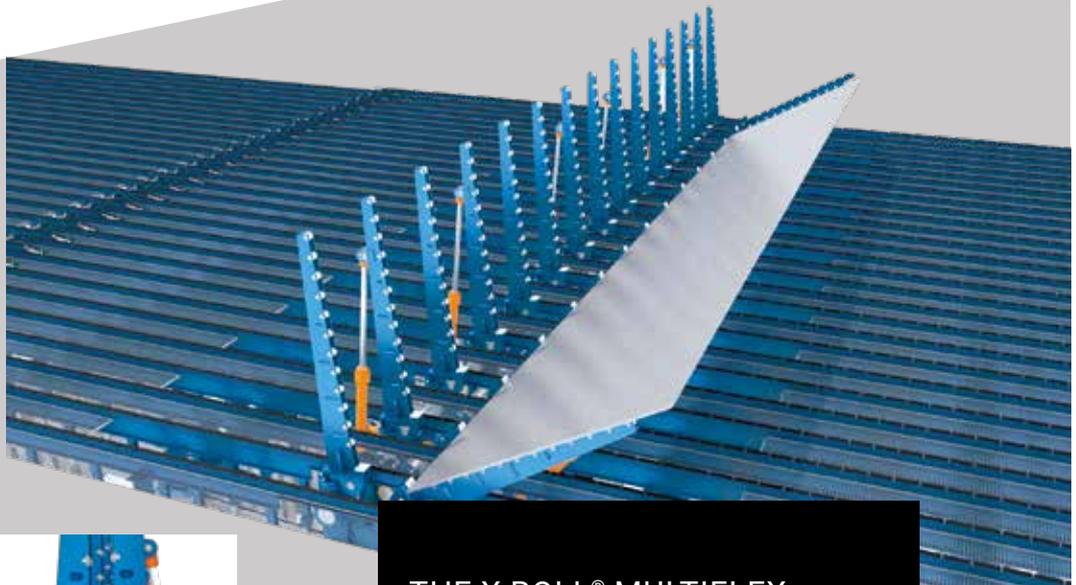
GERMANY

X-Roll® MultiFlex-Turnover Device

The new plate turnover device combines proven and new functions to the maximum benefit for customers.



The new turnover device in operation.



Turning arms flexibly adapted to the respective plate thickness.

THE X-ROLL® MULTIFLEX-TURNOVER DEVICE SIGNIFICANTLY REDUCES:

- Noise emissions and noise peaks
- Marks and surface defects
- Restrictions in thickness range design

Plate turnover devices are part of the equipment in heavy-plate finishing lines. With an innovative plate turnover device SMS group expands the range of the efficient X-Roll® MultiFlex machine concept already launched on the market with the X-Roll® MultiFlex-Quench®, among others.

The new plate turnover device in X-Roll® MultiFlex design combines proven and new functions to the maximum benefit of customers. In addition to low-noise operation, the focus is on surface-friendly handling of the plates and on the expansion of the operating area. Investing in the new X-Roll® MultiFlex-Turnover Device ensures safe handling of both, extremely thin as well as very thick plates, and of a large product mix, with the option of being adapted to future requirements.

Plant owners often had to experience that existing conventional turnover devices reached their limits. But frequently, these limits are not fully apparent until it comes to modernizations, and in particular, if the scope of modernization is to include an expansion of the product mix.

Conventional plate turnover devices are not very flexible

Conventional plate turnover devices are designed to cover one plate thickness range with the turnover arms being arranged at a fixed distance to one another. This distance defines the maximum product thickness that can be turned. Hence, the manageable range of plate thicknesses is determined by the fixed distance between the turnover arms.

Moreover, this distance is the crucial factor determining the maximum noise emissions generated during the turning process. Thin plates tend to wobble in an uncontrolled manner from the lifting side to the receiving side in the gap between the turnover arms. In addition to the noise level representing a considerable health risk to the operating staff in the plant, the results are marks and even defects on the plate surface due to the hard hits. This leads to inferior quality and causes time- and cost-consuming rework. In the case of critical materials, turning must be waived in some cases to avoid rejects, and a complex manual procedure has to be applied to check the bottom side.

In a nutshell, this means:

- The definition of a fixed, maximum thickness for conventional plate turnover devices has negative impacts on product quality and on noise emissions.
- In order to eliminate these drawbacks, SMS group has developed the patented X-Roll® MultiFlex-Turnover Device as part of an innovative plant concept.

“The mature design of the X-Roll® MultiFlex-Turnover Device substantially minimizes noise emissions during the turnover process as compared to conventional plants.”

Gisbert Paß, SMS expert for finishing lines

“With the MultiFlex-Turnover Device the balancing act between optimal design to minimize noise emissions and best possible prevention of product surface defects in the requested thickness ranges is a thing of the past. The infinitely adjustable arms of the plate turnover device allow for quick and flexible adjustment to the thickness of the plate to be turned,” says Gisbert Paß, SMS expert for finishing lines.

Before turning, an eccentric shaft ensures that the distance between the arms is precisely set to the gap required for the process. So, the product determines the ideal gap to be set between the arms and this prevents noisy wobbling movements. In addition, the replacement of the mechanically driven turning arm shafts by hydraulic cylinders provides additional damping and thus contributes to further improvement.

Manfred Dingenotto, Sales Manager Heavy Plate Mills at SMS group, explains the importance of plate turnover devices for new projects or for the modernization of other existing plants as follows: “Customers have to consider the total sound emission of the facility when building a new plant or modernizing an existing one. Frequently, the question arises as to whether the total noise emission might be too high. In that case, there is not only a risk for the employees inside the building, but also in the plant environment the noise level may present a problem.”

Conventional plate turnover devices are one of the main causes of noise emissions, especially noise peaks. If the problem cannot be remedied by simple means, it will be necessary to take costly measures to protect operating staff and neighborhood. ♦



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Improved strip guidance

RUSIA

At the end of 2020, SMS group has completed the modernization of PAO Severstal's hot strip mill HSM 2000 with good results and in due time. The activities focused on the side guides upstream and within the finishing mill.



Finishing mill side guides after successful recommissioning.

Russian steel producer PAO Severstal has been running its hot strip mill HSM 2000 at the Cherepovets location since 1975. With an annual capacity of about 6.5 million tons of hot strip, the mill's output is still very high even after more than four decades of operation and is essential for the customer's business. Therefore, PAO Severstal decided to make its HSM 2000 fit for current and also future requirements and, in spring 2018, awarded SMS group a contract to modernize the finishing mill. In autumn 2020, the upgrade was completed with the customer granting his final acceptance.

SMS group supplied latest-generation hydraulic side guides to replace the existing electromechanical guides in the entry section of the finishing mill and additionally for all of the seven mill stands. Furthermore included in the supply scope were hydraulic valve stands, a new hydraulic pump station, a new grease lubrication system and the X-Pact® electrical and automation system.

Extended guide length

One of the main goals PAO Severstal wanted to achieve by installing new guides was to improve rolling stability. The new hydraulic side guides in the entry section of the finishing mill give the guiding system ahead of the crop shear an extended guide length. The new guides offer numerous benefits. Drive-side and operator-side guides can be operated independently from each other. All guide bodies are designed for quick changes. Strip deviations from the rolling axis are reduced, and this positively influences strip quality. The result is less damage at strip edges and fewer surface defects. On the whole, strip guidance in the finishing mill has been substantially improved.



An intermediate-stand base frame dummy was used for pre-assembly and function-testing of the new equipment during ongoing production. The new hydraulic valve stand was also operated in this phase.

To minimize the impact on PAO Severstal's production process, the conversion was carried out during several individual downtimes. Ahead of these periods, the mechanical and hydraulic equipment as well as the control systems were pre-assembled and tested for proper functioning during ongoing operation. This procedure was a major factor to make sure conversion downtimes could be implemented according to schedule.

The first step was to install the guide system upstream the shear during the planned annual maintenance shutdown at the end of 2019. This was followed by mounting a single side guide in the finishing mill area during a short downtime in summer 2020.

From that work valuable experience was gained and used to optimize the planned main conversion downtime at the end of 2020 for the installation of the residual guides.

PAO Severstal was extremely pleased with the activities and the result of the modernization and granted SMS group the final acceptance for the upgrade just eight days after the mill had been successfully recommissioned in November 2020. ♦



Conversion phase in the shear area. Installation of a new hydraulic side guide from SMS group.

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The flat-neck spindles from SMS group ensure the safe and efficient transmission even of extremely high torques. (Photo taken during the workshop assembly.)

Higher annual output

CHINA

SMS group received the final acceptance from Wuhan Iron & Steel for efficiently revamping the high-capacity hot strip mill.

Wuhan Iron & Steel (WISCO), China, has issued the final acceptance certificate to SMS group for the successful upgrade of the drive train of roughing stand R2 and the modernization of the descaling system ahead of the finishing train in its high-capacity Hot Strip Mill No. 2.

WISCO aims at boosting its annual production capacity to more than six million tons, while improving product quality to satisfy the constantly growing market requirements. To achieve this goal, WISCO chose to bank on the knowhow and technological solutions of SMS group.

Converting the complete drive train of the second roughing stand allowed a higher rolling torque to be implemented which, in turn, led to fewer necessary passes and hence to a boost in the mill's capacity.

The revamp by SMS included the installation of two new oil-air lubricated flat-neck spindles of the latest design, the associated oil-air lubrication equipment, a new spindle bal-

ancing system, adaptation of the work roll sets, the hydraulic control system and spindle head holders. To install the new components minor modifications only had to be implemented at the mill stand. For most of the new equipment, the existing mounts and the anchor bolts in the foundations could be reused, which minimized the overall installation effort.

Completely new descaler

To be able to raise the operating pressure of the existing descaling system ahead of the finishing train, SMS group renewed the complete descaler, including added functions such as quick-change system for the spray headers, new position-controlled spray headers and new water collecting channels, stronger housing and hydraulically actuated cover. The new design permits the customer to continue using in-stock exchange parts, such as pinch rolls and table rollers. All hydraulic functions were adapted to the new requirements. To this end, the SMS experts expanded the existing valve stands.

The new pump system designed by SMS provides two options. Depending on the material to be processed, the entry-side descaling headers can be supplied either with a process pressure of 180 bar by the existing system or with up to 380 bar by the new frequency-controlled rotary pump system. The valve technology for this solution was supplied by SMS, too. ♦

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Fitted with latest equipment

CHINA

HBIS Laoting starts full production of the new high-performance hot strip mill supplied by SMS group.

It took less than four months for the new high-performance hot strip mill of HBIS Laoting Iron & Steel Co. Ltd. to be fully integrated into the production process. HBIS group, a leading steel producer in China, can now produce a wide range of high-quality flat steel products at Laoting on a modern high-performance hot strip mill.

The rolling mill supplied by SMS group is designed for an annual capacity of 4.1 million tons of hot rolled coils with a maximum width of 1,900 millimeters and final thicknesses ranging from 1.2 to 25.4 millimeters. The wide product mix covers low-alloyed carbon steels, high-strength automotive grades, weathering-resistant structural steel, pipe grades, boiler and pressure vessel grades, ship building steel and steel for heavy structures in bridge building.

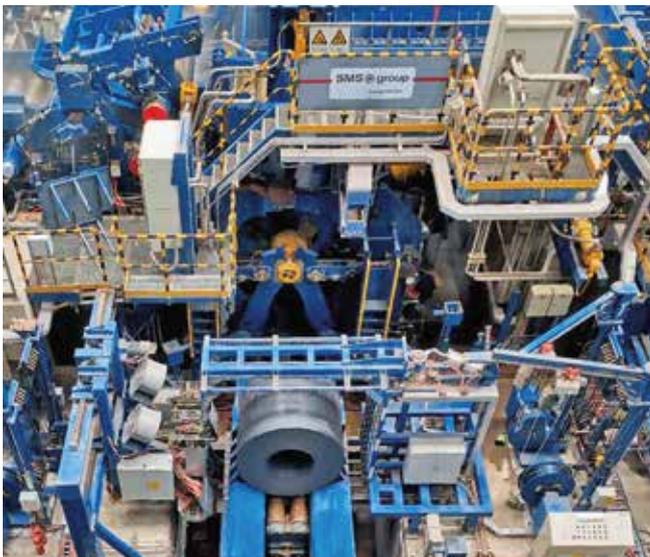
The new hot strip mill features latest equipment, such as a slab sizing press at the entry of the roughing mill, which allows width reductions of up to 350 millimeters, enabling swift and efficient responding to customer requests using slabs

on stock and more effective production planning in the upstream steel plant. The two high-performance roughing mill stands assure high production flexibility and, in combination with the edger attached to the second roughing stand, tightest width tolerances. The seven-stand finishing mill, designed for maximum roll forces of 52 MN (F1-F4) and 40 MN (F5-F7), respectively, is equipped with hydraulic screwdown and bending systems to assure compliance with the tightest thickness and profile tolerances. High-precision adjustment of the strip profile, contour and flatness is performed by the proven CVC®plus system (Continuously Variable Crown) with integrated work roll bending.

A latest-generation laminar cooling section arranged at the run-out of the finishing mill boasts the capacity and flexibility to cover a wide range of cooling rates and strategies to set the required mechanical properties within tight tolerances and to fulfill even future market demands.

The flow-controlled higher water rates towards the end of the cooling section enable reliable and repeatable production of multi-phase grades. ♦

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One of three hot-strip coilers of the new high-performance hot strip mill at HBIS Laoting.



The mandrel-less coilbox reduces temperature losses of the transfer bar, especially at the inner windings.

MMK RECEIVED AWARD

The significance of this efficient modernization was underlined in the opening ceremony of the 26th International Industrial Exhibition Metal-Expo'2020 in Moscow on November 11, 2020, when MMK received the prestigious award "Main Event of the Year in Russian Metallurgy".



Finishing mill after the upgrade.

Revamp according to schedule

RUSSIA

Magnitogorsk Iron & Steel Works (MMK) has successfully modernized and commissioned the 2,500-millimeter hot strip mill at its Magnitogorsk location, jointly with SMS group. The upgrade included key equipment in the finishing mill and also a fundamental renewal of the electrical and automation systems.

finishing stands F1 and F2 were realigned and the housing windows re-milled. The second and main shutdown in 2020 was used to fundamentally modernize the finishing mill area. SMS group replaced finishing stands F3 to F6 and installed new hydraulic roll gap adjustments and new work roll bending systems in the finishing mill. Thanks to these powerful actuators, MMK is now able to produce strips within narrow geometrical tolerances.

Automation system checked in test center

The large-scale project included the installation of a completely new X-Pact® automation system from SMS group. Prior to mounting on site, the system was installed in SMS group's test center to be tested and pre-optimized under realistic conditions to the proven Plug & Work concept. In addition to basic automation systems, the scope comprised process models such as the X-Pact® Pass Schedule Calculation model for the roughing and finishing stands, the Contour and Flatness Control model X-Pact® PCFC, the X-Pact® Cooling Section Control model for strip cooling, a pacing system for the entire hot strip mill, the X-Pact® Vision operating and visualization system, and a broad range of measuring equipment and technology.

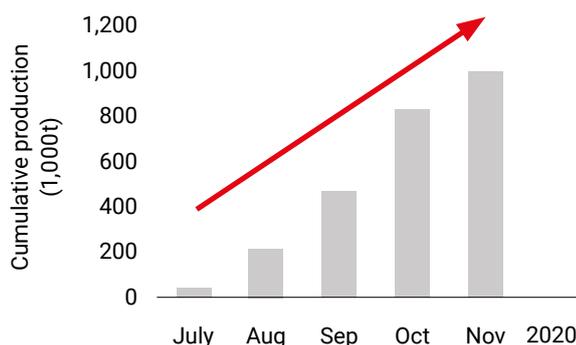
Moreover, SMS group renewed the finishing mill drive technology and supplied six main drives including converters, two new spur gear units and six pinion gear units as well as new drive spindles. New work roll and backup roll changing equipment and a new high-pressure hydraulic system for the finishing stands were also part of the installed scope.

On June 18, 2020, the first coil was rolled on the revamped hot strip mill. As early as on November 15, 2020, the extensively modernized mill produced the first million tons of hot strip. ♦

MMK awarded the order in February 2018. Talking on project goals, Pavel Shilyaev, CEO of PAO MMK, pointed out that the revamp of hot strip mill 2500 is part of the corporate development strategy up to 2025. The MMK CEO said: "We will gain a number of advantages from this modernization: we will be able to expand our product portfolio and to reduce the production costs."

The hot strip mill, which had been established and supplied in the 1960s by a Russian manufacturer, was modified during two shutdown periods. In the first shutdown in 2019,

Production ramp-up curve of MMK's hot strip mill 2500



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Expansion of production range

CHINA

Benxi Iron & Steel grants final acceptance for hot-strip mill modernization, confirming its trust in modernization expertise from SMS group.



One of the finishing mill stands of Benxi Iron & Steel's hot strip mill after the installation of the CVC®plus system.

The objective of this project was to bring the mill's production capacity and the production range – by adding high-strength steels – up to the requirements of the hot-strip market. Continuing their longstanding cooperation with SMS group, Benxi again banked on the know-how, expertise and leading technology from SMS group for the project – meanwhile the fifth comprehensive modernization of the mill, which was first commissioned in 1987.

As a key part of the modernization, three CVC® plus (Continuously Variable Crown) work-roll bending and shifting systems have been installed in the finishing stands F2 to F4, complete with the associated valve technology. These systems enhance the geometrical tolerances of the hot strip.

The optimization measures performed on the rolling stands F2 to F4 comprised not only the mill stands themselves but also the inter-stand areas. Improved guides and new work-roll cooling systems have been installed on the entry sides of all three stands. The innovative roll gap lubrication system, in combination with the optimized roll-gap cooling system, reduces the mechanical stresses (forces and torques) acting on the rolling stands, prolonging the roll lives as a result. Thanks to the resulting boost in performance capacity of the finishing stands F2 to F4, the mill can now also produce strip in high-strength grades.

Responding to growing market requirements

Further, the back-up roll balancing systems in the finishing stands F1 to F7 have been upgraded by replacing the emulsion-based balancing hydraulics with oil hydraulics. This measure involved the replacement of the cylinders and the complete control system, including the connecting pipes and the piping within the stands. In addition, in stands F1 and F5 to F7, the work-roll locking systems on the operator side have been replaced by a reinforced design.

Benxi benefits from the modernization in terms of enhanced mill availability, higher product quality and a more stable finish-rolling process.

"Based on the very good cooperation with SMS group in the past and their innovative solutions, we entrusted SMS group also with this recent mill revamp. With SMS as our partner, we can be sure that our mill will always be up to date and that we can respond to the growing requirements of the market in an economically efficient way," says Song Dawei, Deputy Manager of the HSM#1 Equipment Department. ♦

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Meeting in virtual space with a touch of solemnity: ElvalHalcor and SMS group signing the acceptance certificate.

High-performance aluminium hot strip mill

GREECE

Greece-based aluminium producer ElvalHalcor S.A. has granted SMS group the final acceptance for the new four-stand high-performance hot strip mill installed at the Oinofyta facilities near Athens.

During the commissioning phase, aluminium strips were successfully rolled in thicknesses between 1.8 and 12 millimeters and widths of over 2.6 meters on the advanced technology mill. Just a few weeks from the commissioning, ElvalHalcor rolled some 70 coils of excellent quality and suitable for a wide range of industrial applications on the new, highly flexible mill in one production shift.

Given the challenges posed by the COVID-19 pandemic, the specialists from ElvalHalcor and SMS group did an excellent job in accomplishing the commissioning activities without interruption. Increased use was made of digital communication channels, also involving, to a great extent, experts based in Germany.

Accordingly, the Final Acceptance Certificate was signed by the two contract partners during a virtual ceremony. Michael Schäfer, responsible for aluminium rolling mills at SMS group, and Lampros Varouchas, Managing Director of ElvalHalcor S.A., agreed: "The key to the successful completion of the project was the excellent specialists on both sides, who stood up to the special challenges with close cooperation and great commitment."

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The first strip had a width of 1,780 millimeters and was rolled to a final gauge of 2.8 millimeters.

Aluminium cold rolling mill early on stream

CHINA

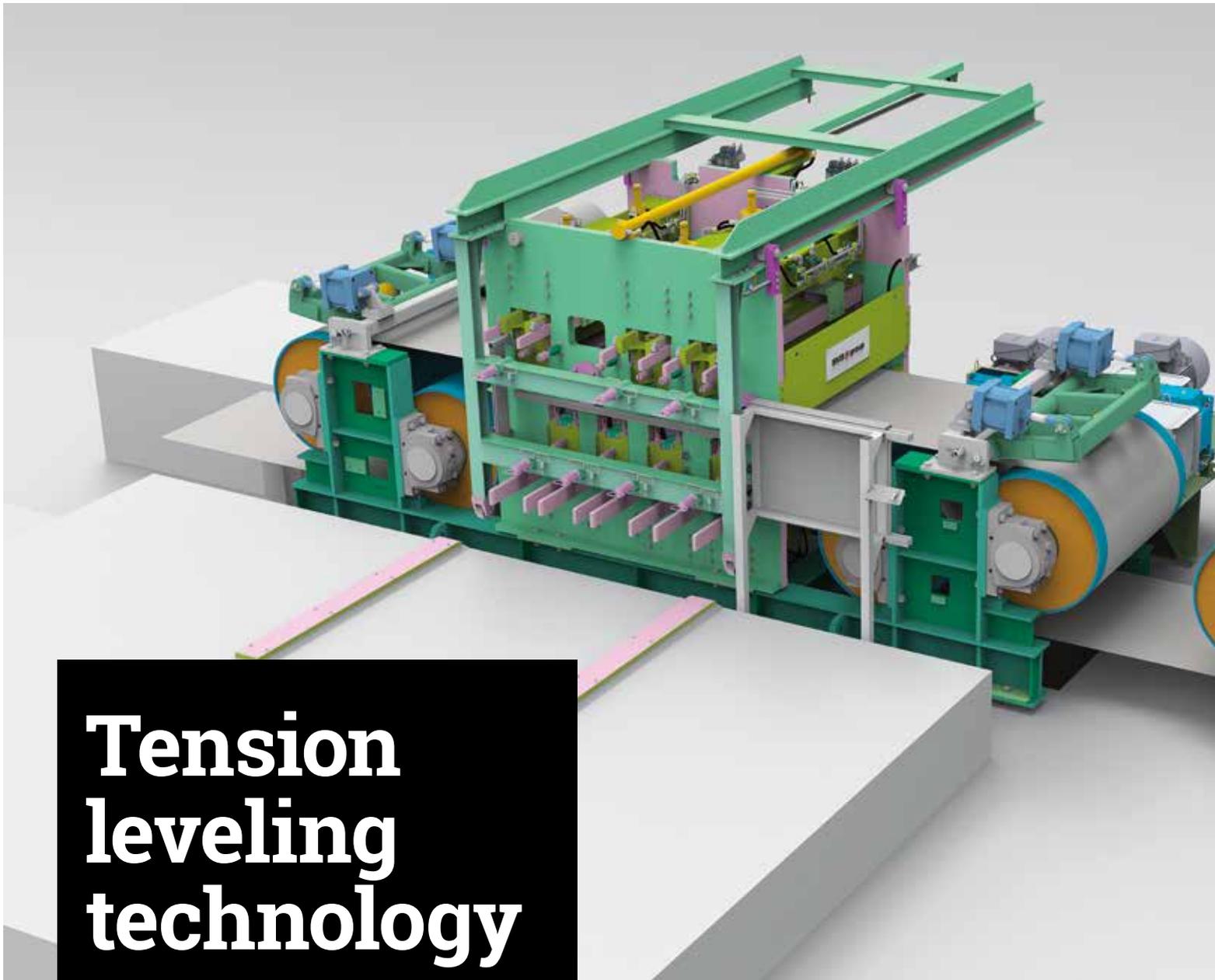
SMS group supplied a state-of-the-art cold rolling mill for aluminium strip to the Chinese aluminium supplier BaoWu Aluminium Technology Ltd., which is part of BaoWu Iron and Steel Group Co., Ltd., the largest steel producer in China. In autumn 2020, the cold rolling mill was successfully put on stream rolling the first coil at the company's location in Sanmenxia in the Chinese province of Henan. Despite the Corona pandemic, this milestone was reached faster than expected.

The six-high cold rolling mill can process aluminium strips with a maximum width of 2,350 millimeters. The smallest final thickness of the finished strips is 0.15 millimeters. The plant was designed for an annual capacity of about 120,000 tons.

The facility is designed to roll a wide range of aluminium grades and alloys. Strip quality, plant productivity and the environmental compatibility of the operational process are ensured through the globally leading technologies installed by SMS group.

The rolling technologies include CVC®plus in combination with positive and negative work and intermediate roll bending as well as inductive roll barrel heating. They assure a consistently high strip quality across the entire strip width for maximum yield. SMS supplied all mechanical, hydraulic and fluid power equipment.

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Tension leveling technology

WORLDWIDE

Market demands for higher material strengths require exacting changes in machine technology.

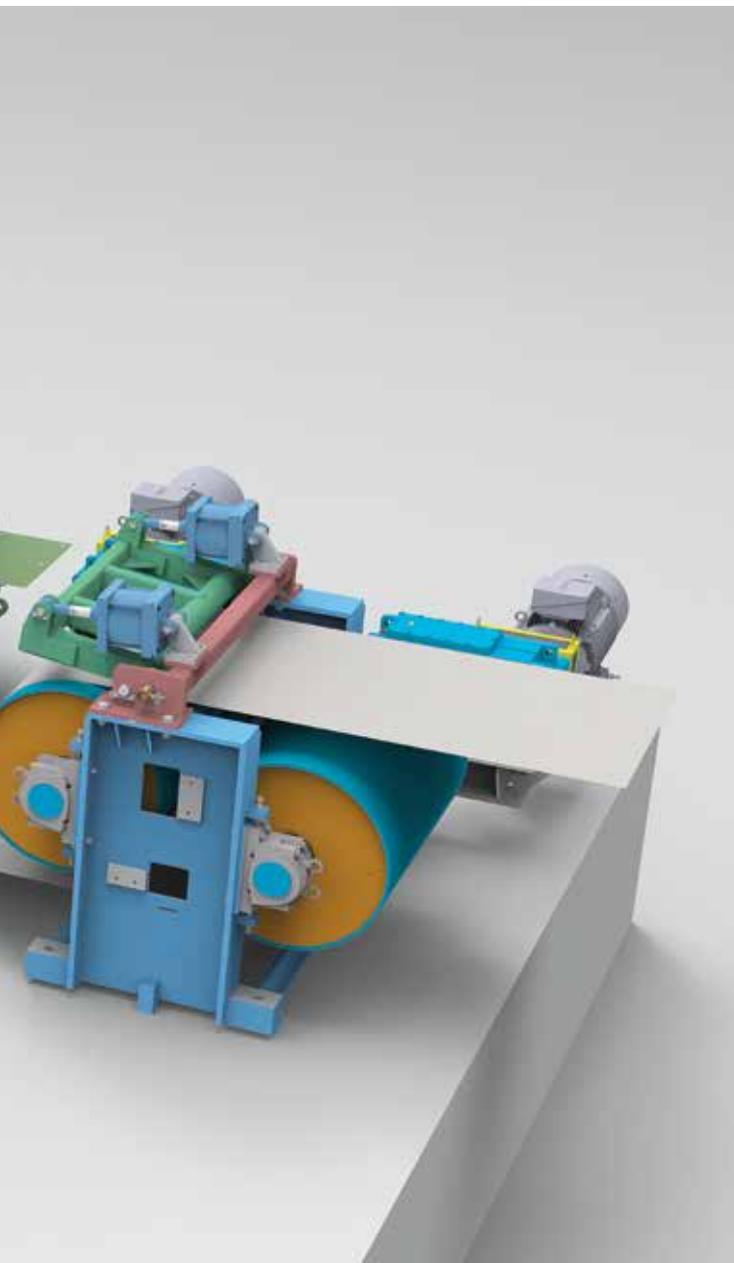
In strip processing lines, tension levelers minimize flaws such as waviness, cambers or longitudinal and transverse bends by a combined tensioning and levelling action to create a flat final product. In pickling lines, where it is called scale breaker, the tension leveler has to perform an additional task which is to break the scale layers by alternate bending and

stretching to assure better pickling medium efficiency and hence a faster pickling process. Market demands for higher material strengths lead to exacting changes in machine technology.

One aspect is higher forces in stretching and bending. SMS group has developed tension levelers for cold as well as hot strip lines, that are capable to level steel strip with yield points much higher than 1,000 megapascals. The machines are also suited for installation in existing plants to make these facilities meet future material requirements.

New high-strength tension leveler

The newly developed tension leveler TL-40-V490 for high-strength cold strip is designed for strip tensions up to 550 kN. These strip tensions are capable of levelling third-generation AHSS grades. The machine is equipped with two bending roll units of 40-millimeter roll diameter to assure intense bending action. Fur-



The tension leveler TL-40-V490 for high-strength cold strip can level steel strips with yield points much higher than 1,000 megapascals and helps to increase material flatness.



Successfully put on stream: tension leveler TL-40-V490 for high-strength cold strip in Shougang Jingtang's new hot-dip galvanizing line.

Furthermore, three correcting roll units are integrated to eliminate longitudinal and transverse bends in high-strength grades. The special arrangement makes sure the operating area is not coupled to the correcting area. Adjustment of the rolls as well as quick opening are achieved fully hydraulically, which permits the parameters to be flexibly adapted and thus to avoid non-flat areas. Material grades not to be leveled may pass the machine without contact. A special exchange system allows to quickly change the leveler cassettes during ongoing production.

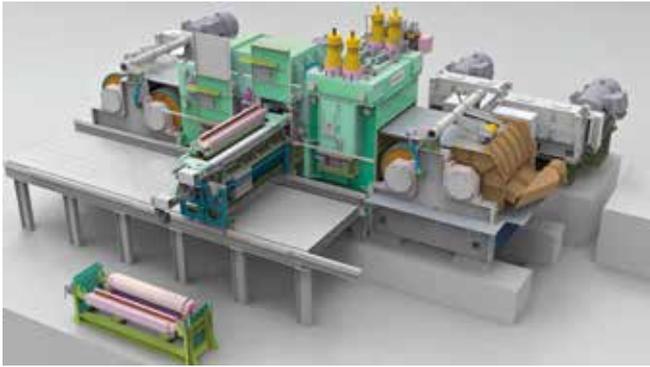
High-strength strips in Shougang Jingtang's new galvanizing line

At the end of 2019, Shougang Jingtang, China, successfully put on stream the new hot-dip galvanizing line from SMS group, including integrated tension leveler for high-strength strips. The line was specially designed for the processing of coated high-strength

steels which are used, among others, as structural elements in the automotive industry. Referred to equal or even more stringent safety requirements, the new steel grades reduce the weight of the body in white. The main reason for placing the order with SMS group was the comprehensive expertise in processing lines for high-strength steel strip in addition to the positive experience they had with SMS group as plant supplier. The exit section of the line, including tension leveler, was designed to process steel strip with tensile strengths of up to 1,500 megapascals. One of the reasons behind was Shougang Jingtang's intention to use the line for the development of new materials.

High-strength scale breaker

To meet the higher requirements in continuous pickling lines, SMS group developed tension leveler SB-80-V1050, a special machine for hot-rolled strip mate-



Designed for hot strip with yield points over 1,000 megapascals: scale breaker SB-80-V1050 made by SMS group.

rial. The machine is particularly made for use in pickling lines and designed for strip tensions of up to 1,100 kN. Usually, the required high tensions are established and released by at least two bridle roll sets upstream and downstream of the machine. Two bending and two correcting roll sets are installed to bend and stretch the material as needed. Further integrated in the machine are several backup rolls ensuring a uniform bending effect at the top and bottom strip sides.

This has the following advantages: a notable elongation referred to the strip tension applied, an increase in bending roll service life and a reduction in pickling time due to effectively pre-breaking the scale layer. Scale breaker adjustments are all hydraulic, and an exchange system permits the bending cassettes to be changed during ongoing operation.

Scale breaker for high-strength strips at SSAB

The end of the second phase in December 2018 completed the revamp project of SSAB's continuous pickling line in the company's Hämeenlinna works in Finland. The scope of the extensive modernization included the integration of a high-performance scale breaker. If so required, the maximum strip tension in the line can be increased to 900 kN, depending on the material grades. Besides the distinctly improved flatness, pickling times could be significantly shortened using the new scale breaker. For some materials it was possible to clearly increase the slow processing speed due to the pickling treatment, and hence to raise the output. ♦

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New walking beam furnace started up at SN Seixal (MEGASA)

PORTUGAL

MEGASA Group und SMS group have successfully started up the new walking beam furnace in the existing combined mill of SN Seixal Siderurgia Nacional S.A. in Aldeia de Paio Pires, Portugal.

The new reheating furnace has a capacity of 160 tons per hour (cold charged) and of 210 tons per hour (hot charged) and is equipped with the latest developments in terms of flameless digital combustion technology: SMSPrometheus® Level 2, SMS DigiMod combustion management system and SMSZeroFlame burners. Together, these three components enable outstanding performances combined with less fuel consumption, less scale formation and reduced pollutant emissions.

The project represents a cornerstone for MEGASA Group to consolidate its leading position in the market of wire rod and construction steel.

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First billet discharged on March 17, 2021.



The expansion will increase the production capacity of the flat rolling mill complex established for ArcelorMittal Vega in Brazil in 2003.

Product range enlarged by automotive grades

BRAZIL

ArcelorMittal Vega contracts SMS group to expand its cold mill complex and supply a hot-dip galvanizing line and a recoiling line.

ArcelorMittal Vega, Brazil, has awarded SMS group the order to expand the flat rolling mill complex in São Francisco do Sul, Brazil, supplied by SMS group in 2003. With this project, the company intends to boost the mill's capacity by 640,000 tons annually and add ultra-high-strength steel strip for the automotive industry to its portfolio. To this end, the existing pickling line/tandem cold mill will be modified, and a new universal annealing and hot-dip galvanizing line as well as a new recoiling and inspection line will be integrated into the facility. Commissioning of the new and modified lines is scheduled for 2023.

SMS group will supply the mechanical and process-technological equipment and supervise the installation and commissioning activities. Part of the equipment will be integrated into existing facilities and systems.

The pickling line/tandem cold mill supplied by SMS in 2003 underwent its first expansion in 2010, also by SMS. Now, the tandem mill is going to receive a fifth stand, which will be integrated directly ahead of the existing cold mill. Thanks to the additional roll stand, it will become possible to

roll strip of a maximum initial thickness of 6.0 millimeters. Currently, the maximum initial thickness is 4.8 millimeters. In addition, a maximum rolling speed 1,300 meters per minute will be achievable on the new mill, and specific mechanical equipment will be added or modified in order to be able to handle the expanded product range and the higher production. This will include the integration of a new coil preparation line and a flying shear. All these measures will raise the mill's annual capacity by 640,000 tons to 2,150,000 tons.

Universal annealing and hot-dip galvanizing line

The additional 640,000 tons-per-year produced will be refined in the new universal annealing and hot-dip galvanizing line mainly into high-strength steel grades for automotive structural components. Reliable production of high- and ultra-high-strength steels will be ensured by a high-performance annealing furnace from SMS group company Drever International. The furnace will achieve very high cooling rates, thanks to its innovative UFC_{plus} rapid gas-cooling system, for example. A FOEN[®] air-knife system will assure precise attainment of the specified zinc layer thickness. Both zinc and zinc-magnesium coatings will be possible. The line concept also provides for an "anneal only" option.

For further treatment of the strip, the line will include a skin-pass mill, a stretch-leveler, a horizontal roll coater, a recoiling and inspection line with an integrated side trimmer, an inspection station and an oiling machine. The line will process strip in thicknesses from 0.4 to 3.0 millimeters and widths between 750 and 1,875 millimeters. ♦



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In contrast to the X-Pro laser welder, obsolete flash-butt welding machines or conventional laser welders are not capable of welding modern qualities reliably, as the high or very low alloy contents have an impact on the weldability of the materials.

Sustainable strip processing lines

WORLDWIDE

Strip processing lines have to treat a wide product range including state-of-the-art high-strength steel grades. Although some of the materials are difficult to weld, they must properly be joined in the entry section of a strip processing line within a short period of time.

Technical key data of the X-Pro laser welder for hot strip

Strip material	Carbon steel, stainless steel, silicon steel
Strip thickness	1.0 to 6.5 mm
Strip width	650 to 1,950 mm
Core machine size	3.5 m (width) x 4.0 m (height) x 7.5 m (depth)
Laser source	Carbon-dioxide / fiber laser

Particularly suited for modernization projects

As early as in the development phase of the machine, special attention was paid to a compact design with simple requirements on the foundation. The core machine needs an installation space of just 3.5 x 4.0 x 7.5 meters and can hence be provided for in an existing line layout even under challenging space conditions. This means the machine is not only suited for integration in new strip processing lines, but is also perfect for modernizations and for replacing obsolete welding technology.

Patented inductive heat treatment of the weld

The welder offers a substantial advantage and that is the patented inductive pre- and post-treatment of the weld, which allows for an individual heat treatment process. Since every combination of materials comes along with individual demands and the range of possible material combinations has grown significantly, the spaces between and hence the timing as well as the applied power of the inductive units can be varied. This means the duration of treatment and temperature are flexibly set to suit the respective material combination. The highly efficient, deep-thermal treatment using medium-frequency induction makes sure the material is completely heated within almost no time and prevents hardness increases in the weld seam area and thus the related risk of a strip breakage. The special design of the inductor considerably reduces holding time as compared to conventional systems and permits even hard-to-weld materials to be welded such as martensitic grades or those with high carbon or high silicon content.

Automated quality assurance system for the weld seam

The integrated, automated quality assurance system evaluates the entire welding process. A user-friendly interface

The X-Pro laser welder offered by SMS group has been specifically developed to meet the requirements involved in joining hard-to-weld strip material. One of the components developed master this challenge is a patented, inductive heat treatment system.

Further advantages are an automatic welding parameter calculation system, a quality assurance system, short cycle times and an exchangeable laser source. The laser welder has been installed in numerous new plants, but also as part of modernization projects. For the revamp of its pickling line in Hämeenlinna, Finland, SSAB Europe decided in favor of an X-Pro laser welder. Despite the demanding product portfolio, commissioning could be done within a short time followed by a steep ramp-up curve. At present, a further machine is being installed in the entry section of a continuous cold rolling mill at another European customer.

90

percent of the operating expenses can be saved as compared to conventional machines with carbon-dioxide laser source - thanks to high efficiency as well as lower running and maintenance costs.

provides the operator an indication of the total process. The system checks most different parameters of the weld seam, as for example geometry or temperature, and includes them in the overall quality assessment of the weld seam.

Automatic calculation of weld parameters

Based on the chemical analysis of the steel melt, the automated calculation system individually adapts all weld parameters to the material combination that needs to be welded. Thanks to this automated calculation it is possible to directly and reliably weld even combinations of unknown steel grades. The only data needed for the calculation are the geometrical strip data and the steel melt analysis of the two steel strips.

Short cycle time reduces down times

Another highlight of the machine is its clearly shorter cycle time. Thanks to the intelligent machine design all sequences within the welding cycle are optimized, which leads to distinctly shorter total cycle times than common on the market so far. The short - welding cycle time results in reduced - downtimes in the entry section of the lines and indirectly permits production to be increased. So, an expansion of the product portfolio is not the only advantage when replacing an existing welding machine.

Fast change of knife cassettes

The time needed to change the shear top and bottom knife cassettes is extremely short, too, thanks to a special system. Both cassettes can be changed in less than 30 minutes. This is the result of an "intelligent machine design" without additional equipment needed by the machine to make such a rapid change possible.



X-Pro laser welder installed in the new pickling line/tandem cold mill of Big River Steel, U.S.A.

Freely selectable laser source

Due to the modular design of the welder and hence the separation of weld seam preparation and welding process, the laser source can be exchanged easily. This allows customers to use both, a conventional carbon-dioxide laser source or a modern solid-state laser source. The high efficiency, low operating and maintenance costs of a solid state welder make operating expenses drop by 90 percent as compared to conventional machines with carbon-dioxide laser source.

Digitalization

To keep the production process as simple as possible, a number of digital solutions have been implemented in this machine. All relevant data are saved in an archive and may serve as a basis to prepare a maintenance schedule. The machine documentation is available digitally and linked to the various applications. In addition, SMS group offers a remote service able to respond to the customer's problems at short notice. For this purpose, the expert will virtually connect to the customer's machine and perform an initial problem analysis.



Fast ramp-up and better performance at SSAB

In SSAB's modernized pickling line, the X-Pro laser welder joins steel strip with thicknesses from 1.5 to 6.5 millimeters and widths between 650 and 1,650 millimeters.

The welding machine at the Hämeenlinna works in Finland is equipped with a solid-state laser. SSAB decided in favor of the X-Pro laser welder as the machine permits welding of high-alloy steel grades while keeping cycle times short. After the revamp phase at the end of 2018, SSAB was able to expand its product portfolio. The company can now connect even state-of-the-art high-strength steel grades without any problems and pickle strips in a continuous process at high speeds. ♦

 **Jens Szonn**
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The "heat-to-coat" process permits galvanized steel strip to be produced with durable corrosion protection.

Galvanizing line with unique "heat-to-coat" technology

U.S.A.

In December 2020, following a successful commissioning phase, Nucor Steel Gallatin granted SMS group the final acceptance certificate for the new "heat-to-coat" pickling and galvanizing line established in Ghent, Kentucky, U.S.A. SMS group supplied the complete line, including engineering, process technology, furnace technology, pickling and galvanizing equipment as well as electrical and automation systems. The line is designed to produce 500,000 tons of pickled and galvanized hot-rolled steel strip per year. With a maximum capacity of 180 tons per hour and an extremely large strip size range (up to 6.35 millimeters thickness and 1,854 millimeters width) the line sets new standards in hot strip galvanizing. 70 per cent of the designed capacity could be reached in the commissioning phase already. This promising production result gives reason to assume that Nucor will even exceed the designed capacity in 2021.

The "heat-to-coat" technology for hot strip galvanizing is characterized by its compact and operator-friendly U-shape design, the turbulence pickling system, the high-power inductive heating system, FOEN® galvanizing equipment and Drever after-pot cooling system. The coated hot strip is applied in many fields and sectors.

 **Contact**
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Innovation in tube production

WORLDWIDE

SMS group launches 4th generation of PQF® plants and boosts productivity with low investment costs.

MASTERPIECE
The 4th generation
7-inch PQF® is
able to roll 200 tubes
per hour.



It represents a quantum leap in the productivity of PQF® (premium quality finishing) plants for the production of seamless tubes. As market and technology leader and inventor of PQF® technology, SMS group experts have succeeded in achieving a 30 percent increase in output with the fourth generation of PQF® plants. This gain is not only possible with new plants; existing PQF® plants can also fully benefit from this with a low-investment upgrade.

Fourth generation of PQF® plants

SMS group has once again lived up to its slogan and high standards as Leading Partner in the World of Metals with its fourth generation of PQF® plants. At the same time, the new plant and upgrade solution is characterized by a considerable cost reduction per ton of tube and substantially higher profitability for tube producers, who are able to gain a significant competitive edge as a result. Achieving such a high production capacity and plant performance in the manufacture of high-quality PQF® tubes has not been possible until now.

Economic benefits and new market opportunities

For the plant owner, the increase in productivity certainly has positive effects. Here are two possible scenarios:

- A 30 percent higher production capacity with the same production time and manpower means an increase from 500,000 to 650,000 tons per year. This creates new opportunities for sales and a fast return on investment.
- The performance enhancement is used to produce the same quantity of PQF® tubes in less time than before. Due to the minimized time required, working shifts and human resources can be adapted accordingly.

Depending on the market situation and capacity utilization, plant owners can either produce more tonnage or a set target tonnage in a shorter time using the same manpower. In both cases, cost efficiency is higher and tube producers can respond adequately to volatile market and price situations.



Conventional seamless tube lines cannot viably compete with the high-precision quality and the productivity boost of the latest PQF® generation.

PQF® – the standard of the future

Around 40 million tons of seamless tubes are produced worldwide every year, around half of them in high-grade PQF® quality. The main customer is the oil and gas industry, which uses OCTG tubes preferably made using the PQF® process. The reason: As the conditions for extracting fossil energy deposits become more and more extreme, the tubes must meet correspondingly high quality and load requirements. Structurals are another application for high-quality PQF® tubes, and due to the reduced production costs further market shares could be gained. Existing old equipment for seamless tubes can also be replaced by state-of-the-art, digitalized PQF® plants of the fourth generation, as conventional seamless tube lines can neither viably compete with the high-precision PQF® quality nor with the new productivity boost.

A plus for the environment

In terms of their lifecycle assessment and sustainability, plant owners also benefit from the fourth generation of PQF® plants. The reason is that the total amount of energy required ▶

30%

increase in
performance in tube
production

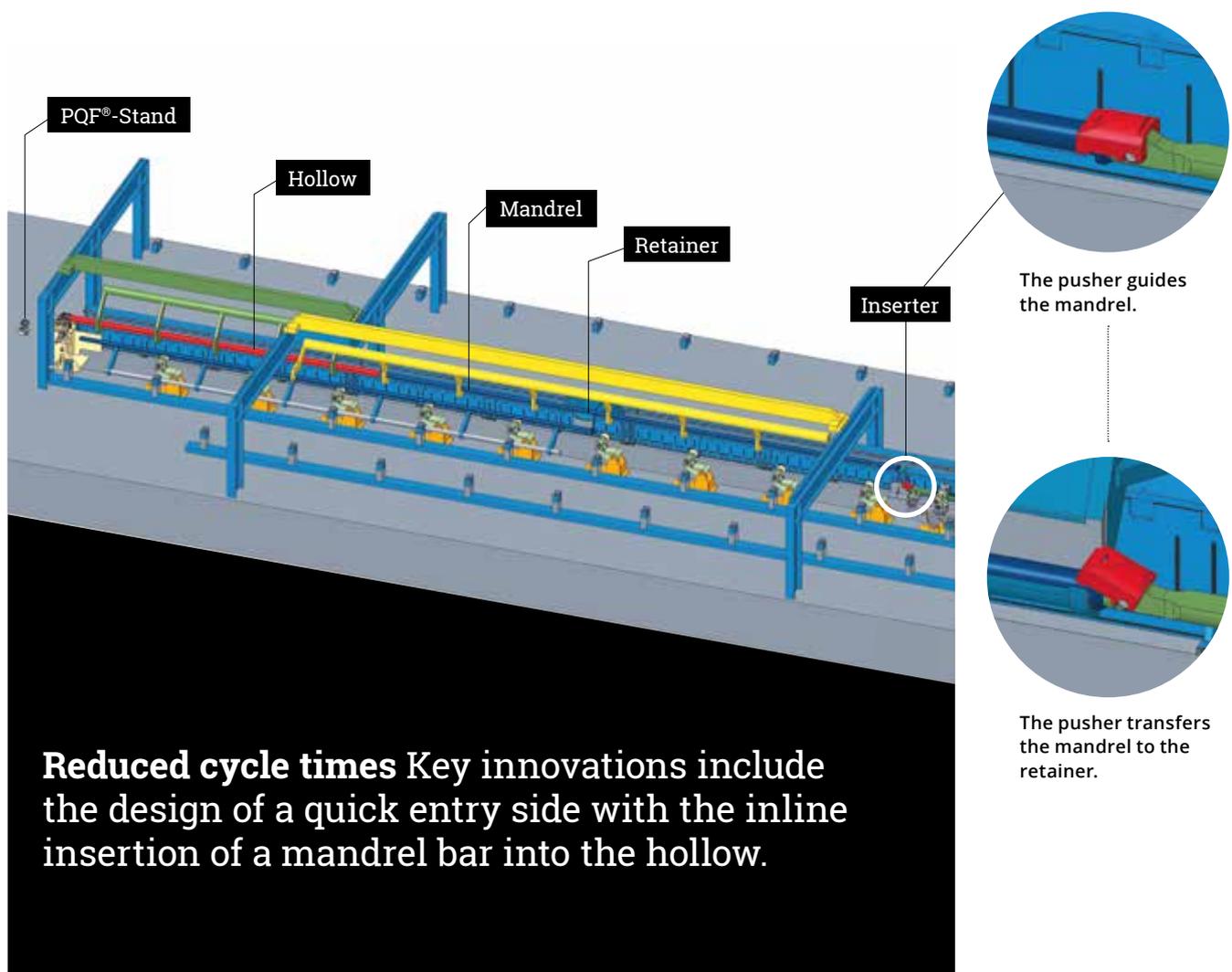
does not increase – as one would otherwise expect – in direct relation to the growth in production. On the contrary, less energy is required per ton of tube produced. This mainly results from the fact that the energy consumption of the secondary operating facilities and administrative facilities remains constant with the increase in production.

Significant five-second reduction in cycle time

The main innovations include the arrangement of a quick entry side with the inline insertion of the mandrel into the hollow. In conjunction with the highly efficient configuration of the

retaining system, the cycle times are reduced by four to five seconds. This means that a cycle time of around 20 seconds per tube – and even up to a peak of 18 seconds – is now possible instead of a cycle time of 24 seconds. A 7-inch PQF® is therefore able, for example, to roll 200 tubes per hour; a 10 3/4-inch PQF® can achieve 150 tubes per hour.

Another novelty is the design of the chocks in the PQF® rolling mill that help to simplify roll assembly and dismantling. The roll and shaft are separated from each other and are no longer made of one part. This reduces tool costs considerably and reduces the necessary operating stands inventory. A special, newly devel-



oped grooved profile between roll and shaft replaces the previous cylindrical coupling, thus ensuring reliable torque transmission.

Higher speed also means higher productivity – but what effect does this have on quality? The consistently high quality and precision levels of PQF® tubes are ensured by the rolling technologies and performance module from SMS group. These include the advanced, digital inline technologies as part of Industrie 4.0: For example, the CaliView® measuring system, developed by SMS group, enables the fast inline calibration of all longitudinal rolling mills and therefore guarantees perfect alignment of the pass line. Equipped with the LASUS® Multiscan and SecControl® systems, the wall thicknesses of the tubes produced can be individually measured and controlled. Furthermore, CARTA® neo supports process engineers with the monitoring, analysis, and intelligent control of all quality parameters.

Faster return on investment with stable investment expenditure

For new plants the investment in a fourth-generation PQF® remains almost the same. Additional investments are only required for some equipment areas in the line, because furnace and saw capacities, for example, need to be increased. Even in the case of an upgrade, the financial outlays are manageable. These mainly concern adjustments to the cycle times and capacity extensions in the peripheral line equipment. ◆



“We are convinced that our new generation of PQF® plants represents a really unique and highly attractive offer for tube manufacturers all over the world. Of course, the huge increase in capacity and productivity also ensures a faster return on investment. Our team is on hand to present the technological innovations and the economic benefits to plant owners and interested parties.”

Thomas Maßmann, Executive Vice President Long Products, SMS group

Optimum protection

WORLDWIDE

Why thermally sprayed surfaces
are among the secret agents within
many sectors. ▶

Thanks to their thermal coating, offshore wind turbines withstand corrosion caused by seawater.



Anyone in the winter out and about on the world's ski slopes is familiar with the situation: if you are freezing you wear the wrong clothing. It is so to speak our protective coating. In a similar way, the thermal coating process affects the components. Using various thermal spraying methods, protective coatings are applied to the surfaces to protect them against external influences. In this way, components may become resistant for example against corrosion or wear, which not only may make them last longer, but additionally extend their field of application.

Fascinating technology

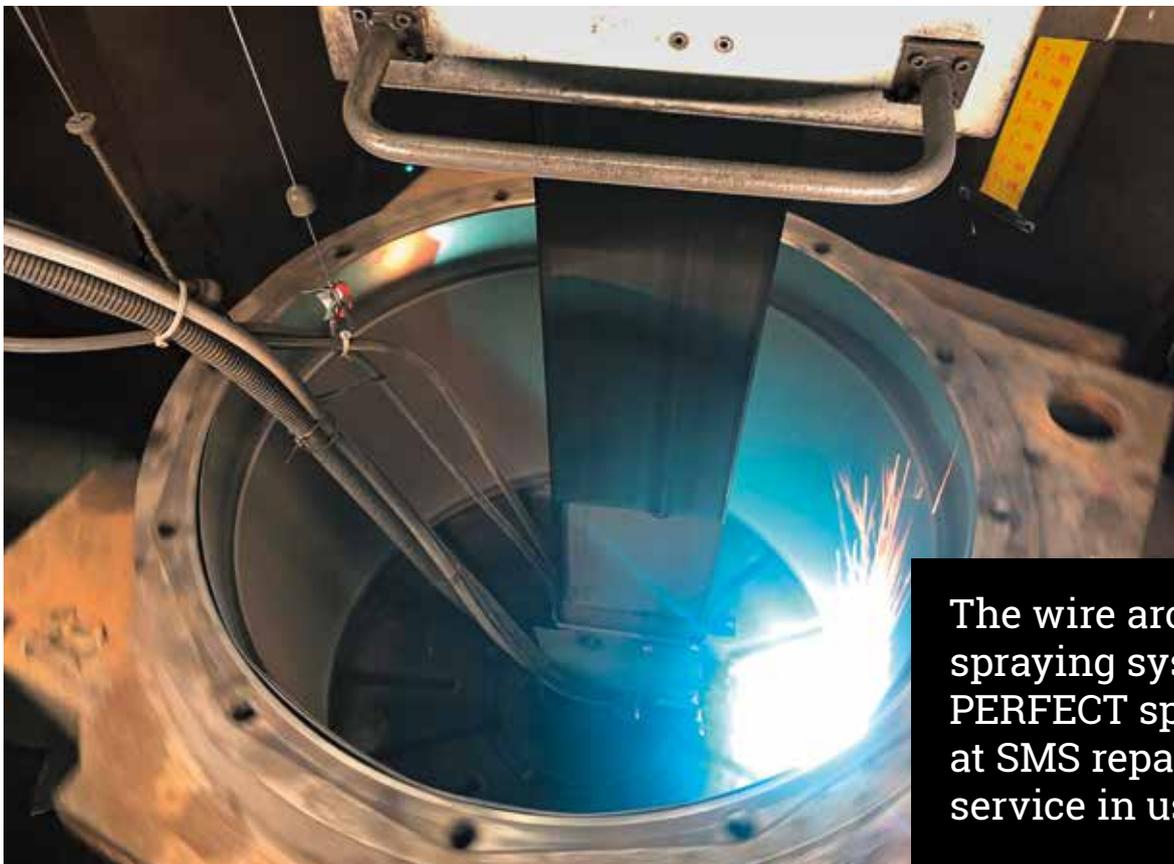
In thermal spraying, coating materials such as wires, powders or bars are fed to a spray gun or to a burner. The materials are heated and then accelerated into the direction of the component. In this way, the joined or fused particles achieve high speeds of up to 800 meters per second hitting the surface of the component. After the heat is transferred to the base materi-

al the particles solidify on the component's surface where they form a layer. The spray coating, however, not only spreads on the surface but virtually joins to it. Depending on the desired coating thickness, this process is repeated.

The term thermal spraying comprises several different processes which in their application are not in direct competition. On the contrary, they complement one another due to their specific characteristics with regard to processes and coatings generated.

Opening up new fields of application with proper protective coatings

When protective coatings are applied high-duty components may be qualified for the utilization in mechanical and plant engineering, but also in aerospace or automotive technologies. In addition to that, lighter base materials may be used for applications for which they were not suited up to now due to their surface properties.



The wire arc spraying system PERFECT spray® at SMS repair service in use.



The PERFECT
spray® system
during wind tower
coating.

“At SMS group, we use the wire arc spraying system PERFECT spray® at our Coating Competence Center (CCC) in Mönchengladbach, Germany. Thus, we can repair heavy-duty components suffering damage caused by friction losses by means of thermal coating. Our Technical Service provides coating services for our customers at seven locations worldwide. The development of new coating systems and repair processes is coordinated centrally at the CCC.”

Ulli Oberste-Lehn, Project Manager
Coating Competence Center, SMS group

For coatings using thermal spraying nearly all base materials are suitable. In addition to metals, ceramics, plastics, fiber composites or even natural materials such as stone and wood can also be coated. The latter, for example, represents a popular building material, combining high compressive strength with simultaneous elasticity. And often high resistance can be extended with a sprayed coating and additionally protects wood against parasites such as insects and against fungi infestation. Thanks to a functionalized surface, the building material can be used for a broader field of application. Furthermore, esthetic aspects may also play a role: for trendy furniture for example copper-coated wood is used.

Medical technology also offers application examples for thermal spraying, for example for implants, which are better accepted by the natural body tissue due to the additional coating.

Thermal coatings score with corrosion protection in seawater

With thermal coating large steel structures in the offshore area can be protected permanently against seawater corrosion. A great advantage compared to varnishing exists in self-healing of thermal coating



Thermal coating of a mandrel bar by means of PERFECT spray®.

WIRE ARC SPRAYING

In practice, the thermal wire arc spraying process has proven to be extremely suitable for applications such as welded pipe seams. During thermal coating by means of an electric arc, two metallic wires are fed into a focus point as starting material, where the wire tips are fused by an arc. Droplets are formed which are accelerated by secondary atomization with a high-kinetic gas jet in the direction of the workpiece surface to be coated. The atomized particles on the workpiece form a finely structured, homogeneous coating featuring excellent mechanical properties such as improved hardness and/or abrasion resistance and oxidation and corrosion resistance even at high temperatures.

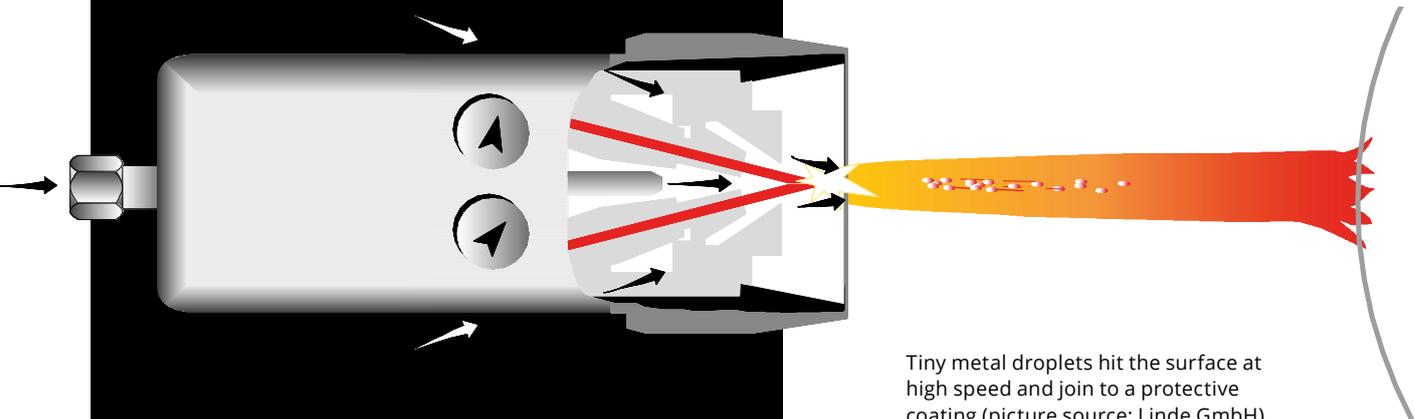
which means that minor surface damage heal independently due to the electrolytic effect between the base material and the zinc coating applied.

“The components employed in offshore wind turbines are usually made of low-alloyed structural steels. To be able to achieve long-lasting corrosion protection throughout the overall planned service life of 25 years, Duplex systems play a key role consisting of a combination of a wire arc sprayed zinc-aluminum 15 (Zn|Al15) coating and a suitable organic cover coat. For applying such coating, wire arc spraying is the most commonly applied procedure, as it allows high melting rates and thus high area output,” said Dr. Frank Prenger, Grillo-Werke AG. For this application state-of-the-art wire arc spraying systems offer top quality, tight coating tolerances and a sustainable corrosion protection.”

And in fact, corrosion protection is one the most frequent applications for thermal spraying. Within machinery and equipment corrosion protection provides for extended lifetime and thus ideally for a production advantage. Another application example is corrosion protection for pipelines to improve their durability and make them more resistant.

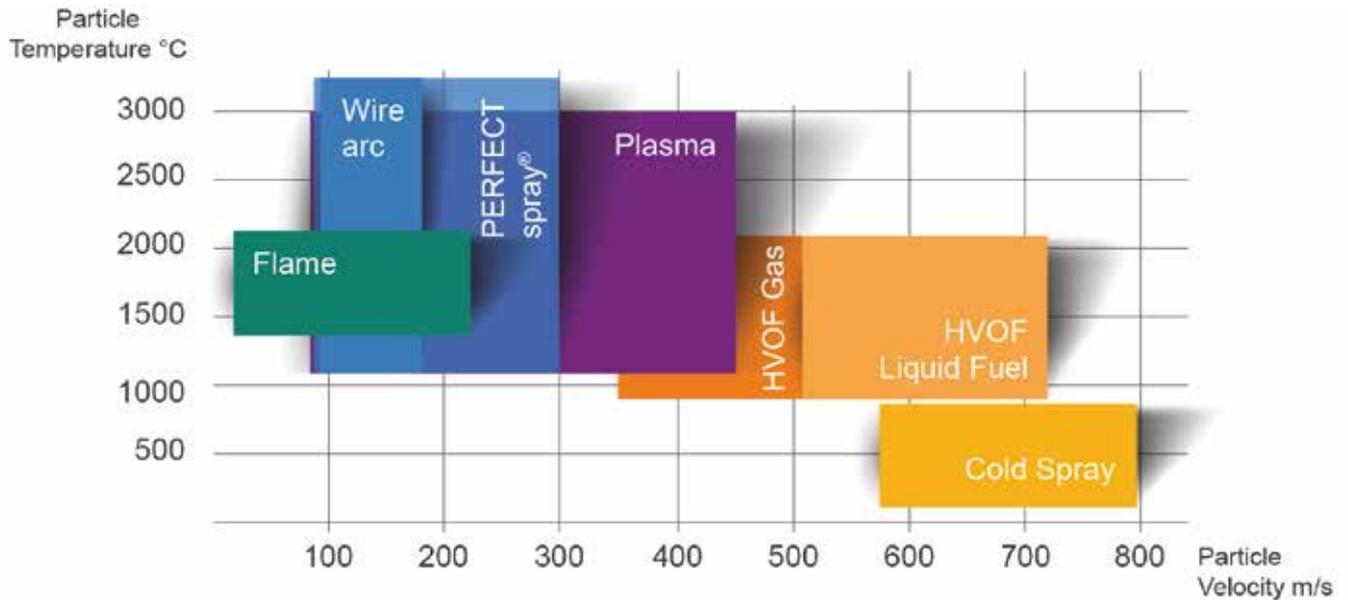
PERFECTLY equipped: The wire arc spraying system of SMS group

At SMS group, we combine the process of wire arc spraying with a digital power/voltage source developed inhouse. The result is a product exceeding the possibilities of classical wire arc spraying. The coating gun is equipped with an innovative nozzle design which specifically generates atomizing air and thus provides for higher efficiency. Low wear and consis-



Tiny metal droplets hit the surface at high speed and join to a protective coating (picture source: Linde GmbH).

Thermal spraying processes at a glance



tent electrical contact of the wires ensure a smooth spraying process. The gun offers maximum reliability together with a low-maintenance concept, whereby high-functional and long-lasting materials are employed.

The SMS group system is modularly structured providing several technical advantages – including the possibility to lead the flow at the wire ends well into the supersonic range or decelerate the gas to subsonic speeds. Ceramic inner flow contours adapted to the respective coating application have been designed according to gas-dynamic aspects and can be adapted to the desired gas volume and mass flow. Processes for cost reduction in component production are under permanent development. With thermal coating, it is possible to “save” components which have been worn or damaged during the treatment process. Here, thermal coating offers a cost-effective solution. In addition to that, rejects can be reduced and productivity can be boosted. ♦



Learn more about the wire arc spraying technology in a webinar with our experts. Sign up today!



Contact

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Further information

www.sms-group.com/thermal-spraying

New benchmark in steel beam production

ITALY

Italian steel producer Duferco commissions SMS group to supply medium section mill powered exclusively by renewable energies.

Breakdown
stand from
SMS group.



Duferco Steel, located in Brescia, Italy, has placed an order with SMS group for a new medium section mill. This flagship project will focus on core components of digitalization and automation in production and logistics, and on sustainability. This new, ultra-modern rolling mill to be installed in Italy will make Duferco one of the most important centers of steel beam production in Europe.

With the new mill, the Duferco Group will be able to reach a yearly output of 1.5 million tons of long products in future. "Our main goals are to set new standards in customer service, maximize the overall process efficiency and become the best-cost producer in Europe," says Antonio Gozzi, President of Duferco Italia Holding. "We wish to make beam production more sustainable, meeting the highest standards in environmental protection and safety."

Entire medium section mill including electrics and automation

SMS is going to supply the complete new medium section mill, including electrics and automation systems up to Level 2. Moreover, a SMS DataFactory will be implemented, combining the information from the product tracking system with all available data in the plant, from the sensor level up to the higher-level automation systems. In this way, a product genealogy will be created, which is the basis for digitalizing the complete production process and – through the use of artificial intelligence – will be setting new benchmarks in digitalization. Thanks to the first green PPA (Power Purchase Agreement) signed by the Italian steel company, the whole power supply of the new rolling mill will be covered by renewable energy.

The mill will be equipped with the latest generation of CCS® (Compact Cartridge Stand) tandem mill stands, featuring strengthened guide holders, a new chock design and the new Technological Control System TCS plus. "By implement-

"We are proud to support Duferco in becoming the benchmark for efficient production of sections in Europe."

Marco Asquini, CEO of SMS group S.p.A

ing TCS plus, Duferco will have additional productivity reserves and will also be able to minimize the hydraulic power consumption. Moreover, the new tandem mill will be supplied fully prepared for thermo-mechanical low-temperature rolling which will allow savings on valuable resources such as alloying elements. This is one of our contributions for a future orientation in steel production with the aim to produce cost-effectively with a smaller carbon footprint," says Thomas Maßmann, Executive Vice President Long Products at SMS group.

The laser-based PROgauge light section measuring device, including the SurfTec surface defect detection system from SMS, will enable Duferco to measure the sections inline and to detect and analyze surface defects that may occur during the rolling process.

The project is scheduled to be implemented during a period of only two years, with commissioning planned for the end of 2022. ♦



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SMS DataFactory As a basis for digitalization of the entire production process it combines the information from the product tracking system with all available data in the plant, from the sensor level up to the higher-level automation systems.

Heavy beam mill in operation

CHINA

For the largest beams ever produced in China Masteel puts heavy beam mill into service, thus enabling to serve new infrastructure projects.



At its Chinese Ma'anchan location, Maanshan Iron & Steel., Ltd. (Masteel) has started production of a new heavy beam mill supplied by SMS group. Masteel is therefore the only producer in China able to produce beams with web height dimensions of up to 1,100 millimeters and flange widths of 500 millimeters and flange thicknesses of up to 130 millimeters. The weight per meter of the heaviest beam produced on this plant is 1,377 kilograms.

The factory situated approximately 300 kilometers west of Shanghai is designed for an annual production of 800,000 tons and extends Masteel's production capacity by larger sections. This also includes a newly developed special section which could not yet be produced in a rolling process up to now. Consequently, previously necessary downstream process steps can be dispensed with – production output is increased and costs reduced. In addition, Masteel's new plant focuses on top product quality.

Real-time process control

Within the scope of this order, SMS group supplied the engineering and key components of the plant which includes among others the core of the plant, a CCS® (Compact Cartridge Stand) tandem rolling group with hydraulic adjustment system and fully automatic quick program change as well as a CRS® (Compact Roller Straightener) enabling simultaneous quick change of all straightening rolls by means of a shifting platform. Both the CCS® stands and the CRS® straightener are the largest of their kind in use worldwide. The scope of supply of SMS group also comprises a CCS® tandem control stand (TCS) allowing a process control in real time and ensuring automatic zeroing and setting of the rolling gap after a program change.

The successful completion and quick ramp-up of the plant was made possible through a close cooperation between Masteel and SMS group. The design capacity has been reached



The core of the plant: CCS® (Compact Cartridge Stand) tandem rolling group with hydraulic adjustment system and fully automatic quick program change.

and exceeded during the rampup phase. As a result, the FAC (Final Acceptance Certificate) was issued already within a short period of time. Both companies were able to rely on their long-standing partner at all times. Already since 1993, Masteel has been operating a heavy beam mill and since 2005 a CSP® (Compact Strip Production) plant from SMS group.

With the new heavy beam mill Masteel will manufacture products for bridge and building construction enabling the Chinese market to realize infrastructure projects. ♦

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QUALITY ENHANCEMENT AND TIME SAVINGS THANKS TO PROGAUGE

CHINA

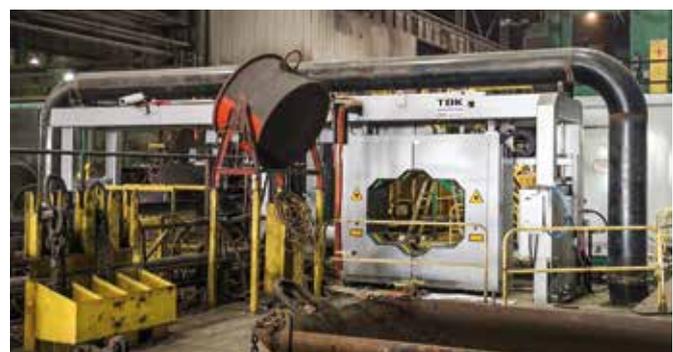
Maanshan Iron & Steel Co., Ltd. (Masteel) has placed an order with TBK Automation und Messtechnik GmbH, a company of SMS group, for the supply of a PROgauge laser-based light-section measuring system. Masteel is expanding its heavy section mill to include the option of measuring sections inline and detecting and analyzing surface defects that may occur during the rolling process.

The PROgauge system inclusive the SurfTec surface defect detection system will be installed within the heavy section mill between the CCS® (Compact Cartridge Stand) tandem mill group and the controlled cooling device. Placing the gauge in this position will enable Masteel to identify deviations in the section's dimensions as well as surface defects in the ongoing production process – while the section is still between 800 and 1,100 degrees Celsius hot. In this way, it will be possible to adjust parameters that influence the production as early as during the rolling process. This reduces startup times, downtimes, and scrap and production costs.

Masteel will use the TBK PROgauge 1300/600-8ES for the measurement of H-sections with web heights of up to 1,100 millimeters and flange widths of up to 500 millimeters, as well as for sheet piles with dimensions ranging from 600 down to 310 millimeters. These dimensions make the system a record-breaking gauge as it will be the largest laser-based light-section measuring system currently available on the world market.

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 **Further information**
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TBK is supplying the world's largest laser measuring device PROgauge to Masteel.



Hasçelik visiting the SMS group stand at METEC 2019. In the front, from left to right: Viktor Härter, SMS group; Naci Faydasıçok, Hasçelik; Falk RöBeler, SMS group; Michael Süs, SMS group.

Each process step enhanced

TURKEY

Hasçelik banks on SMS group's experience and orders one of the most powerful combined drawing lines for bar steel.

Hasçelik San. Ve Tic. A.Ş., based in Gebze, Kocaeli, and operator of the highest production capacities for bright steel bars in Turkey, has placed an order with SMS group for a state-of-the-art combined drawing line (CDL) KZ-RP IIIB/25 to expand both its production range and capacity. The new drawing line, based on the proven Schumag design – with its bar steel processing machines Schumag merged into SMS group in 2008 – comes with optimized features and new developments along the entire process chain.

The SMS group scope of supply includes a coil preparation unit with double coiler, a two-carriage drawing machine, a two-roll straightener, a chamfering machine and the entire electrical and automation system.

With this drawing line, the Turkish company, which has been combined under the roof of Faydasıçok Holding since March 2017, is expanding its production range to include round bars from bar to bar and from coil to bar between 19 and 42 millimeters. In addition, the company will be able to

produce hexagons, squares and other sections. The plant will be designed for a maximum drawing force of 250 kN, a maximum speed of 80 meters per minute and a bar length of 2.5 to 6.5 meters. Hasçelik, present in Europe with several sales offices and warehouses, has an overall product portfolio that enables the company to produce drawn bars of up to 100 millimeters, and peeled and ground bars of up to 160 millimeters in diameter.

Commissioning of the drawing line is scheduled for summer 2021

"We decided in favor of the combined drawing line from SMS group, as it is one of the world's most powerful lines for this diameter range. We bank on an integrated systems supplier who not only delivers the equipment, but also supports us in our work with their technical service," says Naci Faydasıçok, Chairman of the Board at Hasçelik San. Ve Tic. A.Ş.

"Hasçelik will benefit from the increased quality, safety, maintainability and process transparency of the line, as we have introduced significant improvements and further developments in each individual process step," says Falk RöBeler, Vice President Bright Steel Plants and Finishing Lines at SMS group.

Depending on the product mix, the new line enables Hasçelik to achieve a productivity increase of 10 up to 20 percent compared to a conventional drawing line operating at the same production speed. ♦



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The eight-stand sizing section of Bornay's tube welding line from SMS group.

Portfolio for mechanical steel tubes expanded

SPAIN

Bornay commissions high-precision tube welding plant from SMS group to expand its portfolio.

Bornay SL (Bornay), with its head office in the Spanish town of Ibi, has successfully commissioned an HF (High Frequency) RD 40 tube welding line. The production facility in the Spanish Alicante region has been producing welded steel tubes for various sectors since 1965, including the automotive industry, the furniture industry, the agricultural sector and the renewable energies.

The new tube welding line enables Bornay to produce high-quality tubes with round, square or rectangular cross-sections and yield points of up to 1,200 MPa. Here, tubes with a diameter between 10 and 40 millimeters and a wall thickness of up to 4.5 millimeters can be produced. Tubes with square cross-sections are manufactured in dimensions of up to 30 x 30 millimeters and rectangular products in dimensions of up to 40 x 20 millimeters with wall thicknesses of max. 4.0 millimeters.

The products are used as precision tubes in the automotive industry, but also for furniture, agricultural applications and the structures for solar panel tracking systems. The manufacture of these tubes requires a high degree of precision, which is why Bornay has placed high demands on the new tube welding line right from the start. Thanks to the close cooperation between the two companies, the new line was successfully put into operation in spite of the difficult conditions resulting from the COVID-19 pandemic. ♦



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Hydromec complements SMS group

ITALY

Mechanical and hydraulic presses for hot forming of brass and aluminium parts from Hydromec have now become part of SMS group complementing the product portfolio in the forging press sector.

With the acquisition of the Italian company Hydromec S.r.l., SMS group is now expanding its product range in the forging press sector. Hydromec is a highly successful international player in the field of forging presses and ring rolling machines for steel, and will therefore strengthen the competitiveness of SMS group in these markets. Moreover, Hydromec has a long-term expertise in the hot forming sector of brass and aluminium.

Founded in 1980 by Francesco Meschini and along with three other associates, Hydromec entered the market with the innovative design of a closed-die forging press attracting new customers who immediately acknowledged the benefits of this press. Innovations in this field are continuously introduced and customers were impressed by the presses of the latest generation featuring highly advanced technological solutions. More than 500 units are installed worldwide and some customers even have several Hydromec machines in operation confirming long-term trust in the press maker. The typical products made with Hydromec presses are ball valves, gate valves, water meters and fittings for sanitary, heating and gas industries.

Hydromec mechanical presses are available in a range from 200-ton to 1,000-ton capacity, that can be equipped with one or more subpresses:

- HPE 4-ram horizontal forging subpress
- HPI adjustable 4-ram horizontal forging subpress
- HPM vertical+solid forging subpress
- HPV vertical bell-type forging subpress

Highly effective mechanical presses

The traditional HF model has already been on the market since 1980, while the design has been updated continuously over the years with the aim to have an always reliable and successful model available, maintaining the standard transmission with crankshaft.

Along with HF presses, the new HF-CDS press was designed and presented to the public in 2015, featuring brand-new technology, such as a new transmission system, a kinematic drive with clutch, a flywheel and a planetary reduction gear in only one unit.

Its progressive die cushion doubles the force of the die closing device ensuring high energy for deep-drawn components and flashless forgings.

Hydraulic presses for more sophisticated parts

When the market requests started to change and several companies began to think about differentiating their products with the intention to beat the strong competition in their field, the press makers have also been challenged. In 2012, Hydromec hydraulic presses of the HFH type were launched for the production of standard and special components of brass and aluminium.

Hydromec's long-time experiences in the hydraulic steel press sector were used to develop the new hydraulic system with high-level technological solutions adapted for the requirements of brass and aluminium forging.

Very huge and complex pieces can be forged with this new press, whereby forces and strokes of each ram can be



HF-CD press



HFH hydraulic press



HF-CDS press

programmed independently and electronically, increasing the types of shapes that can be produced and making flashless forging easier.

The right solution for any customer

The typical end-user for this market segment varies according to its production sector. Italian companies usually work with many contractors ordering both large and small lot sizes of forged parts. In this case, customers look for quick die changes and high production rates to respond timely to incoming orders.

Certainly, trends differ around the world: customers forge items also for their own production, whereby the quantity is proportional to the number of sold finished parts.

Consequently, turnkey plants may be offered in cooperation with renowned external suppliers to include stand-alone machines such as saws to cut bars in billets, billet graphite

coating systems or gas/induction furnaces for billet heating, which are directly connected to the press by means of a chain conveyor.

One last operation can be realized either by means of manual trimming presses or automatic lines with optical detection (both made by Hydromec) to eliminate burrs, should forging of flashless pieces be impossible due to shape or dimension.

These plants represent a useful complement of Hydromec to non-ferrous continuous casters of SMS group installed upstream of the forging process. Through the integration of Hydromec into the worldwide sales network of SMS group bringing together customer contacts in non-ferrous markets Hydromec will be able to expand its market position also in China and the Americas. ♦

Increased productivity in ring rolling

WORLDWIDE

During the rolling process, temperature losses can be counteracted with an induction heating system.

On a radial-axial ring rolling machine, a pierced piece of basic material (blank) is formed to a seamlessly rolled ring in a continuous rolling operation. The cross-section of the ring is reduced in its wall thickness and height. Consequently, the diameter is enlarged. The driven main roll and the mandrel from the radial roll pass, thereby reducing the wall thickness. Both driven axial rolls – the axial roll pass – serve to reduce the ring height.

During the rolling process, a ring centering device retains the rotating ring in a defined position. Rings with rectangular cross-section and profiled rings can be rolled for different applications. Depending on the application of the finished product, most varied materials are rolled on the ring rolling machines. This encompasses all common steel grades as well as titanium and nickel-base alloys, copper and aluminium alloys, etc.

Heat balance of the ring during the rolling process

During rolling operation, the ring slides over a table and is reduced in its cross-section by means of the above-described rolls. For the heat balance of the ring, forming heat

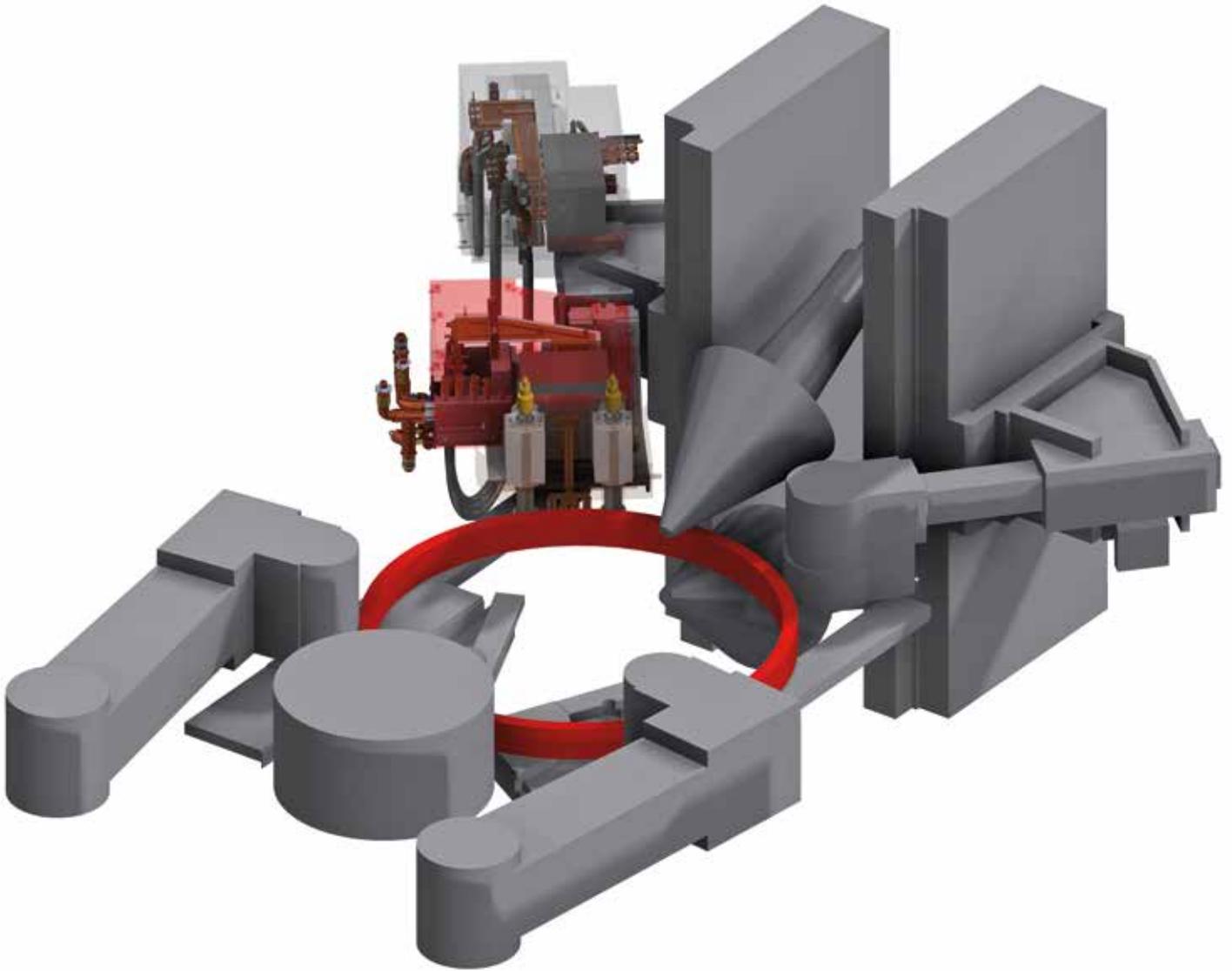
exists on the positive side and on the ring surface radiation plus convection exists on the loss side. At the contact points, heat is also withdrawn from the ring. The ring surface is also growing as the ring increases which in turn leads to higher heat losses.

Reheating without induction heating

Low forming temperatures result in higher process forces, poorer material flow and lower productivity when rolling is performed at full capacity of the ring rolling machines. This makes one or even several reheating operations necessary to ensure that a loss of quality is prevented when a minimum temperature is reached. For such a reheating step, the actual rolling process has to be interrupted, the machine is opened so that the ring can be removed and transported to a furnace. These interruptions lead to considerable logistical efforts and reduce the productivity of the plant.

Ring rolling with up-to-date induction heating

Temperature losses can be counteracted with an induction heating system. For that reason, an induction unit is installed on each controlled motion axis at one or several points of the ring rolling machine. The unit mainly comprises a conventional frequency converter (not included in the image), a condenser cabinet providing the required reactive power for inductor operation and a transformer unit with the inductor directly mounted on it. The transformer unit is connected with the condenser cabinet via air- and water-cooled cables providing electric adaptation of the induction voltage to the output voltage of the converter. The frequency converter operates in a frequency range between 4 and 10 kHz.



Advantages of inductive heating

During ring rolling the temperature level is increased which may particularly result in enhanced productivity of approx. 10 percent when larger rings are employed (with regard to plant size). The advantages arising from the fact that reheating operations can be dispensed with are even significantly greater, for example tool wear and loss of scale are decreased and maintenance measures are required less often.

Contact-free workpiece positioning

The challenge is to position the inductor closely to the workpiece (coupling distance) making sure that this is maintained throughout the entire process (ring increase, ring height, diameter). To do this, the transformer is electromotively supported on a flanged plate in a flexible and adjustable manner. The motion enables both a translational and a rotational movement of the transformer unit on the supporting arm. Consequently, the supporting arm has to move the inductor only to near the workpiece. A precise contactless positioning is then realized via optical sensors and motors facilitating the extension of the induction unit from the machine area for loading and unloading purposes. ♦

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Shandong Weiqiao Light Metal receives all-rounder extrusion press as complete package.

Profiles and tubes for future mobility

CHINA

Shandong Weiqiao Light Metal Co. Ltd., China, has commissioned SMS group with the supply of a 28-MN direct-indirect extrusion and tube press. With this investment in a multifunctional light metal extrusion press, the Chinese company enters the new business area for extruded aluminium products. The product spectrum will include both profiles and thin-walled tubes made of aluminium and aluminium alloys which are mainly employed in the automotive sector, especially in the production of electric vehicles. The annual capacity of the extrusion press is about 10,000 tons per annum.

"We are investing in an extrusion press fulfilling all our technological demands. Flexibility in production and high productivity provide a solid basis for the new business segment of our company. The extrusion press technology of SMS group is the most advanced of its kind and it is additionally eco-friendly," says Zhang Guo, Technical Project Manager at Shandong Weiqiao Light Metal.

The press is designed with a patented lamellar press frame providing a significantly more rigid and resistant construction. The highly precise linear guides used are virtually maintenance-free. With a servo drive technology for all auxiliary functions and the EcoDraulic concept, the press achieves a far more favorable energy balance.

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The HybrEx®40 press is the central element of the extrusion press line of UACJ Extrusion Nagoya Corporation.

Hybrid drive reduces energy consumption

JAPAN

UACJ Extrusion Nagoya Corporation, Japan, has issued the FAC (Final Acceptance Certificate) for a HybrEx®40 extrusion press line supplied by SMS group. With this investment, UACJ extends its extrusion capacity at the Japanese plant location in Nagoya. UACJ will use the new extrusion press line for the production of light-metal automotive components for renowned automobile manufacturers.

The core machine HybrEx®40 incorporated into the line is part of the new press generation of SMS group. Through the use of hybrid drive technology energy consumption can be reduced significantly compared to conventional extrusion presses. Moreover, the HybrEx® is characterized by its compact design thanks to an optimized hydraulic concept. The award-winning design of the press enclosure ensures that further safety barriers are no longer required. The HybrEx®40 extrusion press processes 10-inch aluminium billets with a maximum extrusion force of 40 MN and a speed of up to 21 millimeters per second. Apart from the HybrEx®40, the scope of supply of the extrusion press line includes an induction furnace plant (TEM-PRO Heater®) from IAS, a subsidiary of SMS group, and an up-to-date runout system including intensive profile cooling of OMAV, likewise a company of SMS group.

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First fully automated forging line for burrlessly forged pistons used in Chinese cars and trucks.

Fully automated forging line for pistons

CHINA

Anhui Anhuang Machinery Co. Ltd., headquartered in Anqing in the Chinese Anhui Province, has commissioned the supply of a fully automated closed-die forging line for engine pistons. Anhui Anhuang will be one of the first Chinese automotive suppliers in the massive forming sector capable of manufacturing car and truck pistons in a fully automatic manner. For SMS group, it will be the first reference of a closed-die forging line for pistons in China. The 2,500-ton forging line consists of a fully automated eccentric closed-die forging press of the MP 2500 series and an induction heating system ELO-FORGE L of SMS Elotherm, a company of SMS group, for the heating of forged blanks.

Thanks to a fully automated forging line, the efficiency of the entire process can be significantly improved. "The demand in China for automotive parts is growing continuously. With this investment in a complete forging line of SMS group, we are now able to react to increased market demands and assure high quality to our customers. The decisive arguments for a fully automatic plant were high availability in combination with higher output compared to other press vendors. In addition to that, SMS group has already several references in this sector and is also a system supplier – that convinced us," says Leming Huang, President of Anhui Anhuang Machinery.



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The die lubrication system with additively manufactured spray heads.

Closed-die forging line commissioned

CHINA

Chinese automotive supplier Ningbo Xusheng Auto Technology has issued the Final Acceptance Certificate to SMS group for the new, fully automatic closed-die forging line installed at the company's Ningbo location in the Chinese province of Zhejiang. The forging line supplied by SMS group consists of an MP 2500 eccentric forging press and, as a pre-forming unit, an automatic roll forging machine. The eccentric press operates with a maximum press force of 25 MN. The new line is used for the production of chassis components in aluminium, especially for electric vehicles. With support of a specific simulation software, SMS group cooperated with Ningbo Xusheng to jointly develop the technology and dies for the aluminium forging process. Excellent mechanical properties and a uniform microstructure of the aluminium forgings are indispensable requirements to guarantee the safety of mass-produced automobile chassis parts.

Specifically for Ningbo Xusheng, SMS group developed a function-optimized spray lubrication system. Three newly designed, 3D-printed spray heads markedly enhance the effectiveness and reliability of die lubrication. Thanks to the possibilities provided by 3D printing, the spray nozzles inside the spray head are arranged in a way that guarantees perfect lubrication of all die contours.

Read more
on AM spray
heads on the
following
pages.



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Lighter, faster and more effective

CHINA

Additively manufactured spray heads from SMS group are opening up a whole new range of possibilities in the field of massive forging.

A Chinese forming specialist, based in the province of Zhejiang, is successfully using die spray heads developed by SMS group employing the additive process. The tasks of spray heads in closed-die forging plants are cleaning, cooling, and coating.

The function-optimized design and 3D-printed die spray heads have resulted in tremendous improvements in die maintenance during the production of aluminium forgings. What convinced the customer were the performance and effectiveness of these innovative spray heads. The forging roll ARWS1A as pre-forming unit and the closed-die forging press MP2500 from SMS group forge chassis components for a well-known electric car manufacturer. The light, aluminium 3D-printed spray heads work without a hitch and convince with a very precise, first-class spray pattern. These excellent properties optimally support the fast cycle time of the process which is achieved by means of a specially designed automatic walking beam unit supplied by SMS group.

The decision to use the new type of spray heads here was mainly based on the low overall height of the 3D-printed variant, as conventional solutions would already have reached their limits. The new additively manufactured spray heads exhibit significant advantages over conventional spray heads.



Customizable spray pattern

The 3D-printed spray head can withstand pressures of up to 10 bar. Thanks to greater flexibility, the aerosol can be precisely adjusted and positioned when setting the spray mist. Owing to high pressure and optimized spray nozzle geometry, a larger quantity of spray fluid can also be applied, if necessary. The streamlined channels prevent a build-up of deposits. The nozzle passages are thus always clear.

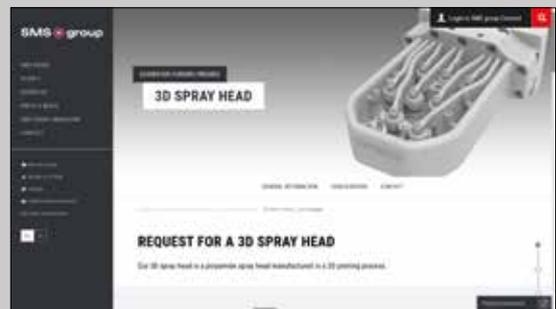
As with the plate-type spraying head, the principle of the externally mixing two-substance nozzle is also applied for these spray heads. This guarantees that there is a uniform droplet size and that no separation can take place. Not only that, the 3D-printed version also has the advantage that the outlet form can be customized.

A special feature of the spray heads in the Zhejiang plant is the first spraying head, which is responsible for the preliminary die. The nozzles are arranged at angles spraying diagonally upwards and downwards. Here, the angles are chosen in such a way that the spray cones precisely wet the engraving of the pre-form dies. Additive manufacturing and the function-optimized construction associated with it are what make this design possible. ◆

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INTEGRATED KNOWLEDGE

For the use in closed-die forging plants, SMS group is consistently working on advancing its 3D-printed spray head. Today, it is an advantage that the whole process chain of 3D-printing is reflected by SMS. The in-house powder atomization plant is an important part, which exclusively deals with function-optimized engineering. Thanks to integrated knowledge in all process stages within the additive process, more and more components are designed in a function-optimized manner. Already in 2019, SMS group won the German Design Award for a spray head of the same type.



Online configurator

SMS group provides an online form on its website that makes it very easy to request a standardized spray head, so you do not even need your own design.

Step by step, you define all the relevant parameters for the 3D spray head you need: the dimensions of the spray head and the number and coordinates of the spray points.



To get to the online configurator, simply scan the QR code on the left or visit:

www.sms-group.com/plants/all-plants/closed-die-forging-presses



NEW REQUIREMENTS
The coiler mandrels have been continuously advanced using the latest tools.

SMS group
Mandrel No. 400

Milestone – manufacture of coiler mandrel number 400

GERMANY

Coiler mandrels are the essential element of X-Roll® Uni^{PLUS} coilers and belong to the high-tech products in SMS group hot strip mills.

In October 2020, SMS group was able to deliver to the customer the 400th X-Roll® coiler mandrel manufactured in the Hilchenbach workshop. The development and manufacture of the X-Roll® coiler mandrels at SMS group can be traced back to the year 1967. Already at the end of the 1980s, the delivery of the 100th coiler mandrel took place followed by the 200th coiler mandrel leaving the Hilchenbach manufacturing center in the year 2000. The delivery of coiler mandrel number 300 took place in April 2008. Some of the coiler mandrels manufactured by SMS group have been in operation for more than 40 years, which is due to the extremely high development and manufacturing expertise.

Continuous development at the highest

Since 1980, SMS group has sold and commissioned around 215 X-Roll® coilers. Both the many years of experience and the comprehensive know-how of the company have been incorporated into the permanent and sophisticated advance-

ment of the coiler components. The first coiler mandrel developed and manufactured by SMS group already had a decisive function for the coiling quality: the re-expansion. Further milestones were the introduction of the mandrel support bearing and the continuous grease lubrication.

The ever-increasing market demands for high-strength hot strip with strengths of up to 1,400 megapascals together with increasing strip thicknesses and strip widths have resulted in particularly intensive development activities in recent years. For these new materials and dimensions, the coiler mandrel is exposed to extremely high forces and torques, especially during winding of initial wraps. The experts in the SMS group competence centers for design, development and manufacturing have continuously advanced the coiler mandrels on the basis of these new requirements using state-of-the-art tools. The coiling process is simulated in order to determine the exact forces and torques for dimensioning the components and thus to optimize the design and selection of the suitable materials for all components.

An essential milestone in this development work is the patented X-Roll® coiler mandrel of closed-type design. In recent years, SMS group has already manufactured 77 of these mandrels, which are designed for coiling tube steels of strength class API-X80 with strip thicknesses of up to 25.4 millimeters once again featuring extended service lives.

Inspection, maintenance and repair services

In addition to selling new coiler mandrels, SMS group puts its focus on regular and demanding inspection, maintenance and repair services.

Christoph Bald, Head of Service Workshop at SMS group: "We are also optimally equipped for third-party makes and possess knowledge and skills on successful repair accumulated over many years in our manufacturing center. Through regular inspection and maintenance, the service life of the core component X-Roll® coiler mandrels can be considerably extended, while ensuring the highest coiling qualities."

All repairs are customized and carried out in the specially equipped repair centers of SMS group at regular intervals. In coordination with the design department, older mandrels and third-party makes can be upgraded to the latest state of the art.

The scope at the SMS manufacturing center in Hilchenbach comprises the inspection, maintenance and repair of core components at the highest technical and technological level. These include e.g. X-Roll® coiler mandrels, AGC/HGC cylinders, CVC® shifting and bending systems, spindles, gear units, oil film bearings, valve stands for HP/LP hydraulic systems, mechanical adjustment systems, Sermes adjustment systems, shears and chocks.



Our customers demand 100-percent plant availability together with a long service life of the core components. For this reason, the X-Roll® coiler mandrels are designed and manufactured at SMS group in Hilchenbach and subjected to a workshop test in the manufacturing center specially equipped for this purpose."

Marc Hoffmann, Executive Vice President
Flat Products, SMS group

Digitalization

The latest generation of the SMS group coiler systems can be equipped with intelligent components, sensors and corresponding software solutions from SMS digital, such as the Process Condition Analyzer (PCA) or Genius CM®. "This way, the coiling process is permanently checked, the plant condition is monitored and corresponding recommendations are provided to the customer's operating and maintenance team," says Wolfgang Fuchs, Head of Hot and Heavy Plate Rolling Mills Product Unit, summarizing the possibilities of digitalization for coiler systems. ♦



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Disruptive and practicable

DUBAI

BOXBAY system completes first 60,000 moves.

A major milestone set by the inventors of a new technology has been achieved: BOXBAY, an innovative high-bay storage system designed to boost the efficiency of container logistics and installed in the port of Jebel Ali in Dubai, has successfully accomplished its first 60,000 container moves. "With this milestone, we have reached a very important point on our ambitious path," says Sultan Ahmed Bin Sulayem, Group Chairman and CEO of DP World. International port operator DP World, based in Dubai, and SMS group had formed BOXBAY as a Joint Venture to advance a new high-bay container storage technology of the same name. "We have been making great progress in setting up the system in Terminal 4," emphasizes Mathias Dobner, CEO of BOXBAY. Usually, when setting up a new plant or system, you first have to run practical tests to find out where further optimization will be needed, especially, when the system you are building is the very first of its type, as is the case with BOXBAY. "We are using the test phase for detail improvements. To this end, we are acquiring and evaluating comprehensive plant data," explains Marius Schnittert, Head of Process Automation of SMS group company AMOVA GmbH. "This enables us to optimize the throughput rates and cycle times, and measure fully automatically the progress we make - and to make this progress visible."

An automated system

BOXBAY has set out to revolutionize global supply chains. The patented HBS (High Bay Store) is an automated system



DP WORLD

DP World is active in a wide range of business areas, from maritime and inland terminals to marine services, logistics and value-added services, as well as technology-driven customer solutions. Container transshipment operations is the company's core business. This business segment accounts for more than 50 percent of DP World's turnover. With 150 branches in more than 45 countries on six continents, DP World is present in all growth markets of the world. The company has more than 46,000 employees at locations in 120 countries.

capable of stacking containers up to eleven stories high. It provides three times the capacity of a conventional container yard. This means that, in the future, the footprint of terminals can be up to 70 percent smaller. In addition, BOXBAY stores all containers in separate compartments, enabling each one to be accessed individually. Compared to the typical way of stacking containers on top of one another, this reduces the share of "non-productive" moves dramatically. With the conventional storage method, these moves may account for up to 60 percent of the logistics effort in a port. BOXBAY is designed to be fully electrified and can be powered by solar panels on its roof.



The concept is scalable to virtually any number of slots. For the large-scale facilities being planned we are talking about 30,000 to 40,000 slots. In its current stage, the facility in Dubai includes 792 slots, or 1,276 TEU. Originally, SMS group company AMOVA had developed this storage technology for the handling of steel and aluminium coils weighing up to 50 tons. These high-bay coil stores are up to 50 meters tall. The assembly of the first ever High Bay Store for containers was completed in July 2020. Since then, the system has been in trial runs. It will be presented to the public during EXPO2020 in October 2021. "Seeing the new system being set up in just one year was really impressive. Safety of the teams, of course, has always had top priority. We didn't have a single accident during the complete assembly and installation phase," says Klaus Poeggeler, General Site Manager of SMS group company AMOVA GmbH. ◆

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 **Further information**
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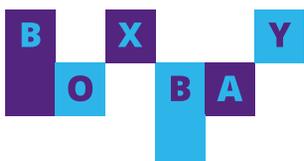
THE FUTURE IS VERTICAL

REVOLUTIONIZING CONTAINER STORAGE IN PORTS

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- Lower operating and maintenance costs
- Excellent eco-balance

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