SIEMENS
VAI

Issue 02 | January 2013

Metals Magazine

Innovation and technology for the metals industry

Keeping pace with changes

Life-cycle management in steel plants

IT provides a view of the big picture

Steel production goes digital

New technology for pellet production

Siemens VAI develops pelletizing plants

SIEMENS
VAI

Dry-type dedusting system for LD (BOF) converter

Increased energy efficiency meets improved emission control

www.siemens.com/metals

Is it possible to protect the environment and save money at the same time? For steel companies, it is more than ever a must. This is why we have brought the next level in efficiency to the oxygen steelmaking process. Experience the currently most effective environmental solution available for emission control, energy recovery and dust recycling: the dry-type dedusting system for the LD (BOF) converter.

This technology goes far beyond the boundaries of a wet type dedusting application: Reduce clean-gas dust contents to unprecedented levels of 30 mg/Nm³ or below.

Reduce energy consumption up to 50% compared to wet-type technology. Reduce operation costs thanks to an improved low pressure loss. Free yourself from the need for a waste water and sludge treatment.

The worldwide proven system stands out through a compact design and is available as a complete technology package for both new and existing plants.

Meet strictest regulations while saving costs sustainably – with the most effective dust recycling solution for the LD (BOF) process.

Answers for industry.

E10001-M1-Z48-V1-7600

Dear Reader,

Long-term investment security, flexible and innovative plant concepts, IT intelligence and automation in the steel plant. These are the topics that come up when I discuss the future of steel production with customers. The way market conditions on the international steel markets are changing at an ever-faster pace means that many steel producers are having to rethink their business and technology strategy.

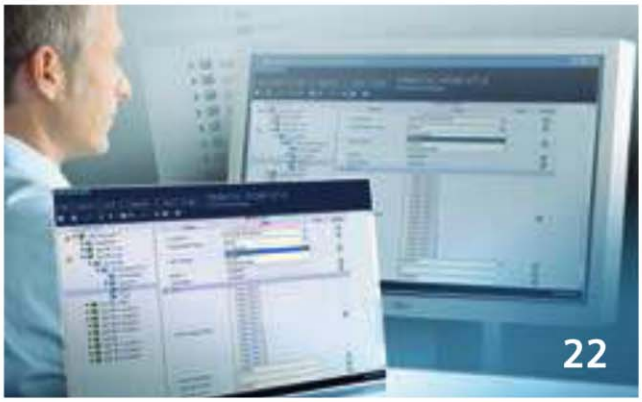
Whereas in the past the quality and price of raw materials could be calculated for the long term, and sales volumes could be predicted for the midterm, today both the input and output parameters of the international steel business are marked by a high degree of volatility. The result for steel manufacturers is that, from the first day of operating a new plant, they have to think about how they will keep it competitive in technological and economic terms. And these are plants that are expected to operate for 40 years or more. Life-cycle management – a global view of technical and business planning, management and control of a steel plant over its entire lifetime – is the key to long-term success in steel production.

For Siemens VAI Metals Technologies, this development means we are concentrating on taking an increasingly holistic approach to the requirements of our customers. Our ambition is to go from being a plant manufacturer to a life-cycle provider. Whereas conversations with our customers used to revolve around the technical requirements and specifications in individual areas of the steel plant, today the discussions are much broader. What comprehensive automation and IT solutions will enable us to flexibly switch between producing various different steel grades at our plant, depending on the current market demand? What preventive services do we need to constantly keep our plant efficiency at the highest level and minimize downtimes? What solutions will allow us to practice active energy and environmental management at our plant, thus cutting operating costs and fulfilling constantly increasing environmental requirements? Our goal is to answer these questions, to develop groundbreaking strategies and to implement innovative technical solutions in partnership with our customers. When it comes to life-cycle strategies in the steel business, close and long-term cooperation between the steel manufacturer and technology provider – ideally over the entire plant life cycle – is the recipe for mutual success.

Yours sincerely,

Werner Auer
CEO Siemens VAI Metals Technologies GmbH

Contents



Focus

Technology

Keeping pace with changes

Steel plants run for 40 years and more. Technological modernization packages, automation platforms and IT applications enable processes and plant components to be adjusted flexibly so that they are in line with current entrepreneurial objectives. Plants can thereby be kept fit to deal with changing and constantly rising market demands.

12

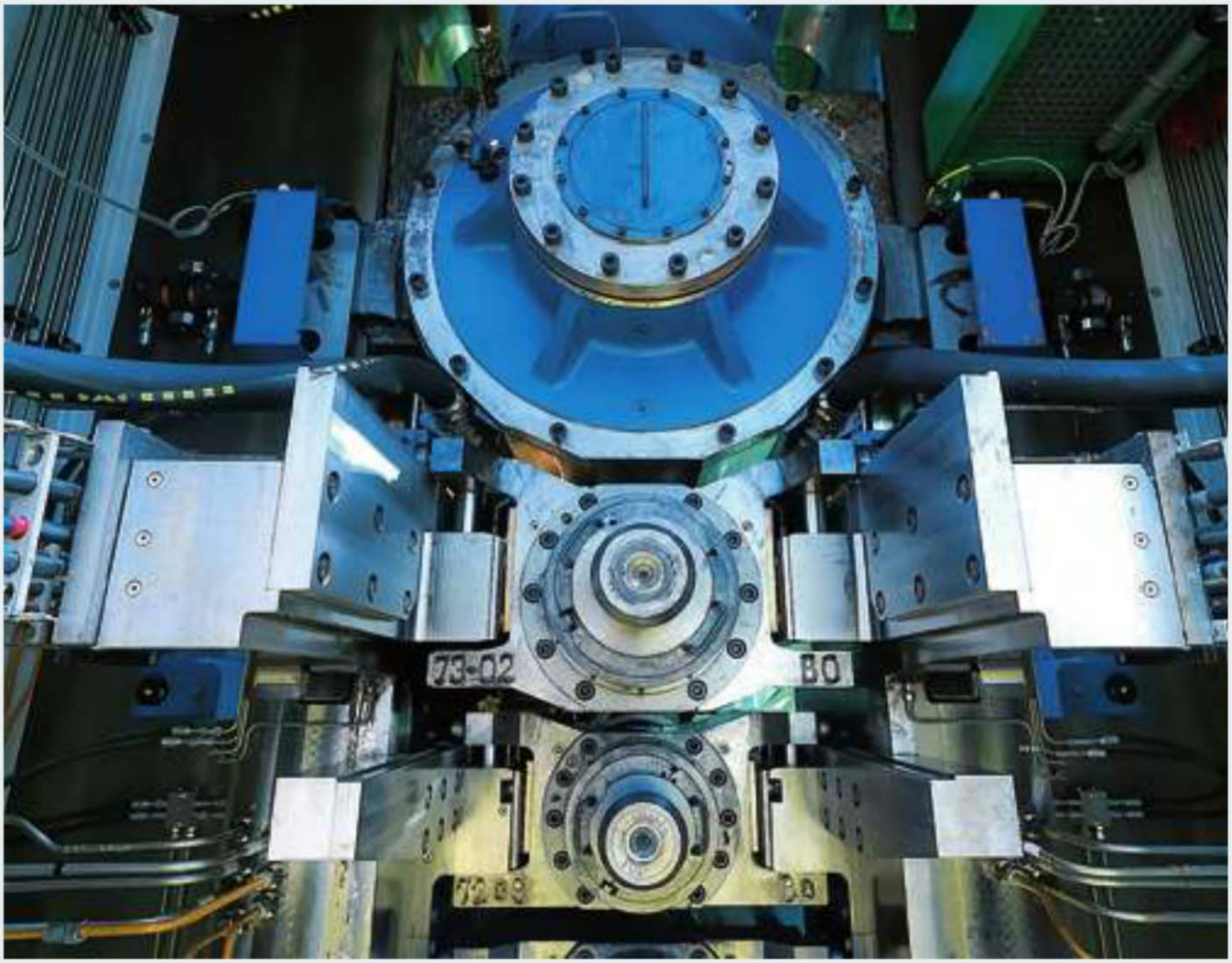
Innovation

People

China ▪ VAMA

New combined pickling line for China's automobile industry

Valin ArcelorMittal Automotive Steel Co., Ltd. (VAMA) ordered a combined pickling line and tandem cold-rolling mill from Siemens VAI Metals Technologies.



A cold rolling mill with a six-high rolling stand from Siemens

The line is part of a new cold-rolling complex being erected at Loudi in the Chinese province of Hunan. After the first stage of construction, the line will produce 1.5 million tons of cold-rolled strip per year, primarily for the automotive industry. The order volume is within the mid-double-digit million euro range. Start-up of the new pickling line and tandem cold-rolling mill is scheduled for mid-2014.

Siemens is engineering and supplying the entire mechanical and electrical equipment, including auxiliary equipment such as the hydraulic, pneumatic and safety systems, for the combined pickling line and tandem cold-rolling mill of VAMA in Loudi. The cold-rolling and pickling line are being equipped with a common and consistent automation system consisting of basic (Level 1) and process (Level 2) automation and special process models. This will allow a high degree of availability and yield to be achieved while maintaining the same level of prod-

uct quality. All installed systems and components are part of the Siroll CM system developed especially for cold-rolling mills. Siemens is also responsible for monitoring the installation and start-up activities of the pickling line tandem cold mill.

The tandem mill consists of four six-high rolling stands with an installed power rating of 7,000 kW per stand. The maximum roll force is 35,000 kN, making it possible to roll especially high-strength steels within narrow tolerances. SmartCrown rolls, special actuators and control systems ensure high accuracy with the specified flatness of the final product. The strip entry thickness lies between 1.8 and 6.0 mm, and the final thickness ranges between 0.5 and 2.5 mm. Strip widths range between 900 and 1,890 mm. The maximum rolling speed reaches 1,400 m/min. A wide range of steels can be processed in the line, including mild, high-strength, low-alloyed, IF, DP, TRIP and bake-hardening (BH) grades. Even high-strength steels with tensile strengths of up to 1,200 N/mm² can be processed in the line.

The plant in Loudi delivers high-quality sheet to the automobile industry.

Valin ArcelorMittal Automotive Co, Ltd. (VAMA) was founded in September of 2010 and is a joint venture company of ArcelorMittal and the Chinese companies Valin Iron & Steel Group Co., Ltd. and Hunan Valin Iron & Steel Co., Ltd. The production plant in Loudi will supply high-quality sheets to the Chinese automotive industry. In its initial construction stage, the new cold-rolling mill is designed for an annual production capacity of 1.5 million tons of steel strip and can be expanded to produce an annual volume of 2 million tons.

Montpelier, USA

Innovative drive system for SSAB

Siemens supplied the SSAB Americas' plate and steckel mill in Montpelier, Iowa, with two new Sinamics SM150 drive systems and synchronous motors. The new drive systems replace the existing equipment at the mill. "In addition to replacing obsolete parts related to the cycloconverter, SSAB wanted a more reliable motor and to reduce maintenance costs associated with the existing equipment," said John Powell, SSAB facilities engineer responsible for electrical and utilities installations. "For this reason we decided to go with the Siemens solution." The new Siemens drive system includes innovative software tools, including remote access diagnostic features, which significantly facilitate maintenance and documentation procedures. As a result of the modernization, power on the mill stands increases from 19 to 21 MW.

Karnataka, India

BMM Ispat orders new electrical steelworks

The Indian steelmaker BMM Ispat Ltd. ordered the core systems for an electrical steel plant from Siemens VAI Metals Technologies, including an electric arc furnace specially designed for combined charging of hot metal and direct-reduced iron. The steelmaking plant is part of a new integrated production complex in Hospet, in the Indian state of Karnataka. Operation is scheduled to start at the end of 2013. At the beginning of the year, BMM Ispat ordered a flexible bar mill from Siemens for the same production site. BMM Ispat Ltd., the second-largest steelmaker in Karnataka, is currently expanding its production capacity at the Hospet site by 2 million tons per year. At the new electrical steelworks, Siemens is engineering and supplying the mechanical and electrical equipment for a new electric arc furnace with a tapping weight of 110 tons, a 110-ton ladle furnace, a vacuum degassing plant, and the alloying and additive systems. The electric arc furnace is specially designed for the combined charging of direct-reduced iron (DRI) and hot metal.

Linz, Austria

voestalpine improves cast steel

The voestalpine Giesserei Linz GmbH, part of voestalpine, ordered a 50-ton vacuum oxygen decarburization (VOD) plant from Siemens. With this order the Austrian company is supplementing its facilities for secondary metallurgical processing of cast steels for demanding applications in the energy and the machine-building industries. Siemens VAI Metals Technologies will handle the engineering and will supply all core components for the new vacuum decarburization facility. As one of the first VOD systems in the world, the plant in Linz will use a combination of electrically driven mechanical vacuum pumps to create the vacuum. This includes Roots blowers and screw-type »

» compressors. In contrast to the conventional steam ejector pumps used in secondary metallurgy, these pumps do not require any process steam. The new vacuum decarburization plant completes the secondary metallurgical processing options of the voestalpine foundry in Linz.

Sichuan, China

Higher capacity at Tiancheng Stainless

A consortium led by Siemens VAI Metals Technologies will deliver Steel Products Co., Ltd. (TCSS) with an annealing and pickling line for its Guanghan works. The plant will have an annual capacity of 240,000 tons of cold strip, and it is scheduled to come into production at the end of 2013. The coupled annealing and pickling line will be constructed at the TCSS Guanghan location in the Sichuan province. As leader of the consortium, Siemens will be responsible for project

management as well as for supervision of installation and commissioning. The scope of delivery includes a two-high skin-pass mill including installations to bend the work rolls, a roll polishing system and a strip-degreasing unit. Siemens China with its local partner will be responsible for the mechanical and electrical equipment. The annealing furnace and the pickling section will be supplied by European consortium partners. The integrated automation will be based on Siroll PL, a solution concept developed by Siemens specifically for strip processing lines.

Raahe, Finnland

Less dust at Ruukki Metals Oy

Finnish steelmaker Ruukki Metals Oy is aiming to drastically reduce dust emissions with the installation of a new secondary dedusting system at its location in Raahe. Siemens VAI Metals Technologies is supplying the equipment that will reduce emissions from the steelworks and mixer bay to well below statutory limits. The new system is scheduled to come into operation at the end of 2013. The new secondary dedusting system in the Ruukki plant in Raahe is designed for a total extraction capacity of 1.7 million m^3 per hour. The residual dust content of the filtered offgases will be less than 5 mg/m^3. Siemens is handling the basic engineering of the entire dedusting system and supplying key components for the mechanical, electrical and automation systems.

Brazil ▪ Maintenance at ArcelorMittal Tubarão

Better performance

With a contract to maintain continuous slab caster No. 3 at ArcelorMittal Tubarão for the next five years, Siemens is expanding its service business in Brazil.

Payment will be based on plant performance figures, such as the production volume and the guaranteed service lives of casting molds and segments. The ArcelorMittal Tubarão production complex in Serra, in the state of Espírito Santo, has an installed capacity of 7.5 million tons per annum, which makes it the largest steelworks in Brazil. Continuous slab caster No. 3 is designed for an annual production

Caster maintenance in the Siemens MT workshop at ArcelorMittal Tubarão

Châtelet, Belgium

Aperam gets more power

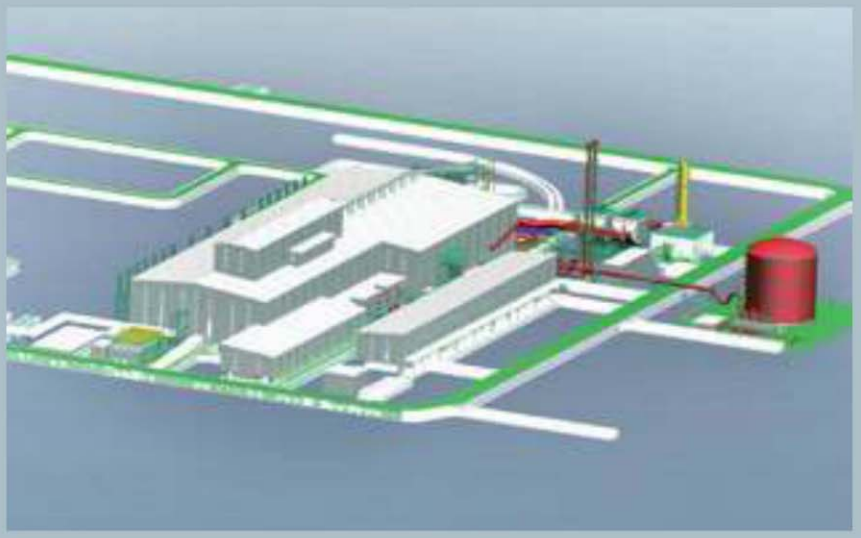
New main drives from Siemens bring more power into Aperam's hot-rolling mill in Châtelet, Belgium. In the framework of the modernization, the existing DC main drives of the finishing mill will be replaced with more powerful AC systems. The project is part of comprehensive modernization plans within Aperam's Leadership JourneyTM to reduce costs and improve profitability. The drives will be modernized in seven stages during scheduled annual maintenance shutdowns, with completion expected by the end of 2019. The first conversion work is planned for mid-2013. A total of seven stands are to be modernized at the finishing mill of Aperam's hot rolling mill. Siemens will supply the motors, converters and transformers, and the company will handle installation supervision, commissioning »

of 3 million tons, and has been in operation since July 2007. The plant can cast slabs with a width of up to 2.325 mm, which is wider than on any other plant in the country. Siemens will be responsible for maintaining the casting molds and segments, reconditioning the rolls in its own workshop in Serra, and for managing spare parts. The mold plates will be nickel-plated in the Siemens workshops in Volta Redonda and Santa Cruz, both in the neighboring state of Rio de Janeiro. Additional technical improvements to the continuous casting plant will lengthen its service life and increase its reliability. For example, rugged, internally cooled EcoStar rolls will be installed in the horizontal section of the caster.

India ▪ Mining company

NMDC to produce steel

A consortium led by Siemens received an order from National Mineral Development Corporation Limited (NMDC) for the supply of a complete LD (BOF) steelmaking plant. The order volume for the consortium amounts to approximately €290 million.



Computer-animated representation of NMDC's new LD (BOF) steelmaking plant

The turnkey steelworks is being built in Nagarnar, in the Indian state of Chhattisgarh. The project is part of an integrated production complex with an annual capacity of approximately 3 million tons of steel. The project is scheduled for completion by mid-2015. NMDC had already ordered a sintering plant from Siemens for the Nagarnar project site. The integrated steelmaking plant of NMDC in Nagarnar is part of a national program to increase the steel production capacity in India. Siemens will be in charge of the design and the turnkey supply of the steel plant, including two LD (BOF) converters, two 175-ton desulfurization plants (HMDS), two ladle furnaces (LF), and an RH degassing plant. The turnkey project scope of supply also includes the material handling systems, the primary and secondary dedusting systems, a gas recovery plant and a water treatment plant.

Siemens is leading the project in collaboration with consortium members SEW Infrastructure Ltd. and Mukand Engineers Ltd., who will be responsible for general building operations, the steel structures and plant erection.

Siemens will supply the complete basic (Level 1) and process automation (Level 2). The installation of state-of-the-art automation and process technology will allow NMDC to produce high-quality steel at low specific raw material and energy consumption. This includes high-strength, low-carbon steels, pipeline grades and steel for the automotive industry. At the same time, the plant will comply with Indian as well as European environmental standards. NMDC is India's largest manufacturer and exporter of iron ore. The state-owned company mines approximately 30 million tons of ore each year at locations throughout India.

China ▪ Jiangsu Shagang

More steel from Zhangjiagang

Zhangjiagang Hongchang Plate Co. Ltd., a Chinese steelmaker and part of the Jiangsu-Shagang Group, has ordered from Siemens two twin-ladle furnaces for its new converter steelworks.

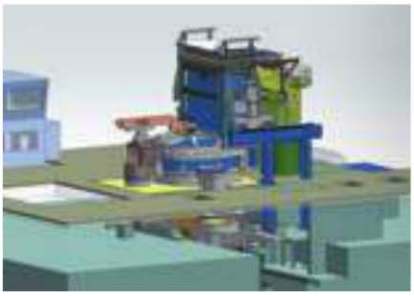
Both secondary metallurgical facilities are scheduled for commissioning in the spring of 2013. Jiangsu Shagang has had three identical Siemens ladle furnaces in operation since 2007. Each of the two twin-ladle furnaces has a capacity of 180 tons, and will be installed in the new Zhangjiagang Hongchang converter steelworks in the city of Zhangjiagang, in Jiangsu province. Siemens is supplying key mechanical and electrical components, including current conducting electrode arms together with the high-current busbar system and hydraulic system. Level 2 process models will ensure that the furnaces run efficiently. Siemens is also responsible for the engineering and accessories, and will provide support services for their installation and commissioning. Zhangjiagang Hongchang Plate Co. Ltd. is a subsidiary of the Jiangsu Shagang Group. With an annual production of some 30 million tons of raw steel, it is the largest private-sector steelmaker in China.

Twin-ladle furnace from Siemens at the Zhangjiagang Hongchang Plate Co. works in China

» and training. For the first time, 12 MW compact machines will be installed in all stands. Adapting the existing structural environment presents an exceptional challenge, especially with regard to the existing different motor foundations.

Singapore, NatSteel

Electric arc furnace saves energy



Siemens is modernizing the finger-shaft electric arc furnace in NatSteel's Singapore works with the goal to increase productivity and reduce the specific power consumption. The project involves installing a new FAST (furnace advanced slag-free tapping) system, renewing the furnace shaft and the lower shell, and updating the automation of the arc and ladle furnace. Commissioning is planned for March 2013. Siemens supplied the 80-ton finger-shaft furnace currently run by NatSteel in Singapore.

The furnace has a round bottom tap and a maximum input power of 56 MVA. This furnace is already achieving consumption figures of less than 290 kWh per ton of steel, which makes it one of the most efficient furnaces in the world. In order to increase the productivity of the furnace and even further reduce the specific energy requirement, Siemens will install new mechanical equipment based on the Simetal EAF Quantum solution platform specially developed for electric arc furnaces, and new automation equipment. The main feature of the furnace modernization will be the installation of the FAST system, as well as a new anode. The lower shell of the furnace will also be adapted, and the opportunity will be taken to automate the plugging of the tap hole.

The FAST system helps to reduce the tap-to-tap time, and so increase productivity by around 6%. At the same time, the specific energy input falls by some 5 kWh per ton.

Camin, Italy

Blooming mill lowers costs at Acciaierie Venete

A modernized blooming mill will help Italian steel producer Acciaierie Venete S.p.A. sink costs at its Camin plant. The project is aimed at improving the quality of blooms with the option of entirely or partly dispensing with downstream processing steps. To this end, a new blooming stand including ancillary systems will be constructed and integrated into the existing installations. The modernized blooming mill is scheduled to commence operation at the start of 2014. Acciaierie Venete, a private manufacturer of rods and profiles made of carbon and high-grade steels, has several production facilities in Italy. The company's headquarters is in Camin, in the province of Padua. Acciaierie Venete produces around 1.5 million tons of steel every year. The new blooming mill at the Camin steelworks will enable greater reduction of cross-sections throughout the rolling process. This will improve the metallurgical properties of end products. As a result, additional processing steps such as forging can be dispensed with either in whole or in part. This means that although the specific conversion costs are lower in total, steel grades as required in particular by the automobile industry or manufacturers of wind turbines can still be produced.

IJmuiden, the Netherlands ▪ Hot rolling

Tata improves production

Siemens upgraded and modernized the coiler at the hot-rolling mill of Tata Steel in IJmuiden. Production quality was achieved right from the first coil.

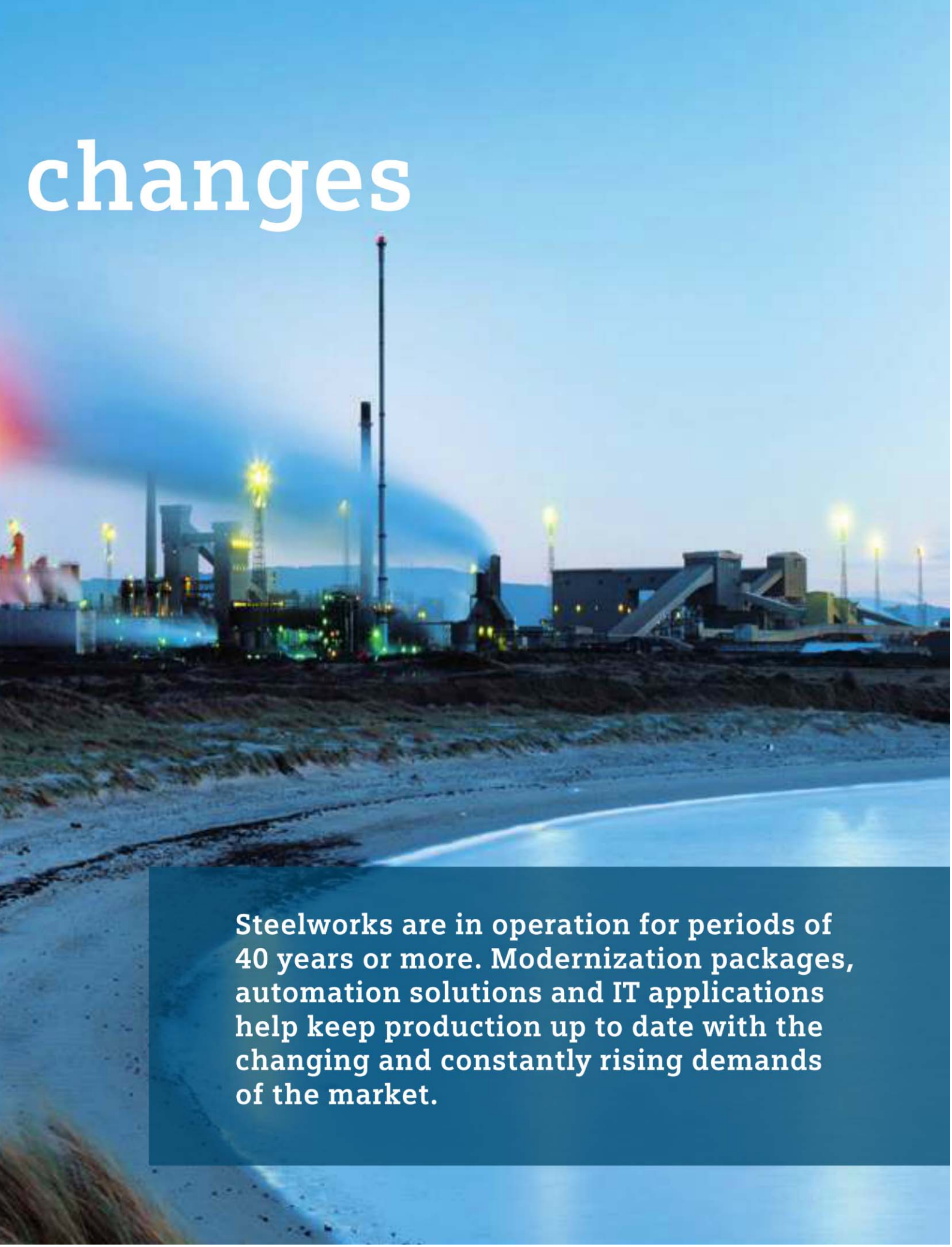
Coiler installed by Siemens at another location but comparable to the one in the hot-rolled strip mill of Tata Steel Europe in IJmuiden, the Netherlands

Siemens VAI Metals Technologies completed the modernization and upgrade of Coiler 3 in the hot-rolling mill of Tata Steel in IJmuiden, Netherlands. The aim of this project was to produce state-of-the-art high-strength steel qualities. The power of the drive system and coiler motors was increased, and state-of-the-art technology was integrated into the existing automation systems. After thorough testing of all systems during production, the first strip was coiled in end-customer quality. The entire Coiler 3 installation has been operating at very high quality and availability levels ever since. The multidiscipline upgrade and modernization project of Coiler 3 at Tata Steel at the IJmuiden site in the Netherlands was executed by Siemens as general contractor in the very short period of only nine months. The final switchover was executed without any delay in parallel with several separate mechanical changes within the annual 100-hour mill maintenance downtime. At its site in IJmuiden, Tata Steel operates a hot-rolled strip mill with an annual production capacity of 5 million tons with thicknesses ranging between 1.47 and 25 mm. Siemens supplied the complete drive and motor system for the modernization of Coiler 3. The project included the supply of the motors and drive electronics as well as their integration into the existing Siroll HM Siemens automation system. The components include a synchronous drive for the coiler boom, induction drives, and DC link converters based on Sinamics S120. Simatic TDC is the basis for the expanded automation system, and Simatic WinCC will be used for the human-machine interface. Siemens is also responsible for the basic and detailed engineering, installation and commissioning of the new drive system. The torque of the coiler was increased by up to 20% with the help of the new drive system so that the hot-strip mill can handle higher-strength steel grades that require higher bending torques during winding.

Life-cycle Partnership

Keeping pace with

changes



Steelworks are in operation for periods of 40 years or more. Modernization packages, automation solutions and IT applications help keep production up to date with the changing and constantly rising demands of the market.

Long-term partnerships between plant operators and Siemens help both parties to keep steel production at the forefront of technology while setting new standards in steel production. Werner Auer, CEO of Siemens VAI Metals Technologies: "Only in partnership can we develop and implement solutions that will keep a plant and its production competitive over its entire life cycle."

Steel manufacturers will have to react more flexibly to new market developments and customer requirements in the future. Customers will manufacture new types of steel at their plants and make products according to specific orders while simultaneously reducing their costs and fulfilling increasingly strict environmental requirements. "The transition from a manufacturer's market to a buyer's market will amplify this trend and set new global benchmarks for steel production," predicts Auer. The plants that now produce commodity steel grades will soon be manufacturing high-quality steels. Whether it comes down to new steel products, a broader product portfolio, more flexible use of raw material or lower energy consumption: "All steel manufacturers need a sustainable innovation strategy to maintain their production and investment," says Auer. "They need a partner like Siemens to support them in keeping plants in shape and profitable for 40 years or more."

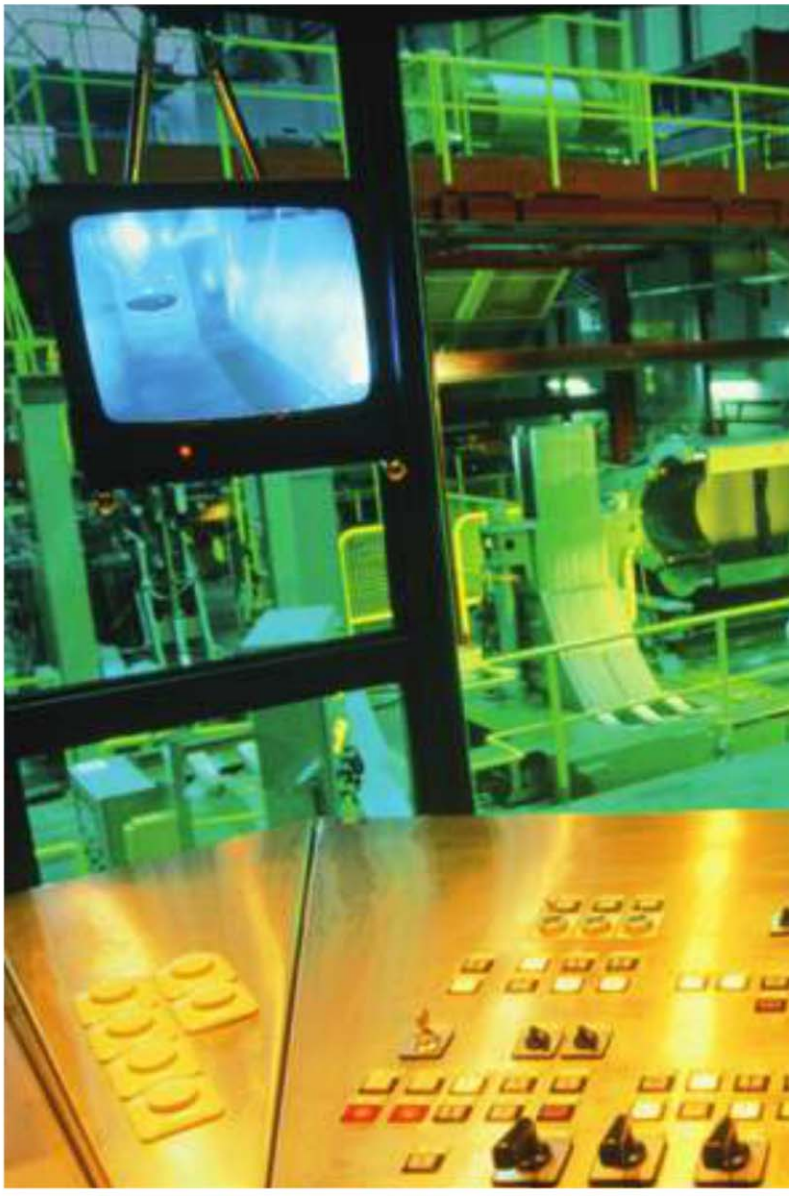
Changes in demand call for new standards in steel production.

In countries such as China and India, production capacities have been increased in recent years with the primary aim of securing infrastructure expansion with commodity steel. Auer observes "a trend of further development of existing plants to produce higher-quality products." Few new steel plants will be constructed in the coming years. At the same time, competitive pressure will increase as a result of overcapacity. As a result, Auer observes that steel companies have started to make investments to modernize and upgrade their production facilities. With these modernization solutions they can improve the quality of their products and production processes. Not only in China do companies want to differentiate themselves in the market and secure sales volumes.

"For us," says Auer, "this means we can integrate new methods and processes, and offer automation solutions for plants that were constructed even within the last ten years. These solutions add transparency to production processes – from incoming orders to the shop floor – and provide managers with a new lever to efficiently operate their facilities."

Now more than ever, steel companies are facing the question of whether they can get more out of a plant that, up to this point, has rolled construction steel. For example, whether they can use it to produce steel grades that will meet the high demands of the oil and gas industry. To build pipelines this industry requires easily weldable, high-strength microalloyed steel grades such as the sour gas resistant API-X70 or even extremely high-strength grades such as X100 – lucrative products due to these specific qualities. "We offer solutions," says Auer, "for these very individual, distinct cases. With the help of our new cooling and rolling concepts, stronger and more sophisticated steel grades can be rolled in existing hot-rolling mills."

If the goal is to switch to a higher product grade, metallurgical reasons prevent the producer from simply changing a single parameter – for instance replacing a caster with a more modern caster. "You have to alter the entire process chain, from raw material quality to iron and steel production," says Auer. The quality of the liquid steel and the solidification process of the continuous casting plant need to be absolutely



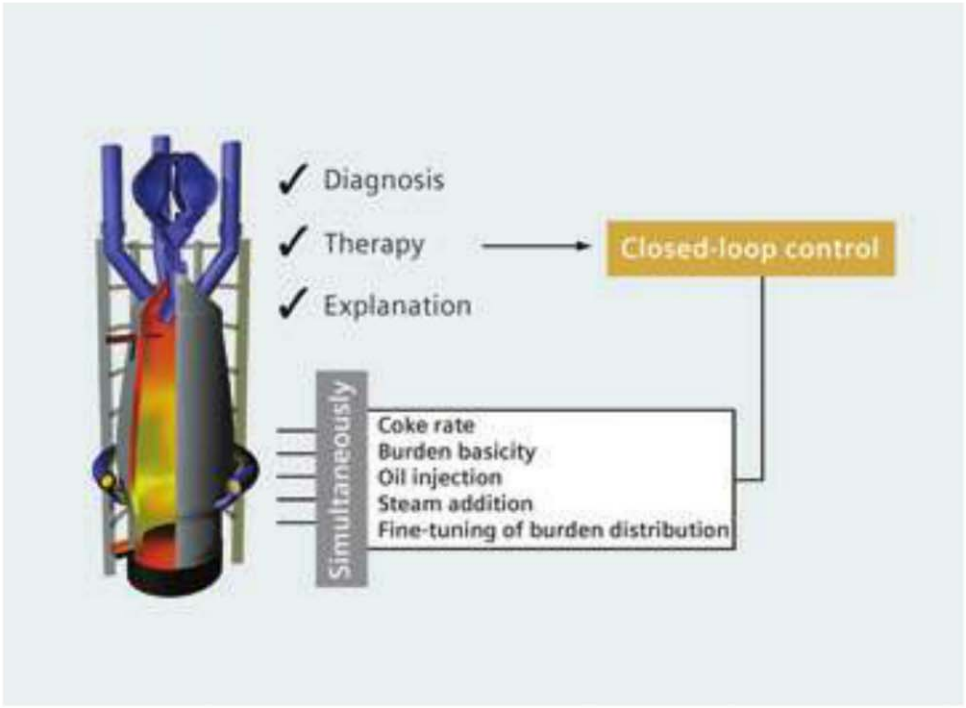
right so mechanical properties can be altered in the rolling process. In this regards, Siemens VAI Metals Technologies has expertise in both metallurgy and plant engineering over the entire value added chain – from knowledge about the demands on the raw material to the liquid phase and finally to the end product. This is not just an issue for metallurgy and technology. It is also a question of designing the mechanics properly and having the right expertise in electrics and automation – an industrial area in which Siemens leads worldwide. Plants have an increasing degree of automation. Siemens has developed mechatronic components that considerably increase performance in production. At the same time, facility and component maintenance is made easier.

Economic conditions as well as technological developments in the last years have had a significant impact on the relationship between steel producers and plant and technology providers. "More and more complex processes have to be harmonized," says Auer. This requires not only integrated engineering to exchange components and entire plant sections, but also that all measures are perfectly harmonized with one another. The solution for tasks of this sort can only come from a life-cycle partnership between steel producers and a partner like Siemens VAI Metals Technologies. "Electrotechnical and mechanical expertise and comprehensive competence in automation and information technology are factors that ultimately influence product quality and affect production," says Auer.

Increasingly, a life-cycle partnership involves the integration of individual process steps in steel production. In this regard, new automation packages and IT applications pro-

Automation and IT competence are prerequisites for improvements in the entire value-added chain in steel production

Blast furnance automation and optimization



vide another point of leverage to improve the management of the entire steel production value added chain. "More and more reliable production data from steel plants is becoming available, from the state of an individual motor and various process parameters to the results of mathematical models on the state of pig iron in the blast furnace or the quality of the steel stock in the rolling process," explains Michael Irnstorfer, who is responsible for Electrics and Automation at Siemens Metals Technologies.

As automation, sensor systems and mechatronics advance, a steel plant produces more and more useful information. This can be employed, for example, to bring about greater transparency in complex procedures and to help control production according to economic requirements. "Developments in IT make a crucial contribution," Irnstorfer says, "in enabling existing plants to produce new steel grades. These developments help optimize operating procedures and save energy to reduce production costs." Over the last

Process automation has developed to become the "brain of manufacturing."

20 years basic automation has made production faster, says Irnstorfer. Over the next 10 years process automation will similarly "evolve into the brain of manufacturing." IT brings intelligence into the steel plant, and it is already capable of giving a concrete warning about a component that is in danger of malfunctioning. For this, Siemens VAI Metals Technologies offers a comprehensive portfolio of innovative solutions.

"Siemens has broad expertise about the relationships between metallurgical processes and plants with their electric motors, drive systems and automation components. By comparing current data on the state of components in a production plant with this knowledge database," explains Andreas Flick, Chief Technology Officer (CTO) of Siemens VAI Metals Technologies, "we can make statements about how they are performing and how much they have been worn. We know, for example, when a motor or a drive spindle in a rolling mill will have to be replaced, or when it might malfunction." For Flick, the ability to detect changes in the plant or precisely predict the effects of interventions in the operating procedure is an essential part of the life-cycle partnership between the plant and technology supplier and the steelworks operator.

For this reason, Flick regards simulation as another point of leverage for successful life-cycle management. "We compare the model-based ideal state of a production plant with the real demands of everyday operation. The simulation of different scenarios shows us where and how we have to adjust a plant's process parameters. For example, to consume less energy, to roll higher-quality steel or to use less expensive raw materials." Using the simulation methodology, says Flick, "we can ascertain the optimal sequence of processes and determine what leverage to use in order to operate complex steel plants more effectively. In doing so, we can also actively look for the weak points that can develop anywhere over the course of a long plant life cycle." This makes simulation expertise an essential part of our life-cycle partnership with our customers.

Wieland Simon

IT toolbox

IT4Metals analyzes processes and reveals potential

Siemens Metals Technologies integrates its knowledge of metallurgy and plant design in the modular IT platform Simatic IT, one of the world's leading automation platforms in the process industry. The result is a new approach for transparency as well as for analysis of production and processes – from the receipt of goods all the way up to shipping coils, from the repair workshop to accounting.

Under the brand name IT4Metals, Siemens Metals Technologies not only offers steel companies a holistic automation concept with extremely broad functionality. This IT platform from a global market leader also draws upon a broad base of expertise in the process and manufacturing industry and demonstrates its ability to plan and control complex production systems all over the world every day. Metals Magazine spoke to Georg Bytomski, Vice President of Technological Products at Siemens Metals Technologies, about IT4Metals. He is responsible for the sale and development of technological solutions, packages and products that with the aid of these IT and automation solution platforms enable steel companies to remain competitive for the long term.

Mr. Bytomski, what is IT4Metals?
IT4Metals is a holistic automation concept. It extends from technical process optimization (Level 2) to holistic production coordination (Level 3) all the way up to the ERP interface, and it basically involves the linking and integration of all key IT functions, from an MES system and storage logistics to an energy management system. Its additional functionality includes an advanced planning system to optimize production of customer contracts, a condition monitoring system for the manufacturing units as well as a computerized maintenance management system (CMMS) for service activities.

So is IT4Metals a platform that links the different areas of a steel plant, a kind of IT network that collects all kinds of data from within the company and monitors, optimizes and documents individual processes?
Fundamentally you should think of it in this way: The Siemens Industrial Automation division, a globally leading provider of automation packages and solutions, control systems and control modules for the manufacturing and process industry, offers a sector-neutral IT platform. This is Simatic IT, which includes internationally defined standards and interfaces for basic automation, for control systems, and for enterprise resource planning (ERP). We open up this platform to the world of steel production and processing. We integrate steel-specific applications into this operational IT platform in the form of functional modules and libraries. The libraries integrate the industry- and company-specific knowledge our customers need to model their processes and control and implement event-driven optimizations in the complete production chain.

Is it true to say that, with this kind of sector-specific IT platform, steel manufacturers are able to collect data from all areas of production up to the shop floor level (sensors), to then evaluate this data and prepare it in the form of KPIs so that management can understand everything that's going on in production? And can management use the platform to control the entire plant or parts of it according to certain criteria, and thus more effectively?
Precisely. That's essentially the exact idea. As a user of the platform, I can easily generate production reports with KPIs for management as well as for those responsible for production and maintenance, and on the customer side for those responsible for technology. A holistic tracking of events and materials in production is possible, from the raw material received to the finished product. I can monitor and analyze energy consumption, I can plan current customer contracts into running production, from the raw material used – including the quality of the raw material – right through to the final product the customer requires and in line with the delivery date.

... and produce different steel grades?
Yes, also different steel grades, different qualities, and all that in a just-in-time production process. That's what we think of as an advanced planning system. It means we can carry out preliminary planning for production over a year in advance. The company can then improve its purchasing of the raw materials it will need to produce goods for one of its customers in 14 months' time, for example.

Why are such holistic solutions only being developed now?
Years ago IT systems weren't as powerful as they are today. They were too slow to process and prepare large volumes of data in real time. There was also no approach for a stan-

Uniform data management from order intake to dispatch creates transparency

dardized IT platform like Simatic IT. One of the buzzwords you hear in the IT world is "big data," and that's exactly what we're working with here. We have to process large volumes of data basically in real time, and then compress them for reporting purposes in such a way that the recipients receive targeted information (KPIs). Our customer's reporting system should be in a position to easily and in a targeted manner generate information to operate production facilities and fulfill customer orders, as well as produce KPIs for the various levels of management.

Of course, today we find ourselves in a particular market situation. Prices for our customers' products have fallen, and at the same time raw materials have become more expensive. As a result, the pressure to produce economically has reached a very high level. It is therefore vital to squeeze every last drop of performance out of the plants. Attention must be paid to quality of the final product, personnel costs, and to all technical and operational factors at the plant. In addition, on the technological side, mechanics and electrics have reached a level where further optimization can only be achieved at a considerable cost. That means that now people are also taking a close look at the individual processes: How do I pass the material on? How long does the material spend in intermediate storage? How much raw material do I purchase? How much scrap will I be left with? What will I do with the scrap? Can I melt it down again? And if I melt it down again, how much energy will this consume? Can I purchase this energy cheaply, for example by melting down the material during periods when energy costs are lower? All this means that overall optimization of a plant has quite a different focus today than it did in the past.

You have pointed to today's computing power. In principle you are networking the individual production units in a steel plant or, to put it another way, integrating the technical and technological automation systems of the individual processes at a steel plant. We already use the term integrated steel plant, but this is actually something you're only just implementing now.

IT4Metals links production with management through a constant exchange of data

Precisely, as far as the process is concerned, we accomplished this some time ago. In regard to IT, we're just now implementing it – although the ideas and the demands of the companies actually go a lot further. Companies don't just want to integrate and optimize a data network in a steel plant at location A. They want a network that spans multiple locations, even a global network and optimization. The goal is to produce orders where production in the required quality is currently the cheapest or most efficient, where delivery times and routes can be minimized in order to offer end customers the best products and the fastest possible delivery times.

How far are we? Can we offer such solutions at the moment?

We are already at the stage where we can fulfill global requirements ...

... in the areas you've described? Does that also apply to smaller steel manufacturers?

Yes. Optimizing processes is vital for every company, not just for the global players. They are all feeling the same pressure. Naturally, in Europe the need for optimization is very high. Here we have the problem that Asia with its high rates of steel production is putting significant price pressure on the market. European concerns such as ThyssenKrupp, Salzgitter and voestalpine have to react to this price pressure and optimize their processes holistically to remain competitive.

You're also protecting the product name IT4Metals. Why is that?

IT4Metals is currently the only holistic IT solution in this segment. We stand out from other IT providers because, for one thing, we possess industry expertise (process and plant layout). We've also been implementing various solutions for decades (hard- and software). For over four years we've been shifting all existing IT solutions to the Simatic IT platform. In the process we've integrated various IT products into a holistic solution. We've also standardized the user interface for our customers. All this means that we've unified the operating philosophy – the look and feel – of the software. We've taken some entirely new approaches. From our condition monitoring system, for instance, information is passed on directly to an advanced planning system and to a maintenance system, and these in turn are linked to an energy management system. These links make a whole range of aspects in the production chain visible and available to the companies. This means they are prepared for all the factors relating to analysis and optimization that affect the business: they have an answer for the changing framework conditions in regard to different production and product requirements, to energy matters and to the environment.

We're always talking about improving processes. But in periods of excess capacities that's only one way to become more economical. Often other issues come into focus such as flexibility in production, the goal of producing other and new steel grades, or working with even less expensive raw materials. None of these aspects really have anything to do with process improvements.

They are related to process improvements in so far as these kinds of requirements are also part of a superimposed plan-

ning system. The steel companies must find answers to these questions, and that's exactly what we can provide. We can offer answers in a number of ways, for example via consulting. For example, by saying what bottlenecks a plant has, where there are problems on the production side (mechanical/technological), what environmental or other requirements must be met for the amount of energy being used, how companies can make their production more flexible – such as by adapting or optimizing material properties of the ordered products to meet customer requirements to a T – and how these requirements can be ideally combined on the process level in regard to IT so that setup, maintenance and optimization times are kept to a minimum, and that maximal production at the highest quality can be attained.

Is IT4Metals also the backbone of life-cycle management?
Yes, of course. The computerized maintenance management system (CMMS) is directly linked to the IT4Metals platform so that we can develop diverse maintenance plans with the customer, such as personnel shifts, plans for proactive spare parts storage, and plans for preventive maintenance. All these solution approaches can be integrated in the IT4Metals platform in order to generate and distribute targeted maintenance requirements and instructions.

Simatic IT is already the standard for automation in many industries. Now you're opening up this platform to the metals business.
That's exactly right. The standard product Simatic IT was actually created for the process industry, although not specifically for the steel industry. This is precisely the point where we took up the challenge. We incorporated the relevant requirements for steel production and processing as well as cross-plant requirements in the individual planning systems in Simatic IT, from the smelting phase all the way to product finishing lines. In addition, all process requirements and mechanical tasks of the different production plant types are taken into account. Even the timely provision of materials for the individual production plants via the various storage areas is very important. As a steel manufacturer, once I've cast a steel slab I have to transport it to a plate mill or a hot-strip mill. After the hot-strip mill comes the cold mill, then the surface finishing. In between are the various intermediate storage facilities. Storage automation has to be able to accept the produced material in a timely manner and to feed it to other production facilities in time.

Do you anticipate any resistance from within the steelmaking industry? After all, you're shedding light on all kinds of situations and processes, from the caster and cold-rolling mill to storage management. Individual subsections for which individual employees feel responsible can now be controlled more easily by management. IT4Metals opens up optimization potential and also identifies errors and weaknesses.
It's certainly a double-edged sword. On the one hand, we identify where errors are being made in production. On the other hand, plant operators – even those who are only responsible for a certain part of a plant – will surely be grateful to learn why they are encountering problems in production when using certain input materials under certain production conditions, and why they are unable to attain the quality they are aiming for. Ultimately the entire process becomes more transparent, creating a more objective basis for discussions about production. This is the key point for customers. They want to sell the materials they produce to end customers, to the automotive industry for example. The requirements placed on materials in these industries are so high these days that the manufacturers can't afford to make any mistakes. That means, as a steel producer, I have to know my process. I have to know where problems are, and how to handle each material. Because if our customers don't have this transparency for all process steps, ultimately their customers will have a problem providing proof of their product quality.

Does IT4Metals also contribute to protecting the environment?
IT4Metals also offers a solution in this area that helps to deal with different requirements such as government regulations. With the help of the automatically collected data it becomes easier to prove how much CO_2 or other gases are being emitted and how much energy, raw materials, gases, etc. have been consumed. Of course, this also opens up completely new options for our customers as to how they plan their production.

"Companies have to optimize their processes holistically to remain competitive."

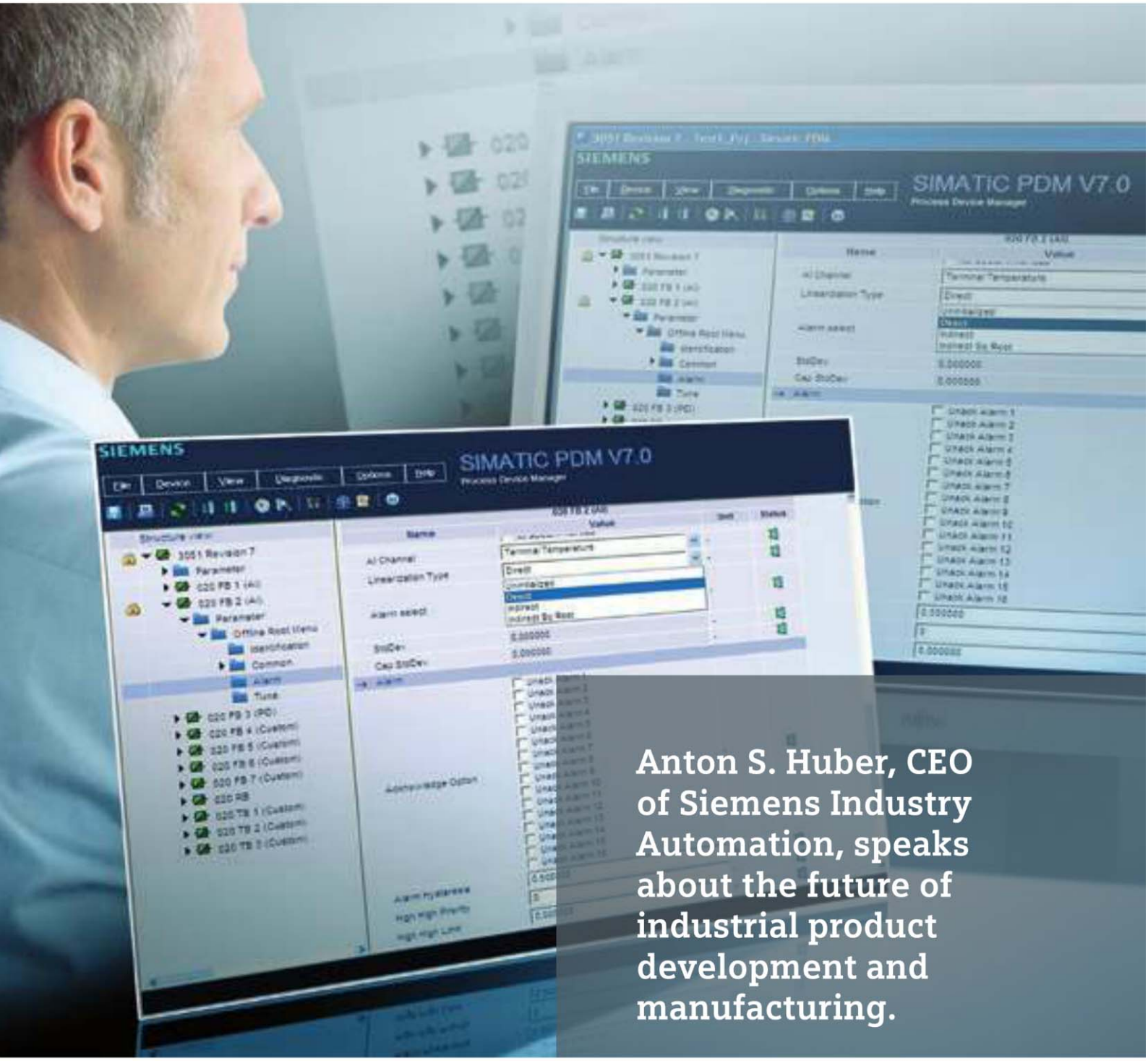
Georg Bytomski, Siemens MT

And how is this planning capability attained?
By focusing on the question: What should, could or would I want to produce within the next weeks, months, years? You have to calculate which raw materials, energy, consumables, production plants, and production and maintenance personnel are required. Using this data, plants can be controlled according to optimized parameters (KPIs).

Is this also something that IT4Metals makes possible?
This is the declared goal of the IT4Metals platform. Time and again steel producers ask: When can I purchase the cheapest energy? When can I give back any energy that hasn't been used? It has only become possible to answer these questions with these kinds of planning tools. However, as I said, it requires a holistic system that can deal with the sum of these exact issues. It's not enough to have a partial MES system, a partial storage logistics system or a partial energy management system. Instead you need a standardized, holistic, optimized automation system that can process inquiries on both sides: What's happening on the energy side? What's happening on the customer side? How about the availability of the various plant parts? All this information is fed back in the form of a holistic plan for the required production, so the customer can get the very most out of the plant in economic terms.

Software and IT

New technologies require investment



Anton S. Huber, CEO of Siemens Industry Automation, speaks about the future of industrial product development and manufacturing.

Mr. Huber, Siemens claims to have the broadest palette of IT tools and platforms for the development, operation and management of modern industrial facilities. Nonetheless, you try to curb customer expectations. What's the reason?

This isn't part of a scheme. We are aware that the implementation of available technologies requires a great deal of effort and considerable investment – not only from technology providers, but especially from industry itself. Specialists from Gartner, a highly regarded industry software research company, said the following about development in a study entitled "Hype Cycle for Manufacturing Product Life Cycle Management and Production": "These activities deserve the same long-term investments that manufacturers made in ERP for transaction processes."

The range of customers Siemens serves is large. What are the demands that go along with such a diverse customer base?

On the one hand, we have customers who focus on their know-how and want to introduce their developments to the market as quickly and reliably as possible. This group of customers is afraid that software could stand in the way. On the other hand, we have customers who wish for a simulation model with which they can build and deliver hundreds of customer-specific plant components in record time. The expectations of both groups have little to do with reality and the possibilities available today.

Those who are already very successful in the large series production of a vast range of product variants – for example the automobile industry – have developed MES software on their own. Their efforts are sure to have cost hundreds of millions of euros. And then there are many who, because of the enormous increase in product diversity, have come to a point where individual software components no longer help. What is needed are solutions that take the overall picture into consideration.

What exactly is the problem with the current practice?

In the future, a competitive advantage will depend for the most part on the ability to simulate a virtual product, virtual system, virtual factory and virtual manufacturing. Today no one has a universal platform that is capable of performing such simulations in all disciplines and in the necessary level of detail. For this, new software is required as well as seamless processes, which have not yet been introduced.

This is so not because the technology is unavailable and such a scenario is therefore not technically possible, but because today's infrastructure, the implemented solutions and the resulting models are not flexible and compatible enough. A change in a component of a complex product with many variants is not immediately available in the virtual product

"Where individual software components no longer help, we have to look for solutions that take the overall picture into consideration."

Anton S. Huber

The automobile industry first discovered the advantages of IT-supported engineering to react more quickly to developments in demand

configurator that the customer uses, for example, to configure a facility component with high-end 3–D visualization. Here data is available that has to be carefully prepared days or weeks before a change goes into effect.

Conversely, a construction fault discovered during manufacturing or during the installation of new facility components, or a fault in the embedded software logic that comes to surface at the customer's, must immediately be followed up with corresponding changes. And of course, these changes must also be immediately apparent all the way down to the customer's visualization tool.

This is especially the case in the automobile industry and for airplane manufacturing. Does Siemens focus particularly on these sectors?

These sectors were the first to discover the advantages that IT-supported engineering offers to more quickly react to developments in demand and to integrate new developments or changes in facility concepts more swiftly than in the past. Company processes from initial concept up to manufacturing have become so complex and dynamic with almost all customers. In fact, they almost can't even be thoroughly described.

If I understand you properly, you are appealing for a fundamental rethink in industry?

Yes, indeed. Otherwise, the technologies now available cannot be used in the long term. As a supplier of IT, we are not interested in having access to our customers' intellectual property, nor do we want to deliver simulation models for their products. But we can offer them the infrastructure and IT tools – the "digital workbench," if you will – that they need to remain competitive. Doing so is a dynamic yet long process. Siemens, which has been in business for over 160 years, is a suitable and stable partner for these endeavors. With an investment of over €4 billion in this area since 2007, Siemens underlines its commitment to being among the world's leading companies for digitalization along the industrial value chain.

In this context, already today we have established that a number concrete customer projects have become significantly more important for our research and development efforts. Also, much of what we assume as reality in the lab has its origins in customer projects. True complexity can only be found in real-life industrial settings.

In your view, what steps should the steel industry be taking?

As we see it, companies need to take steps to redesign their entire manufacturing and associated processes – including the ongoing processes – so that new technologies can be incorporated. It can take years until they are finally in a position to virtually link production areas as they would like to do today. Also in the steel industry, manufacturing is driven more and more by market demand. For example the production of different steel goods and qualities. Flexibility in manufacturing and production on demand will continue to become competitive factors.

Not only the steel industry is set to profit enormously from the digitalization of the industrial value chain – plant construction and engineering will also benefit. Today steel works are operated for 40 years and more. In this time frame, plants change considerably. They are further developed and new process standards are adapted. Individual plant components are replaced with more powerful substitutes. European plants in particular will only be able to maintain and expand their wealth of experience with precision and quality – which are responsible for Europe's excellent position in the world market – if they make comprehensive use of digital technologies. Corresponding investments in technology and business models, as well as in software experts, are absolute musts.

From raw material planning to energy consumption at each production step: the industrial software platform Simetal Manufacturing Execution System (MES) provides customers with full transparency on plant-wide production planning and scheduling

In brief:

What is ... a Manufacturing Execution System?

Typically, production plants in the metals industry consist of more or less independent processing units with predefined production routes for each particular grade of processed goods. All these different processing units are interlinked, which is why a fault or quality issue in a single component can negatively impact the entire production chain of the complete plant. If a fault or unplanned downtime occurs at one point in the process, production personnel must be notified quickly and with the necessary information to maintain smooth production. At the same time, flexible and immediate rescheduling must take place within the scope of available production unit options.

Ensuring overall plant effectiveness and best plant utilization

The Simetal Manufacturing Execution System (MES) is a comprehensive industrial software platform that allows such faults to be remedied promptly and prevents them automatically at first indication. MES ensures a continuous flow of information for all process data in a steel plant enabling plant-wide production planning and scheduling – from raw material selection to product dispatch. It integrates all functions and services customers require to optimize the material flow within their plants and to improve plant availability, productivity and delivery reliability with the goal to maximize overall plant performance. MES software modules are based on ISA S95. They not only optimize all horizontal production processes from ore and liquid metal to final material, but also vertically integrate a plant's information flow from end to end. This helps operators to make better-founded decisions to maintain and further develop a plant along its entire life cycle.

Using different data sources

One language for all engineers worldwide

Description languages as a translator improve collaboration with engineering tools.

Radical changes are on the horizon for the engineering, operation and service of industrial facilities and large infrastructure objects such as airports and highways. Ontology-based languages will act as "translators," improving the interplay of the globally implemented engineering tools at the data level – without manual intervention and without implementation of special interfaces between the respective tools. The automatic interplay of various tools should reduce errors, optimize processes and cut costs over the industrial plants' life cycles.

"Ontology-based languages are expected to take on a significant role at Siemens. Around two-thirds of our sales are generated with the plant business and related areas," says Rupert Maier, Senior Key Expert in Systems Engineering at Corporate Technology (CT).

At the moment, Maier is working intensively in this area. The basic technology enables data to be transferred into technical information and knowledge, and a joint, clear understanding is thus established – whether the information is interpreted by a person or by computerized tools. The Siemens Industry Automation Division demonstrated with its enterprise platform COMOS that the approach functions in principle. CT experts showed that the platform and other software tools used in the oil and gas industry were able to work with "translations" better than before.

The software solution COMOS integrates data and document management of complex industrial facilities that comprise several terabytes. With the help of ontology-based languages, this software is made fit for the future. The development is driven by technologies in the so-called Semantic Web. Companies in the oil and gas industry have created with ISO 15926 a standard for integration, exchange and transfer of data between computer systems.

Using the example of a refinery, the complexity becomes clear, as well as the necessity to create standards: For the construction of a new facility, planners use a number of software solutions: tools for handling customer requirements; CAD tools for the construction of buildings and the plant; aids for the design of hardware; simulation tools; automation tools and planning tools for piping, statics and mechanics; parts lists to order components; commissioning applications; operation software; spare parts and service programs; and SAP tools for administration. Generally, these tools do not have coordinated interfaces with one another, and the terminology used is not uniform. This means that point-to-point connections have to be set up between each set of tools, and that data from one application has to be manually transferred to another application. In the process, mistakes can be made that are only apparent later – and that require extensive revision cycles. In addition, engineers spend almost a third of their time looking for information. In fact, around half of IT costs can be attributed to the conversion or preparation of data.

"Ontology-based languages can make a great contribution to optimization," says Rupert Maier, who was honored with the Siemens Inventor of the Year award in 2007. "They are not only the basis for better interoperability, but also the missing link for automatic collection, storage and use of human knowledge. In addition, they help to automate work processes by reusing fixed decisions and processes, and ensuring that the necessary information reaches the respective person at the right point in time."

Rupert Maier
Senior Key Expert in Systems Engineering at Corporate Technology (CT)

"Ontology-based languages are the missing link for automatic collection, storage and use of human knowledge."

Rupert Maier

Maier suggests using existing semantic technologies and the technical vocabulary already employed in many areas (such as ontologies in the oil and gas industry). As a result, only the additional terminology from the individual Siemens domains has to be added. Terminology from existing data material can be extracted and partly automatically transferred in ontologies. For every tool, only one interface is needed to the ontology-based data file to exchange data between all tools. This technology serves as a sort of "translator" so that all tools can communicate with one another.

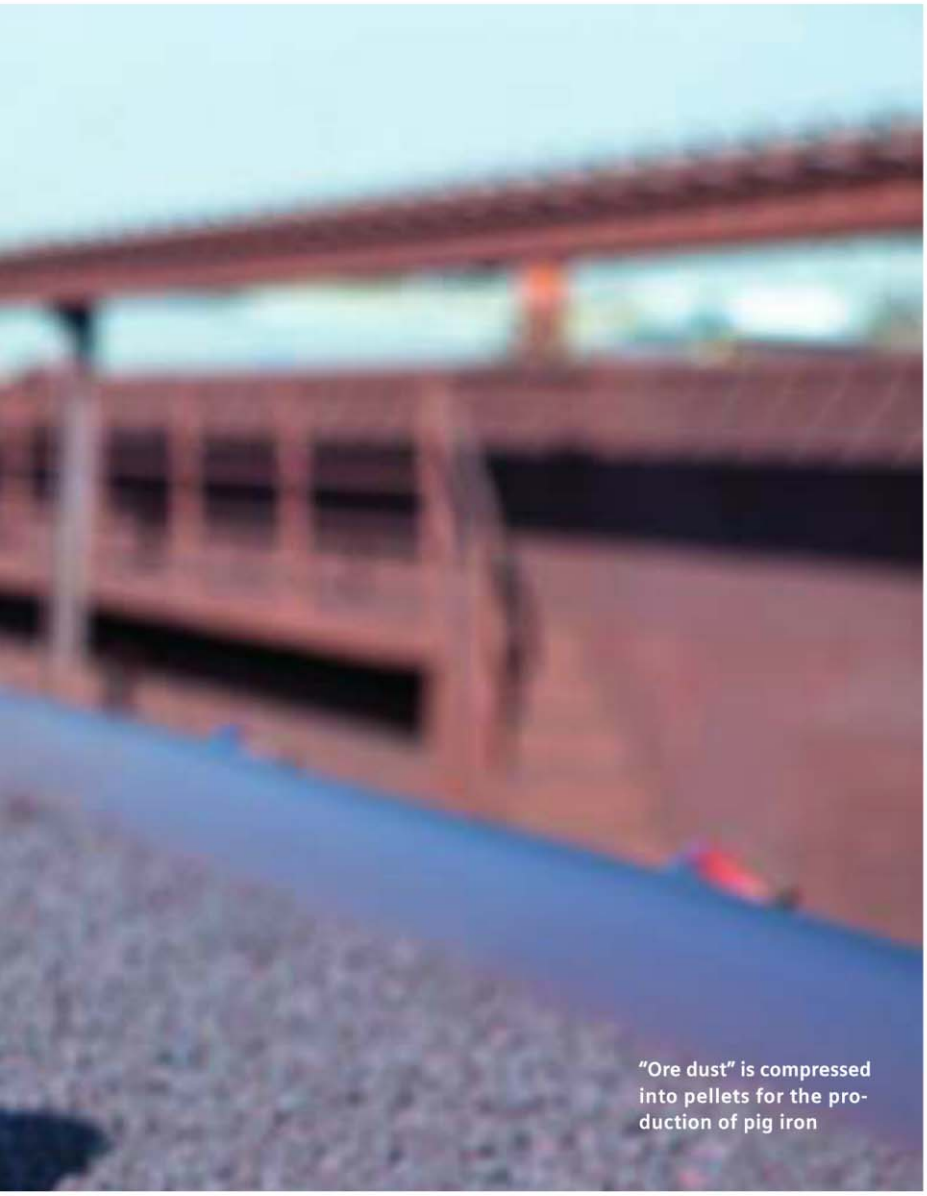
Pellet plants

A new market for Siemens

The first plant with the newly developed Circular Pelletizing Technology (CPT) will start operation in India in summer 2013.

Siemens VAI Metals Technologies is making its way into the market for pelletizing plants with a newly developed product: Circular Pelletizing Technology (CPT). The first plant is scheduled to go into operation in summer 2013 in India with an annual production capacity of 1 million tons – using less energy and operating more economically than comparable technologies. "With our new technological concept, we promise top-quality pellets at a lower price," says Christoph Aichinger in reference to both investment and operational costs. Aichinger is responsible for the development of pelletizing technology at Siemens VAI Metals Technologies. In the following article, he explains the concept of CPT and its contribution to improving iron and steel production, and he speaks about why plants of this type can be interesting for steel plant operators as well as iron ore miners.

Lump ore and agglomerated fine ore are the basic raw materials for the production of hot metal. But worldwide supplies of good-quality lump ore are dwindling. Therefore,



"Ore dust" is compressed into pellets for the production of pig iron

"With our new technological concept, we promise top-quality pellets at a lower price."

Christoph Aichinger, Siemens MT

mining companies are increasingly producing fine ore (sinter feed) with a grain size of less than 10 mm, and recently more and more ultrafine ore with a grain size of 100 µm and smaller. This "iron ore dust" (concentrate) cannot be directly fed into traditional hot metal units (for example blast furnaces), but only to fluidized bed technologies such as Finex and Finmet. However, the development of fluidized bed technologies – compared with conventional technologies – is still at an early stage. Today, almost 95% of hot metal is produced with traditional blast furnace technology. The "ore dust" must be turned into sinter or pellets by means of a thermal agglomeration process as the starting material for the production of hot metal and sponge iron.

Sinter or pellets? For Aichinger, these are not opposites, but a necessary both for a plant manufacturer like Siemens VAI Metals Technologies. For sintering, we have developed the Intensive Mixing & Granulation System to process iron ore concentrate, says Aichinger. In the past, sinter plants were a source of a high level of air pollution. With the development of selective waste gas recirculation and Meros, Siemens has made a valuable contribution to efficient emission control, which means that sintering plants can be operated in the vicinity of urban cities with acceptable emission levels. An example here is the sintering plant operated by Austrian steel producer voestalpine in Linz. The Meros gas cleaning process was developed and brought into maturity in Austria, and "demand is growing where environmental protection standards are particularly high," says Aichinger.

In the discussion about the right process for preparing iron ore for blast furnaces, it is obvious that sintering plants cover the major portion of the required raw material and pellets play only a minor role. "It is assumed that the optimal mix is around 20% pellets and 80% sinter," suggests Aichinger. Blast furnace operators want to approach this optimum, which can vary depending on the specific conditions of the

blast furnace location. "It is therefore necessary that besides sinter, there is a sufficient amount of pellets available."

When pellets are added to the blast furnace shaft, the behavior of the feed material can be improved." A pellet is round with a smooth surface, and the mix with sinter offers considerable advantages with regard to gas permeability and properties of the burden material. At the same time, the amount of slag can be lowered. "And that is the key point: the increased use of pellets helps to improve the performance of a blast furnace," says Aichinger. Less slag needs less energy for heating up and melting, which in turn has an impact on CO_2 emissions. "The operational costs of a blast furnace," says Aichinger, "can be considerably improved."

New business models

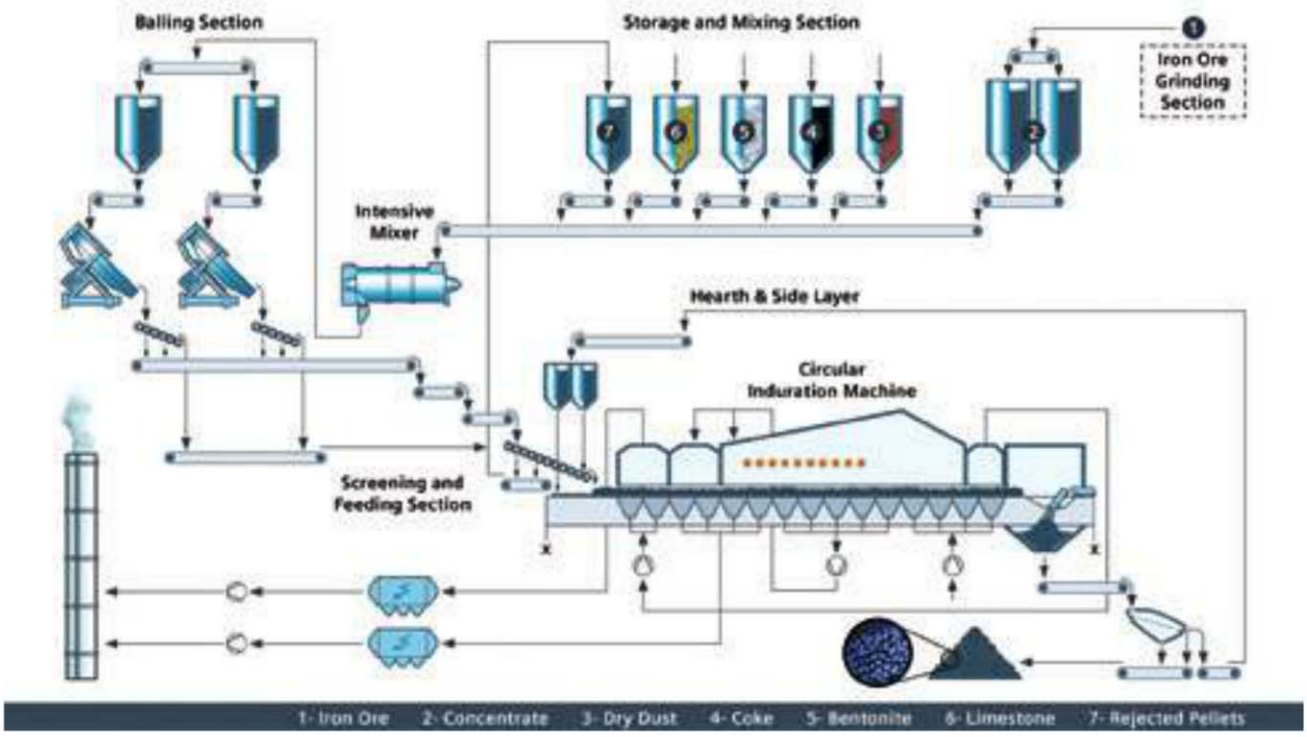
A further reason for the increasing demand for pellet plants lies in the fact that there has been a clear split in terms of business model between mine owners and steel producers. Until now, the responsibility for preparing raw materials was mostly that of the ore miners, but in recent years we can see an expansion of the value chain by steel producers in order to secure their raw materials. In addition, more and more mines are delivering fine and ultrafine ores, which have to be agglomerated so that the steel producers can charge their blast furnaces. Generally, the pelletizing plant is located at the mine and the sintering plant is an integral part of the steelworks, according to Aichinger. Direct production of pellets at the steel plant is becoming more attractive, because steelmakers can produce their own pellets using the available thermal energy, for example from the offgas of the blast furnace or coking plant.

"A small pellet plant," concludes Aichinger, "can make a valuable contribution to the operation of a blast furnace, and it can be implemented effectively in a steel plant." It no longer has to be located at the mine – thanks to its small footprint, it can be located at the steel plant. This setup is beneficial for producers: The producer purchases cheap raw material, namely concentrate, and makes pellets at the plant using energy resources available at the plant. Furthermore, the producer can influence the "recipe" of the pellets so that they meet the requirements of the blast furnace.

"A small pellet plant can make a valuable contribution to the operation of a blast furnace."

Christoph Aichinger

Mines and steel operations are usually owned by separate companies. Pellets are a commodity suitable for trading because they can be easily transported. Sinter has to be produced at a steelworks, because during transport it disintegrates and causes a great deal of dust. "A suitable technology," says Aichinger, "could enable a completely new business model between mines and steel producers." An example is that mines produce pellets directly at a steelworks.



Process schematic of a pellet plant

More and more, ore miners are delivering fine and ultrafine ores, which have to be pelletized for use in the blast furnace

Siemens VAI Metals Technologies therefore concentrates on "smaller" plants to produce pellets. These plants can be operated by either mining operations or steelworks. "Our plants are available in two sizes: The smaller unit has a nominal capacity of 1.2 million tons and enables production of 0.8 to 1.5 million tons of pellets per year. The second model has a nominal capacity of 2.5 million tons and is capable of 2 to 3 million tons yearly." Both plant types are fully standardized, and in terms of construction, equipment and design, modifications can be made with minimal effort.

Aichinger points out that with Circular Pelletizing Technology (CPT) Siemens has designed a plant that meets these requirements. "Our special feature: We use the traditional traveling grate process and combine it with the mechanical system of a circular cooler which we use for sinter plants. The innovation here is the effective combination of this proven process and the reliable mechanical equipment to meet the new requirements. As a result, the plant is considerably smaller, compacter and lighter, and investment costs are lower."

Operational costs can only be assessed once the pilot plant in India goes online in summer 2013. "We assume that the operational costs will be quite attractive," stresses Aichinger. He compares the new plant solution with the grate kiln process, which is implemented for smaller plants, and with small, conventional straight grate plants. In comparison with these processes, Aichinger sees the cost advantage for CPT in the compact design as well as in the fact that "we have also introduced coal gasification as a further innovative element." That means the energy source for the induration process is local, Indian coal. This is, of course, a lower-quality coal, but it is available at a lower price. The feasibility study showed, says Aichinger, that by using coal gasification with locally sourced Indian coal, the costs for this auxiliary facility could be paid back already after one year and the energy costs can be reduced by more than 60%.

Pellets are used in blast furnaces, in direct reduction facilities and in other ironmaking processes, such as Siemens' Corex process. "With modernization projects and capacity expansions of ironmaking facilities," says Aichinger, "there are good arguments for the addition of a small pellet plant." In the framework of a technical and commercial feasibility study, engineers look at the impact on energy consumption, use of raw materials and related operational costs when existing blast furnace operations are converted for a blast furnace feed of 20–30% pellets. "The next step would be," says Aichinger, "to specifically tailor the chemical composition of pellets to match the blast furnace requirements. The result is a so-called fluxed pellet for the blast furnace."

Besides the main market India, Aichinger sees further possibilities for an application of CPT plants in Russia, South America and the Arabian Peninsula, and particularly in those areas where Midrex DRI plants already exist or are being built. Hence, the demand for pellet plants does not come from local markets but is determined by production technologies. "This type of facility is attractive for direct reduction plants and blast furnaces that can be fed with self-made pellets," highlights Aichinger. Therefore, there are two strategies for the new CPT concept for pellet production capacities: on one hand additional capacities for the production of pellets in steelworks, and on the other hand for smaller mine operators who want to obtain additional benefits by making pellets from concentrate, and sell these pellets for a considerably higher price than concentrate.

Oliver Michal

Growing consumption in Asia

Urbanization drives the market for building materials

New rod mills are intended to meet growing demand.

If a surge in recent contracts for new wire rod mills is any indication, Asian markets will continue to demand a high volume of copper and aluminum rods. Economic activity in Eastern Asia expanded nearly 9% in 2010; consumers enjoyed higher wages and employment rose in the manufacturing, construction and service sectors. A recent United Nations economic report states that even with the slower growth forecasted for 2012, the region will still outstrip all other markets.

Within Asia, China remains the fastest-growing consumer market – according to Bloomberg, its economy has expanded an average of 10% annually for the past 30 years. The country's urbanization, infrastructure growth and housing boom have led to high demand for copper, with the result that 40% of the world's supply now goes to China. This level of domestic demand has prompted several metals producers to order new copper rod mills. The appetite for aluminum rod has run a parallel upward track, as the need has grown for consumer products, electrical transmission wires and an expanding industrial base.

To supply this greater capacity, in the last 18 months Southwire Company, based in Carrollton, in the US state of Georgia, has received eight new contracts for copper and aluminum continuous rod mills from customers in China, Korea, Taiwan and Malaysia. As part of a long-standing agreement between Southwire and Siemens Metals Technologies, all rolling mill equipment is designed and built by Siemens.

Of the eight contracts for new mills, two customers are diversifying into additional non-ferrous markets: an existing copper rod producer is adding an aluminum system, and China's largest aluminum producer is bringing a copper rod mill online. One of the copper mill orders is an upgrade of an older mill purchased for refurbishment. While the specific situation may differ, each customer is seeking to increase production capacity.

The mills are part of Southwire's continuous melting, casting and rolling process known as the Southwire Continuous Rod (SCR) system. Fully half of all electrolytic tough pitch (ETP) copper rod made in the world is produced with SCR technology.

Manufacturers in Asia are increasing production.

"Back in 1964 we asked the company, then known as Morgan Construction, to design an economical mill to roll non-ferrous metals as part of our continuous system," said Will Berry, President of Southwire's SCR Technologies. "It's been a successful partnership ever since. Together we've sold more than 95 mills in 35 countries." As a subcontractor, Siemens has also completed close to 30 mill upgrades.

Value from experience

Non-ferrous producers want equipment that features lower operating costs and advanced technology. SCR mills meet these demands: They are durable and reliable from the start, and they feature quick-change casting and rolling components with hydraulic roll mounting in the Morgan No-Twist mill. Maintenance costs are kept to a minimum because the mills have few complex parts, and these are manufactured from standard components. Designed to roll ETP copper, which is required for most electrical applications, SCR systems remain the market leader.

"We offer our customers the reliability and ease of operation they have come to expect from the combination of Southwire and Morgan expertise," said John Buell, non-ferrous sales manager for Siemens. While each contract differs according to customer requirements, Siemens typically supplies the rolling mill as well as the systems for rod delivery, cleaning, coiling and conveyance.

Unlike any other equipment supplier in the market, Southwire operates its own copper and aluminum rod mills, and it has the largest wire-making operations in North America. The company's direct process knowledge benefits customers and promotes continuous improvements in technology and automation. Southwire offers seminars for its rod mill customers to help them better understand changing market requirements and new equipment technology. Depending on the desired speed and tonnage, there are eight different SCR systems for copper rod production, with speeds ranging from 7 to 54 tons per hour, producing rods from 8 to 25 mm in diameter.

To meet demand for aluminum rod, seven different SCR aluminum systems produce 9.5 mm, 12 mm and 15 mm diameter pure electrical conductor (EC) grade rod and alloy electrical grade rod coils at production rates of 2 to 15 tons per hour; another three systems produce EC, electrical and mechanical alloys from 2.4 to 5 tons per hour.

Economic trends remain uncertain at best, but the Asian market continues to see rising demand for non-ferrous products. In partnership with Southwire, Siemens is well positioned to meet the needs of the region's metals producers with its efficient and low-maintenance continuous rolling mill designs.

Allison Chisolm

Complete copper rod mill arrangement

Roughing mill stand

Better lubrication in cold rolling

DAS saves energy and protects rolls

Good roll-gap lubrication with the Direct Application System at ISD Dunaferr lowers the rolling force and torque and improves the performance of cold-rolling mills.

Unrelenting market pressure for higher energy efficiency, lower operating costs and consumption figures as well as demands to extend the product mix are compelling mill operators to introduce new technologies and more effective solutions in cold rolling. The authors outline how Siemens VAI Metals Technologies is helping to meet these challenges.

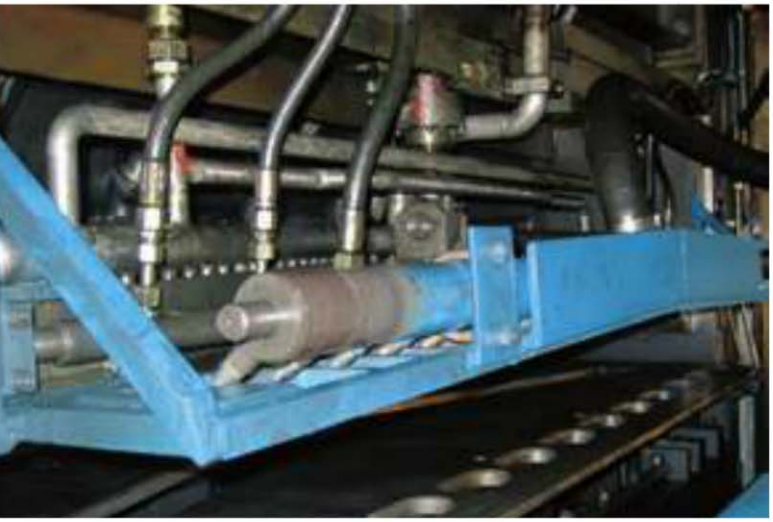
A collaborative effort between the Hungarian steel producer ISD Dunaferr and Siemens at the cold reversing mill of ISD Dunaferr in Dunaujvaros, Hungary, has the objective of reducing friction between work roll and strip and hence energy and material consumption (i.e., electricity and roll consumption) – without affecting product quality and process stability. All this is being accomplished by improving the effectiveness of roll-gap lubrication.

ISD Dunaferr – member of Industrial Union of Donbass (IUD) – produces cold-rolled wide and narrow strip and sheet along with hot-rolled pickled and hot-rolled, pickled and tempered wide and narrow strip and sheet. Typical fields of application include base material for deep drawing parts, household appliances and the automotive industry. ISD Dunaferr and Siemens have a long-term partnership in numerous projects, and work closely together on the design of new plants. For Dunaferr, reliable start-up of new installations is of particular importance. Recently, Siemens received an order from ISD Dunaferr and successfully supplied a new reversing cold mill and a continuous pickling line with acid regeneration.

Direct Application System (DAS)

To produce hard and thin cold-strip gauges, the cold reversing mill is additionally equipped with a Direct Application System (DAS). The main idea behind the DAS is to spray a "fat emulsion," which has an oil concentration up to approximately 30%, onto the strip entering the roll-gap. The increased oil concentration improves the plate-out (i.e., separation of an oil layer at the roll bite inlet) of oil droplets on work-roll and strip surfaces, and significantly increases the oil concentration in the roll-gap for better lubrication.

DAS is a low-volume system with separate tanks for the storage of water and rolling oil. Both fluids are mixed just



Direct application headers on entry side of the cold reversing mill at ISD Dunaferr

before application for best lubrication performance (plate-out). Although DAS requires higher investment costs, it also provides greater benefits.

Advantages of DAS

Improved roll-gap lubrication leads to a lower coefficient of friction between work roll and strip, reduced friction energy losses, and consequently to reduced rolling forces and rolling torques. This process is of increasing importance for rolling hard and thin strips, since many mills are already working on the edge of the mill and lubricant performance capability. As a result, DAS represents an environmentally friendly solution that helps save energy and extend roll lifetime.

A DAS can either be added to a recirculation lubrication/cooling system or used as single source for roll-gap lubrication with separate media for lubrication and roll/strip cooling (typical for tinplate production). Siemens supplies rolling mills with optimized lubrication/cooling equipment and offers modernization packages to upgrade existing mills with a DAS.

As a disadvantage of DAS, it is often argued, that it can only be used in very short campaigns because it leads to a rapid increase of oil concentration in the recirculation emulsion system. However, if the DAS is reasonably applied and if initial operating conditions are chosen and prepared well, then an extended application is possible and the benefits can be fully utilized.

DAS is environmentally friendly, saves energy and prolongs the life-time of the rolls.

Successful trials

Comprehensive trials were conducted on the cold reversing mill of ISD Dunaferr to test and improve the effectiveness of the installed DAS. The mill is equipped with direct application headers positioned 1.3 m in front of the roll-gap on both sides of the mill stand. With a fully open valve, a maximum flow rate of approximately 80 l/min can be applied per mill stand side.

Objectives of the trials were to determine the effectiveness of the installed DAS for different rolling products; the impact of DAS oil concentration and DAS flow rate on process parameter and process stability; the impact of DAS on the final strip temperature after cold rolling; the impact of DAS on

strip cleanliness (reflexivity after cold rolling and after subsequent annealing); and new pass schedules based on the findings.

The main results of the DAS trials showed a significant reduction of roll force and motor torque on later passes, especially for small strip thicknesses (< 0.5 mm); a maximum roll force reduction within a trial program of approximately 16%; and a maximum roll torque reduction within a trial program of approximately 10%. Moreover, DAS is most effective for thin strips, hard strips, and smooth strip surface typical for rolling in the later passes of a cold mill. The system increases strip temperature (with conventional roll-gap lubrication switched off) by up to 6°C. Finally, there is no significant change of strip cleanliness, which was proved by measurements of reflexivity with a Scotch-tape test before cold rolling, after cold rolling and after subsequent annealing.

Improving the pass schedule to fully utilize the mill capability

The influence of the Direct Application System in the first pass is vanishing low because the first pass in any cold-rolling mill is characterized by a relatively high surface roughness (of incoming pickled hot band) in combination with low rolling speeds and soft material strength (no cold work hardening so far). This leads frequently to rolling conditions in the boundary lubrication regime where the coefficient of friction is almost independent of the applied oil concentration level. Especially for rolling situations in the last passes of cold mills where the strip surface roughness is smoothened by the previous reductions and the material strength is significantly increased due to work hardening, the oil concentration and lubricant viscosity becomes increasingly important.

By applying the DAS in the last two passes, the total reduction could be increased by approximately 3% (based on the same rolling forces and rolling torques as in the case without DAS).

Benefits achieved by the DAS during the final two passes, however, include better roll-gap lubrication and reduced coefficient of friction and friction losses (e.g., back-up roll bearings); reduced rolling forces (energy savings); reduced rolling torques and motor power (reduced current consumption); a potential extension of the product mix by increased reduction capability (with unchanged hot-band thickness); potential extension of the product mix by reduction of the minimum achievable product thickness (extension of rollability); reduced restrictions on hot-band thickness (higher productivity of the hot mill); and improved roll service life (reduction of roll consumption).

To further improve the effectiveness of the Direct Application System, ISD Dunaferr and Siemens VAI Metals Technologies intend to continue their work on the optimization of the DAS. Ideas for further improvements are based on an improved plate-out, which can be influenced by tailor-made rolling oils (e.g., with reduced solution stability), different application temperatures, increased contact time and optimum ratios between DAS flow rate and DAS oil concentration.

Otto Varga (ISD Dunaferr),
Dr. Konrad Krimpelstätter
(Siemens VAI Metals Technologies)

Without Direct Application System (DAS)

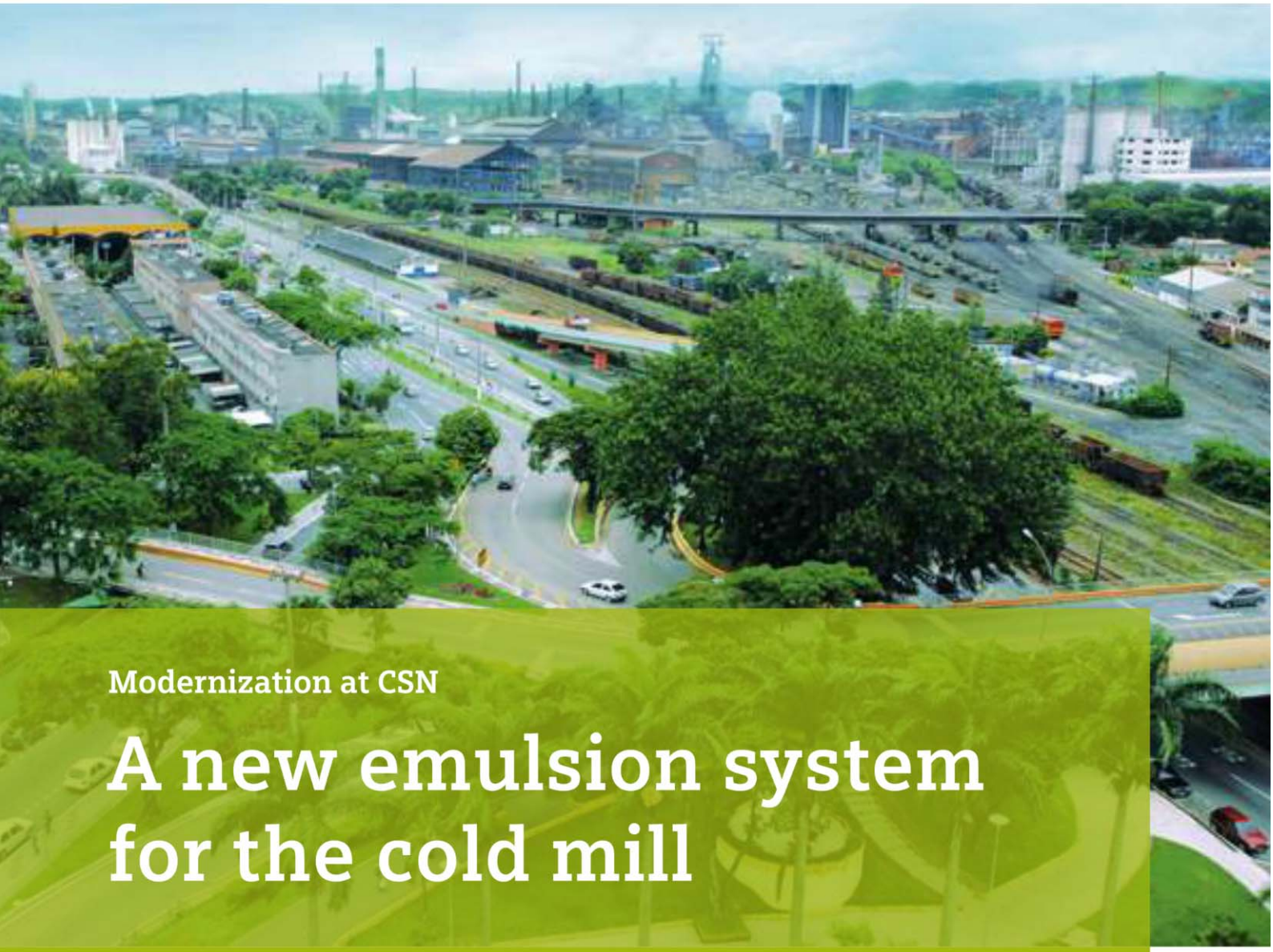
Existing pass-schedule
1.780 mm
1.310 mm
0.920 mm
0.660 mm
0.477 mm
0.355 mm
0.280 mm

Total reduction: 84.3%
Number of passes: 6

Direct Application System (DAS) applied in the last two passes

New pass-schedule
1.780 mm
1.310 mm
0.920 mm
0.660 mm
0.477 mm
0.325 mm
0.230 mm

Total reduction: 87.1%
Number of passes: 6



Modernization at CSN

A new emulsion system for the cold mill

The "clean" solution not only saves money – it also improves the product and helps win new markets.

Last August, a new emulsion system went into operation at the No. 3 cold mill at Companhia Siderúrgica Nacional (CSN) in Volta Redonda, Brazil. The result: improved strip cleanliness, which even helped CSN win new markets.

With an annual capacity of 5.8 million tons of flat steel, CSN is the second-largest steel manufacturer in Brazil. The No. 3 tandem cold mill in Volta Redonda has five stands – one of the biggest in South America – and a capacity of 2 million tons of flat steel per year. The mill's output is sold to local companies for construction needs, white goods, automobile manufacturing and tin plate.

As part of a contract for a complete revamp, Siemens delivered a new emulsion system for mill No. 3. The original design of the emulsion system, responsible for proper rolls lubrication and cooling, featured four 300 m^3 tanks, two 60 m^3 tanks, and 12 pumps to transport up to 10 m^3/minute of oil and water to each of the five stands. Disc separators and common tanks were used for all stands.

Cold Mill No. 3 at a glance

- Type: Five four-high mill stands
- Original manufacturer: Hitachi/Villares – revamped by Siemens in 2011
- Current production capacity: 2,050,000 t/a (2012)
- Entry thickness: 1.8 mm/4.78 mm
- Exit thickness: 0.25 mm/2.67 mm
- Width: 610 mm/1,575 mm
- Maximum coil weight at entry/exit: 40.8 t
- Maximum speed at delivery: 1,890 m/min.

Minimal capital expenditure

The revamp design set out to improve the strip surface cleanliness by reducing the content of iron fine remaining on the strip and to lower overall oil consumption. The good news for CSN is that the goals could be achieved with a minimum capital expenditure, especially since the existing tanks could be reused.

The existing tank A with 300 m^3 capacity was reserved for mill stand 1 and fitted with a magnetic separator. For the intermediate stands 2, 3 and 4, one of the 300 m^3 tanks was equipped with magnetic separators, an oil skimmer and agitators. In order to improve the cleanliness of stand 5 and to significantly lower oil content, a vacuum filter and magnetic separator were installed in one of the 60 m^3 tanks and return line; the treatment capacity averages 4,000 l/minute of emulsion returning from the stand. The installation and cold commissioning of the new emulsion equipment were carried out in parallel with production. As a result, the mill had to be shut down for only 36 hours to restart production. Thanks to the new equipment, iron fines can be more efficiently removed than previously when optimization of tank use resulted in lower oil consumption. And with the improved strip cleanliness, CSN has gained some new markets in the automotive segment.

Philippe J. Mouls

Oil skimmer (left) and the five stands at CSN's No. 3 cold mill

Plant performance and life-cycle management

Competition as a proof of endurance

Andreas Flick
Chief Technology Officer
Siemens VAI Metals Technologies

Three trends are shaping the future development of steel production. Industrial IT: How can plants be operated as efficiently as possible? Mechatronic design: How can we optimally design a plant? Service: How can we support our customers as effectively as possible? Metals Magazine spoke about these topics with Andreas Flick, who is responsible for innovation management at Siemens VAI Metals Technologies.

More and more, new goals for optimal steel production call for IT and automation solutions

For Andreas Flick, Chief Technology Officer (CTO) at Siemens VAI Metals Technologies responsible for the development of innovations and plants, lifetime partnership is a permanent process, one that aims to maintain a system's performance over a period of 40 years or more. This can be achieved by developing new components and processes, or simply through classic modernization, which involves replacing old system parts with new ones that perform better. But there are also plants where even an upgrade to the latest technology will not help, and these are recommended for closure. In the majority of cases, says Flick, "New processes and more efficient components keep the plant in good shape and keep production competitive and sustainable." Flick sees sustainability and innovation as the driving forces of modern plant management rooted in a long-term partnership between the plant operator and plant manufacturer. Metals Magazine spoke with the CTO of Metals Technologies about the future of life-cycle and lifetime management. »

"Sustainability and innovation are the driving forces in modern plant management."

Andreas Flick

» **Everyone is talking about modernization. It has become a fairly hollow term. Normally it refers to mechatronics or automation or new drive technology to improve the production process by making better use of the plant. What does modernization mean for you, and will this be crucial to securing added value in the steel industry of tomorrow?**

We can see all kinds of trends at work, and all of them are heading in the direction of a virtual steel plant. Tomorrow's aim is to simulate the processes online and calculate in advance, using a high degree of automation, what the optimal process is and how it should be carried out. For example, you buy raw materials at the lowest possible price and try to attain the desired quality of steel with an economical mix. Then there's the matter of making the steel manufacturing process as cost-effective and green as possible. There are always new goals being set for optimal steel production. At a steelworks, like in an automatic car, if I press the "Speed" button the maximum output will be produced. If I push the "Green" button the process will be optimized using other parameters, for instance to save energy and reduce emissions. Meeting such targets will give the operators of these works new potential to react flexibly to changes and new challenges.

We recognize three basic and crucial trends that are shaping the future development of steel production. One strand of development is determined by industrial IT: How can plants be operated as efficiently as possible? Another trend is determined by modular construction and mechatronic design: How can we optimally design a plant? The third development has to go in the direction of service: How can we support our customers as effectively as possible? This brings us to the life-cycle partnership.

Is the simulation of processes and systems also the key issue for the future?

That's part of it. For example, using simulation to determine optimal operating procedures. We retrieve the signals from the process. Thanks to the sensors we know the current status of the process, and on that basis we can decide how to shape the process according to different criteria: Green, Speed, Economy – or anything else.

"Tomorrow's aim is to simulate the processes online."

Andreas Flick

Siemens is installing state-of-the-art technology in electric arc furnaces in Finland and Saudi Arabia

Or according to market demands?
Market demands, supply chain – depending on what's most important. This is the way that processes will have to be designed in the future.

What does the customer require from Metals Technologies – and what does Metals Technologies require from the customer – to optimize processes? All kinds of physical parameters such as pressure, temperature, volume and speed have to be ascertained. Is this kind of data already available?
Naturally, the majority of this data is already available. But not all the process steps currently have the intelligent systems required to process this data, which is necessary to optimize the process chain. We already have products such as metallurgical reduction models, smelting models, cooling models, solidification models, rolling models and an energy optimization system. But we also require planning systems, condition monitoring systems and intelligence to bring everything together. This is the direction in which the overall trend is heading. It's a huge issue.

What is Siemens VAI Metals Technologies doing in this regard?
For example, we are developing MES (manufacturing execution system) solutions as part of our industrial IT activities. We have not yet used these for process simulation. This integration is just beginning. We want to simulate processes more comprehensively, and this makes great demands on the models. There are some metallurgical processes that are particularly demanding due to their complex kinetics. You can simplify the models, but if you want to simulate the procedure in detail using all kinds of input raw materials, it simply takes a long time. A lot of computer power and really fast computing algorithms are required to optimize processes in this way. That means we need basic information, so we have to be able to simulate the process chain really comprehensively.

The IT is already out there. The simulation that will provide the basis for a virtual steel plant is the black box we are currently working on. That's why I believe a life-cycle partnership begins at the point where we are developing innovations with a great degree of far-sightedness. If we want to reach new heights in the simulation of steel production and »

The Lomas offgas monitoring system installed by Siemens along with a holistic process model makes a valuable contribution to lowering costs and increasing operational safety

Electric steelmaking

Offgas monitoring saves money

The Simetal EAF Heatopt system improves both productivity and operational safety.

The U.S. steelmaker, Steel Dynamics Inc. (SDI) of Roanoke, Virginia, USA, issued the final acceptance certificate for the Simetal EAF Heatopt system installed by Siemens. The newly developed holistic process model combines modern measurement technologies like the Lomas offgas analyzer with an intelligent control strategy. The system is used to monitor the offgases from an electric arc furnace, and it makes an important contribution toward optimizing the process. It has reduced conversion costs by more than $1.50 per ton. Siemens is already the market leader for installing this technology in LD steelmaking converters.

"The Simetal EAF Heatopt (Holistic Energy And Transparency Optimizing) system with the Lomas measurement tool has completely fulfilled our expectations, and in some areas exceeded them," says Paul Schuler, meltshop manager at SDI Roanoke. "The real-time monitoring and control of the melting process in our 100-ton electric arc furnace has significantly reduced the specific conversion costs. We have also been able to raise productivity and increase operational safety."

The Lomas system and an integrated offgas flow speed meter continuously monitor and analyze the flow of offgas from a furnace. The measured values are fed into the holistic process model and evaluated. This gives the operator's personnel continual, up-to-date information about the progress of the process in the furnace. The system also generates recommendations for adapting and optimizing the process control. Output deficits arising in the process can be corrected by closed-loop control of the injection of natural gas, oxygen and carbon injection by means of burners and lances.

Continuous casting

Simetal Quality Expert automates quality assurance

Material losses and handling activities are reduced and at the same time the foundation is set for higher product quality.

Siemens is providing operators of continuous casting plants with a new tool for automated quality control: the Simetal Quality Expert. The expert system compares quality-related process parameters with the actual values in production and so analyzes the quality of the products. It supports the plant operator with online alarm signals and a quality forecast. With the Simetal Quality Expert implemented, inspection and post-processing of the products become obsolete to a great extent. Material losses and handling activities are significantly reduced, and at the same time they form the basis for consistently higher product quality. This in turn lowers production costs. Because all relevant product and process data are automatically entered, evaluated and stored, the system also provides a basis for certification, for example according to the ISO 9001 standard.

Simetal Quality Expert is a completely new development and replaces the VAI-Q quality assurance system that has been installed in more than 200 plant systems worldwide. The new system was developed with the objective in mind of providing the plant operator with the most flexible tool for consistent and dynamic provision of all relevant data. The system can be quickly and simply adapted to changing production conditions. This is supported by a sophisticated data tracking system and a rule editor that is configurable according to user requirements. The quality forecast is made by means of configurable rules or optional self-learning algorithms. Because the quality forecast data of the Simetal Quality Expert are immediately available following production, lower-quality products can be removed directly from the process chain. Products meeting the quality standards, on the other hand, can be further processed.

Simetal Quality Expert from Siemens: forecast for the probability of various types of metallurgical defects across the entire product length

» reap the associated benefits, we have to make a start here and now. It can take years for a new product or a new process to become reality.

So we're not talking about tomorrow, but further in the future?

It's a long journey that we have to make, with a determined attitude and the best engineers. If we reach the point where we can create a virtual steel plant, the benefit would be that such complex plants could be operated entirely differently in the future. One important step along the way will be to remove people from the dangerous process environment and bring in intelligent machines. We have already installed the first robots – LiquiRobs – in proximity to liquid steel at steel plants and continuous casting plants. The next step is to make them intelligent. This is where it gets exciting. This is where the research is heading, and this is what we have to work on.

> *"In the future we will have to practice completely integrated design."*
>
> **Andreas Flick**

In my opinion, this requires an entirely different approach to plant design. The plants have to be made up of modular elements that combine technology and mechatronics. These should be standardized, yet retain the flexibility to adapt to customer requirements. At the moment people think that basic design is done at development centers and detail design can be passed on to low-cost countries. Designing the plants in parallel isn't an option, nor is becoming quicker or cheaper. In the future we will have to practice completely integrated design. I call it mechatronic design. That means starting with requirement engineering, which will lead into the processes of designing the modular elements. The intelligent part will be the requirement engineering, which must answer the question: What does the customer need, and what do I need?

Requirement engineering needs a sale to already be in place. If a seller is

Billet casting

First order for a new casting plant concept

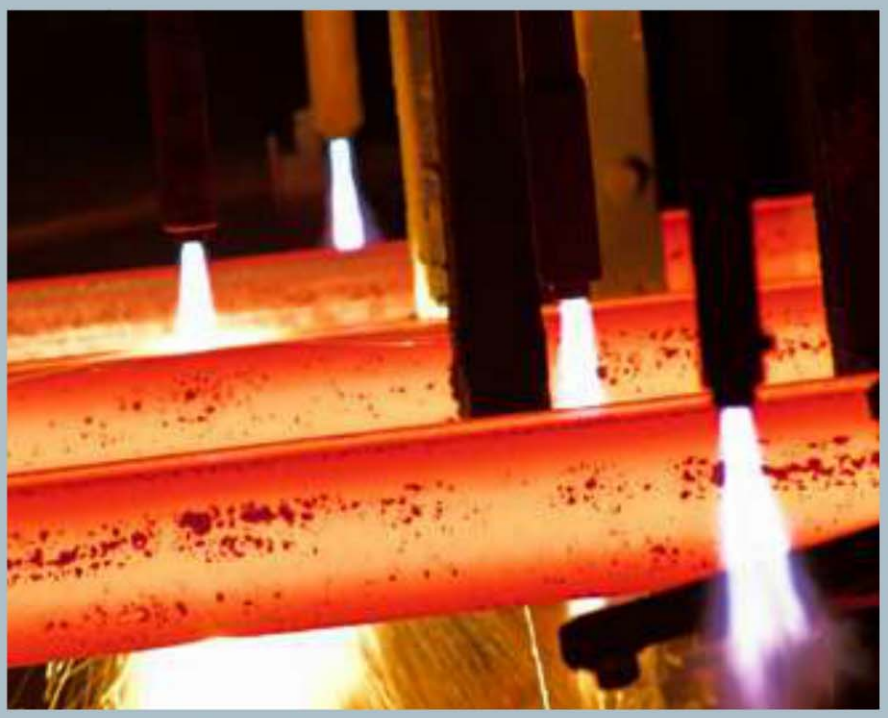
The two-strand casting plant from Armenian steel producer ASCE Group is designed to produced 200,000 tons of billets yearly.

The Armenian steel producer ASCE Group OJSC is the first company to operate a compact and cost-efficient continuous billet casting plant for carbon steels that complies with the new plant design presented by Siemens in 2011. The two-strand casting plant in the company's Charentsavan location is designed for production of 200,000 tons of billets per year. Commissioning of the plant ordered from Siemens is planned for mid-2013.

ASCE Group OJSC is the market leader in scrap recycling in Armenia and operates an arc furnace-based compact steel plant in Charentsavan. At the end of 2011 the company ordered a bar rolling mill from Siemens, which is also to commence production in mid-2013.

The rolling mill receives its material from the new continuous billet casting plant. It features a machine radius of 6 m and will produce 200,000 tons of billets annually with a square cross-section of 120x120 mm. Both quality steel and low and medium carbon steel can be cast. The scope of delivery also includes basic automation (Level 1) as well as the operator control and monitoring system.

The continuous billet casting plant was conceived in accordance with the new Siemens plant design. Each line has a casting capacity of 100,000 tons annually. The individual lines can be operated independently of one another. Thus, the plant's capacity can always be utilized optimally depending on the available quantity of liquid steel.



Continuous billet casting plant from Siemens: a new compact and cost-efficient plant concept shortens project times

capable of selling a plant built to customer specifications, we can base our modular elements on the requirements data, and therefore the order can be processed much more quickly and even automated at certain stages. Time will be the competitive factor of the future, with a quick turnaround from the signing to the first manufactured product. Investors want to earn back their capital investment as soon as possible.

All the research around mechatronic design is heading in this direction: in Linz, Scandinavia, Germany, England – everywhere. Will you also integrate the idea of requirement engineering into the concept of mechatronic design?

Mechatronic design is a flagship project at Siemens. If we take the basic idea of a virtual steel plant, the first part is about process simulation – which is a highly complex matter – and the second part is about being able to simulate the plant modules during the design phase – mechanical stability, dynamic requirements during operation and the process steps in manufacturing. Then, while still at the drawing board stage, we know how the plant modules will behave in reality. Simulations like these not only make the offer process more efficient, they also provide greater certainty when it comes to the design. »

» How would you explain requirement engineering to a normal consumer?
I would describe it as "controlled requirement design." If an engineer would like a plant of a certain size, with a certain product of a certain quality, he or she already knows how the solution is going to look. To an extent the engineer becomes the developer. In the future we will have to say: the load lies between 500 and 550 tons, the hub between 800 and 1000 mm, the tilt angle between 90 and 210°, the pressure is limited to "x-y" bar. In this way we can define our standard, but also adapt flexibly to customer requirements.

What is the difference between requirement engineering and a tailor-made solution? We are talking about somewhere on the spectrum between the standard and a tailor-made solution.

"We have to be able to sell plants that meet customer requirements while making the greatest possible use of our modules."

Andreas Flick

Of course, customers don't want a standard plant per se, they just want *their* plant. We have to be able to deliver plants that meet their requirements while making the greatest possible use of our modules, although the modules can vary. Modularization is standardization with visible customization.

To achieve this, we need the support of design tools and intelligence, which will enable us to tell customers: You can choose to produce a drinking glass with a diameter between 6 and 7 cm. You can choose the height of the glass, the processing and everything else. But if you want to produce glasses with a 9 cm diameter, we'll have to redesign the entire production plant, which costs time and money. That's requirement engineering: we guide the customer up to the first batch. They are happy with their customized plant, and we have a system that tells us what consequences their requirements will have on our design process. Requirement engineering is about recognizing the correlations.

Requirement engineering will deliver answers to us more quickly in the future. This is what the entire industry is working on today.

Plant simulations require and produce enormous amounts of data. Are these amounts of data required for a life-cycle partnership?
They offer new opportunities for process and plant management, and service, for example ...

... and modernization, upgrades?
Of course. The intelligence with which we can develop or monitor plants will improve. Thanks to developments in Industrial IT, the whole process will be equipped with greater intelligence, aiding plant operation and optimizing production. We enable customers to improve their competitiveness by optimizing their processes and plants. The virtualization of processes and procedures will »

"Customers don't want a standard plant per se, they just want their plant."

Andreas Flick

Rail production

Collaboration for higher quality

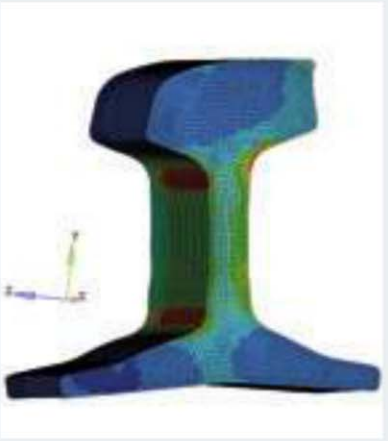
Siemens and CSM develop new production processes and technology packages.

Siemens VAI Metals Technologies S.r.l. and Centro Sviluppo Materiali S.p.A. (CSM), an Italian technical center, are joining forces to develop production processes and technology packages for rolling and processing high-quality steel rails. The goals are to improve overall toughness as well as railhead surface quality. A cooperation agreement will initially run for two years.

"Within the scope of this cooperation agreement, we will be combining Siemens' know-how as a full-line supplier of long-product rolling mills with CSM's many years of experience in the field of material research and process development," says Andreas Flick, Chief Technology Officer at Siemens VAI Metals Technologies. "Our joint goal is to offer customized technology packages that will enable rolling-mill operators to produce rails that meet the current and future demands of international rail transport."

The use of high-speed trains for long-distance passenger transport calls for excellent quality of the railhead surface. High axle loads imposed by freight traffic place increasing demands on the track bed and rails, with wheel loads of over ten tons often imposed on rail contact areas of just a few square centimeters. This requires rails that can not only withstand these high contact stresses but also have a high resistance to wear.

The cooperation between Siemens and CSM will therefore initially concentrate on developing a system for hardening the railhead. Starting from the metallurgical characteristics required for the railhead, technology packages will be created for the rolling and treatment lines in rail-rolling mills, which are suitable for both new plants as well as for integration into existing rolling mills.



Simulation of stresses in a rail segment with the finite element method

The cooperation between Siemens and CSM will initially concentrate on developing a system for hardening the railhead.

CSM is a private, market-oriented industrial technical center that focuses on research and development of materials and relevant processes. Since 1963, the company headquartered in Rome has been actively involved in Italy and abroad in the area of applied research for products and processes related to steel manufacturing, energy and transportation, oil and gas, and environmental technology.

Electric arc furnace

Furnace switchgear attains world record

The Simetal Sivac-X 4K furnace switchgear from Siemens has reliably switched a rated current of more than 4,500 amperes with a single circuit breaker in the test laboratory during the course of a successful type test according to IEC 62271.

This is significantly more than conventional furnace switchgears achieve. The switchgear has a rated voltage of 40.5 kilovolts, and can supply electric arc furnaces with power up to 300 MVA. The lightning impulse voltage is 200 kilovolts, which also makes the switchgear suitable for the North American market. The switchgear has achieved the fault arc qualification of IAC A FLR of 40 kA/1 s, thus also meeting the highest demands for personnel safety. The core component is the 3AH4 medium-voltage circuit breaker, which has a life cycle of up to 120,000 switching cycles. The type test according to IEC 62271-200 was performed by the CESI group in Mannheim and Berlin.

The Simetal Sivac-X 4K switchgear is designed to meet the extreme requirements of high-power electric arc furnaces, and ensures a reliable power supply as well as safe plant operation. Long maintenance intervals of up to 10,000 switching cycles increase availability and reduce operating costs. The 3AH4 range of frequency circuit breakers are designed for use under extreme environmental conditions. These include high temperatures, high air pollution, unstable operating currents, frequent short-circuit releases, and operating cycles with more than 100 switching cycles per day. For this reason, the circuit breakers have a rugged, insulated support design, and are equipped with freely accessible vacuum interrupters. This enables the interrupters to be replaced easily at the end of their service life of about 30,000 switching cycles.

The circuit breaker is specifically designed so that air can flow freely along the heatsinks. This enables the switching device to operate at up to 4,500 amperes in an ambient temperature of up to +40°C without forced cooling. The drive for the 3AH4 circuit breaker range is designed for up to 120,000 switching cycles over its entire life cycle.

About 400 furnace switchgear systems of the Simetal Sivac-X range are in use worldwide. Siemens offers switchgear for operating voltages ranging from 15 to 40.5 kilovolts and rated currents from 1,250 amperes to meet the specific requirements of electric steelmakers. According to the specific circumstances in the electric steel plant, the switchgear can be designed as an open unit with a permanently installed furnace circuit breaker, as a two-field system in a metal enclosure with a permanently installed circuit breaker, or as a single-field solution in a metal enclosure with a withdrawable furnace circuit breaker mounted on a traveling carriage.

The Simetal Sivac-X 4K supplies electric arc furnaces with power of up to 300 MVA

» mean that we can quickly provide customers with better, more customized solutions.

Won't the life-cycle strategy also change the role of Siemens Metal Technologies, making it not only an engineering partner and supplier of plant components and automation solutions, but a consultant too?

For me, consulting has always been part of our portfolio. But consulting in the context of plant life cycles will take on an entirely different meaning in the future. Up to now we have been talking about optimizing the individual processes. We can offer to optimize them and make concrete suggestions for improvements. But plant life cycles are influenced by various market demands that affect our customers' products and therefore determine their competitiveness. Take an example from China: a Chinese materials scientist from a European carmaker explained to our customer that its products are not suitable for the automotive industry. He also described what quality requirements rolled metal sheets for cars have to fulfill. This is where our consulting service comes into play. We can explain how the existing plants can be altered to produce the quality that the market demands and that the customer can sell – this is consultative selling. It's something we're talking about increasingly often, including with our customers' customers, in order to find a solution together. Of course, we then alter the process steps accordingly. If the quality is compromised due to slag inclusions in the casting process, we install a slag stopper in the LD converter. That's quite a trivial example, but through our consulting services we can help our customers to give their production a competitive orientation. And this, in turn, is our business. As life-cycle partners we therefore have a classic win-win situation.

Yet that also means the customers have to change their mentality and respond to market requirements, that simply producing the products they are currently able to produce is often not sufficient. Are changing market requirements having an ever-greater influence on production?

Yes, of course. The Chinese, for example, have outstanding plants that we have supplied, but they continue to operate

Thin slabs are produced here, and later they will be rolled in a hot mill

them as we did in Europe many years ago. Their goal over the next five to ten years is to reach the output quality that already exists for example in Europe, Japan and the United States.

But to do so they require our help?
They are doing a lot of research, but here in Europe steel production and knowledge of metallurgy have simply grown over the course of time. Now we are passing on this experience. For instance, we have made use of our Caster Technology Consulting (CTC) over twenty times, and this has led to contracts. So yes, we can call it consulting when we're talking about plant life cycles.

After all, it's the beginning of the life cycle.
Innovation and consulting are right at the start of a life cycle. Together they get the process started. Then we have plant construction and commissioning.

"Innovation and consulting are right at the start of a life cycle. Together they get the process started."

Andreas Flick

Normally from this point we are no longer "on site." In an increasing number of cases, though, another cycle begins here, including service, consulting, new ideas. That's how I see a life cycle.

A dying plant always interrupts the classic life cycle.
That's exactly right. The plant may be small, it may be a smelting works or it may be a whole group of companies. Once the plant is at its limits, you've got a problem. The plant can't increase its capacity, but in the meantime the world has kept on turning. So I have to say: I offer a service model that will enable the plant to reach the next level of performance. The trend of the past was classic modernization. Now we are starting to incorporate the new elements.

Is service becoming "more intelligent" now as well? You've often talked about giving plants "more intelligence." What exactly do you mean by this? Is it a structured collection of data that I can call upon as required?
Intelligence in the plant means that you can use the data that is collected to make the right decisions. »

Steelmaking

New sublance for LD converters

Simetal Sublance 2.0 from Siemens VAI Metals Technologies offers the operators of LD (BOF) steelworks a new lance system for temperature and oxygen measurement, sample-taking and bath level detection.

The system consists of a vertically mobile sublance, including a lance car and a special probe magazine. It combines a compact, inherently operationally safe drive design with a radar-based measuring system for fast, precise positioning of the lance, which can lower measuring cycle times to just under 110 seconds. The system is simply and ruggedly constructed, resulting in higher reliability and lower maintenance costs.

Because they are physically close to the converters in a steelworks, sublances are exposed to severe environmental conditions, such as high temperatures and heavy concentrations of dust in the ambient air. This makes maintaining and servicing lance systems correspondingly difficult and expensive.

The lance car is equipped with multiple, adjustable rollers that ensure smooth motion along the guiding rails.

The new Simetal Sublance 2.0 from Siemens is designed for installation above the converter cooling stack. Measurements and samples are taken through a port in the stack. The drive system of the sublance is designed on the same principle as that of an elevator. Two redundant steel ropes fed over non-slip traction sheaves connect the vertically mobile lance car to a counterweight. This is slightly heavier than the lance traveling device, so the device can be returned to its starting position in the event of a power outage or drive malfunction. This greatly increases operational safety. As only a low net weight has to be lifted, the drive motor can also have smaller dimensions, and the lance car can be moved more quickly and precisely than with conventional drive solutions. This facilitates measuring cycle times of just 110 seconds.

Simetal Sublance 2.0 from Siemens – simple, dependable and safe

The lance car is equipped with multiple, adjustable rollers that ensure smooth motion along the guiding rails. The sublance itself is attached to the lance car by a quick coupling device. The lance, together with the water supply, is automatically coupled by means of its own dead weight. Additional screws prevent accidental unhinging. The quick coupling enables the lance to be changed quickly and easily, as well as simply rotated through 180°. The lance can also be turned by hand to compensate for any thermal distortion. A centering device is mounted at the lower end of the guiding rail to position the tip of the lance precisely, even at a high operating speed. The lance is positioned by means of a measuring encoder on the drive and a non-contact radar system. No additional position encoders are required on the rails themselves. This increases both the reliability and the safety of the system. All measuring sensors are mounted on the drive platform for easy access.

Siemens has developed a new magazine solution for handling and holding the probes. The magazine has up to five storage boxes, each of which can hold 20 probes for long-term operation. Each box indicates the precise number of probes it contains, and sends a message to the control center when this falls below a settable limit. The boxes can be refilled by hand. A probe is rotated from the horizontal storage position into the vertical position by a special guiding rail. This turns the probe with the aid of its dead weight, and does not require any additional mechanical drives. Before mounting on the lance, the probe is fixated in a vertical position by a gripper, which also removes it after the measurement has been made.

A supplementary solution for automated calibration of the measuring system is currently under development. The Simetal Sublance 2.0 can also be combined with the Siemens LiquiRob robot system.

» Is it a matter of preparing the data?
No, one example would be having an integrated CMS (condition monitoring system). Another would be a spindle drive in a rolling mill that vibrates when it starts up. As long as the vibration is within a certain range, it's OK. If the vibration increases, the system detects the problem. The intelligence comes into play if we can say that, on the basis of this information, the spindle will probably have to be changed in three weeks.

That means the first stage is to observe, collect data, install sensors.
Yes, and then models and experience have to come into play. Then we can positively say that we're making progress. For me, intelligence at a plant begins at the point when I can evaluate the data intelligently. Perhaps intelligence can also be explained in relation to a fingerprint. Where do I have to leave behind a fingerprint so that I can detect the state of the pump, the valve, the spindle, the mechanical components? It's not a trivial matter. We have an R&D project to develop these fingerprints. We want to use the fingerprint to make a decision on whether a component is OK or whether it will have to be replaced or repaired in two weeks. Such decisions must ultimately be based on models that incorporate our experiences. For condition-based monitoring we have certain prerequisites, because at Siemens we have broad expertise on processes, mechanics, electronic engineering, motors, drive systems and so on. That means we can make prognoses about when something will malfunction and have to be replaced.

If you were to picture value creation in classic plant construction – mechanics, mechatronics, electronics, automation, then IT – you would remark that the amount spent on IT is relatively small in relation to the entire investment. But in relation to a plant's efficiency, this is a crucial investment.
It's a small investment that has a large impact. If it works and it is networked in the way we envision, the results will be very significant.

That means in the future investment behavior will focus on achieving great things with these small steps in IT. Will the biggest changes in steel production come in this area in the future?
There will certainly be a change in thinking, that's for sure. Equally, we mustn't forget that people with experience are becoming increasingly rare. Expertise is disappearing. There are more and more young people who still have little experience but are better connected than you or I, and they quickly absorb knowledge. You and I are "disconnected"; we're the people without Facebook. But I think that's going to change. Young people find it easier to deal with this type of media, and networks can help to compensate for a lack of experience. This will lead to a fine-tuning of each business: a little bit better, a little bit faster. This will surely change the way of thinking within companies. In addition, we will develop new processes and plant innovations with the aid of young talent, which is how we create sustainable products.

The robot system Simetal LiquiRob automates the casting platform and improves operational safety

By no means male dominated

Women are the better engineers

Two females engineers in leading positions at Siemens VAI Metals Technologies have one thing in common: already as young girls they attended technical schools. This is not (yet) possible everywhere.

"Discrimination against girls in technical careers varies from country to country."

Sabine Müller

As a Technology Manager at Siemens, Franka Leitlmeier coordinates research and development activities and is responsible for bringing newly developed products to market. Previously, after studying at the University of Leoben, she was head of aluminum and magnesium casting technology at Light Metals Technologies Ranshofen. This is where she developed a continuous magnesium casting system as part of her doctorate.

Sabine Müller wrote her diploma thesis on the "Blade cooling of aircraft engines" before joining Siemens Energy, where she was responsible for designing, commissioning and selling power plants. Four years ago she switched to Siemens VAI Metals Technologies, where she initially worked with heat exchangers and dedusting systems. Today she manages the global engineering network at Siemens VAI Metals Technologies and is responsible for the technical cooperation and capacity utilization of engineering locations worldwide. "My job is to connect the cogs," says Müller, referring to way engineers from the Czech Republic, India, China and Austria cooperate.

The two women have something in common: they both attended technical schools – in Bosnia and in former East Germany, respectively. "Where I'm from the technology classes were intended for both girls and boys," recalls Leitlmeier. She first experienced differences in education systems after the fall of the Berlin Wall, when she went to the University of Leoben. "At home in Bosnia the emancipation of women in technical careers was more advanced than here," reports Leitlmeier. "The ratio of women to men was 50:50. In Leoben I was only the third woman to complete this course of study."

Different forms of discrimination

"Discrimination against girls in technical careers varies from country to country," says Müller. When she moved from Germany to Austria four years ago, she found this step much tougher than going to work on construction sites in Indonesia or the United States, even though the tasks were similar. "Technology is still a male-dominated domain here, and I have the feeling that Austria is still 10 or 15 years behind other countries when it comes to the role of women," states Müller. At the very first interview she attended, dressed in a suit, the boss started "beating around the bush": "Could you imagine working on a construction site and on commissioning jobs?" – "Of course I can." – "Well yes, but it does involve, how I should I say this..." – "...climbing scaffolding? I've done

all that. The boiler at the power plant is 100 meters high and the elevator doesn't always work." – "Yes, but you know, these construction sites can be dirty places too." – "Yes, and a coal power plant isn't exactly a cleanroom either." Müller thought to herself: "My goodness, what world are they living in?" The men soon changed their ideas about the "woman on the construction site." At Siemens in Erlangen Müller has managed a technical department with 20 employees; today she coordinates engineering activities in a network of several hundred engineers. Men have to change their perceptions so that women have a chance, both Leitlmeier and Müller stress, because women bring qualities – to technical careers in particular – that are not exactly among men's strengths.

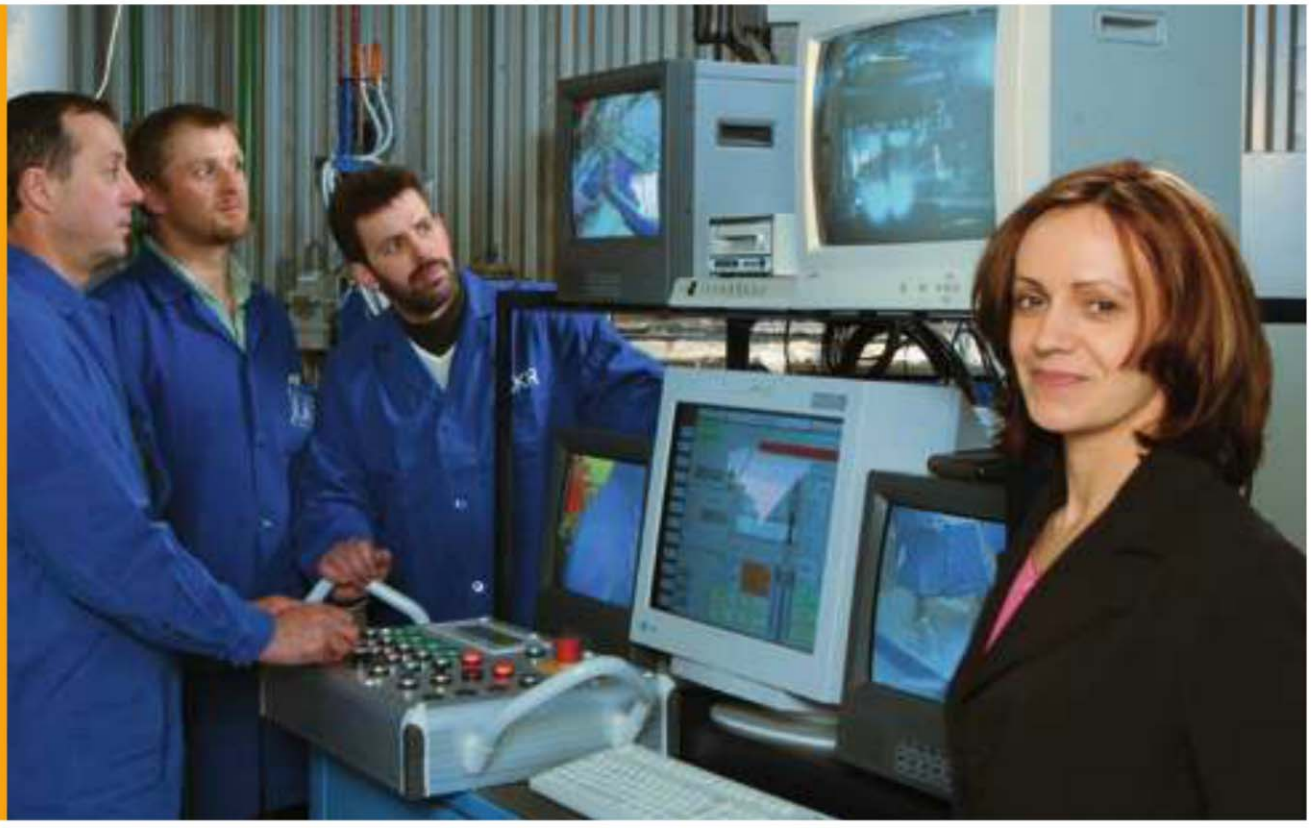
"Women are very good at networking and have strong people skills," emphasizes Müller. "Men have their networks too, but the main difference is that women have a better sense of the company as an entire system. They want the work to go well. Most men want to be in the limelight. They want to show everyone: I've done that. These are my results." "Women are not quite so concerned about receiving this attention," says Leitlmeier. There are always some exceptions, she adds, but most women she has met in the technology sector "are concerned about the project and making sure the work is a success."

No stereotypes

"Women have to be determined if they want to hold their own in a man's word," explains Leitlmeier. They have to know what they want and never let themselves think: "I'm a woman so I'm not cut out for technology." Girls who are interested in an engineering career "shouldn't be misled by the cliché that their only career options are to become a hairdresser or a housewife." They should be clear about their skills and interests, and pursue their goals to "ultimately improve or change things, even in the technology sector."

Leitlmeier wishes there were more women in engineering careers – not just because meetings with women tend to stay focused on the matter at hand rather than being sidetracked by attention-seeking. "I wish more women would study technology in Austria, that it weren't a taboo subject where people think: We protect the women, so they shouldn't study anything technical," says Leitlmeier. "And it's not as if the women are too dainty to do the work either," says Müller. "It's not all hard physical work anymore. There's a need for clear, intelligent and creative minds. And women are creative, we know that."

> *"Women have to be determined if they want to hold their own in a man's world."*
>
> Franka Leitlmeier



Compliance

Theo Waigel at Metals Technologies

The former German politician audited the compliance system on behalf of the SEC.

"Siemens and its employees are close to my heart – as well as fair competition, which is in everyone's interest. Siemens can make a valuable contribution in this area," said Theo Waigel three years ago when he took up the post of Compliance Monitor for Siemens.

In the United States, monitoring of a company's compliance processes is a regular component in a settlement on criminal proceedings. Theo Waigel was employed as a monitor in the course of dealing with the accusations from the American Department of Justice (DOJ) and the U.S. Securities and Exchange Commission (SEC). Since January 2009, he has observed and monitored the compliance system in regard to efficiency and sustainability, and he pays particular attention to sensitive areas where problems can occur. In addition, he reports to the DOJ and SEC regularly on the effectiveness of the company's compliance measures. The recommendation to name a German monitor was Siemens' idea; the U.S. authorities agreed with the recommendation.

In his fourth and final year as compliance monitor, Theo Waigel and his four working teams visited and audited Siemens VAI Metals Technologies. On the agenda was the evaluation of compliance processes, which took place in close cooperation with the Business Unit. The system was judged according to the ability to avoid and combat corruption: Have the appropriate processes been introduced? Or ist there room for improvement? The working groups, along with local legal and compliance teams and supply chain management, audited these areas. Particular attention was paid to auditing business partners and the project business. For Waigel, independence is important: "My team and I are autonomous and independent – from Siemens as well as from the authorities.

Theo Waigel (middle) gathered information personally in regard to compliance at Metals Technologies

The next station for Theo Waigel and his team was Siemens in Vienna. The areas and regions that are audited is not arbitrary; it follows a plan that is coordinated with the DOJ and SEC. At the end of the year, a report with the status from the implementation of compliance measures is sent to these authorities.

Business at MT

Bit by bit: MT pushes product sales

Making it easy for customers to buy – that is the goal of sales manager Stefan Lechner.

Stefan Lechner is responsible for global sales of MT products

In collaboration with the businesses, Stefan Lechner defined 150 products that starting in the fall will go on sale in selected regions all over the world. In the following he describes the approach:

"As a plant builder, we have always concentrated primarily on the project business. To be quite honest, we sold the products on the side with no system at all. Now we are concentrating on consistency and complementarity in product sales. Simply put: going forward we will sell our products along the life cycle of a customer plant, and not according to the organizational unit of the sales rep.

"Product sales complements the product business. Automation, mechanics, mechantronics and spare parts are coordinated with one another for all our products. The customer buys a technically sound product for a fixed price. You can compare this to buying a truck. In essence, our product package is nothing more than a purpose-fulfilling, basic model. We also offer different standard variations, and our products can also be combined modularly. Furthermore, for an extra fee our products can be equipped with additional features according to customer wishes.

"For the compilation of the products, internal cooperation across departments and national borders is decisive for success. A given product may be engineered in the United States and manufactured in China, where we have the necessary competences and capacities. With progressing standardization and modularization of products, we will become quicker in making and processing offers, which will allow us to lower costs."

Pittsburgh, Pennsylvania, U.S.A.

AISTech

The Iron & Steel Technology Conference and Exposition, May 6–9, 2013

AISTech 2013 will feature technologies from all over the world that help steel producers to compete more effectively in today's global market. Visitors to AISTech – whether foreman or president, engineer or operator – can meet with other steel industry professionals to exchange technical knowledge and learn about the latest products, services, technology, methods and equipment in the industry. Organizers promise an event of superlatives. Some 320 exhibitors have already signed up, and 61,500 square feet of exhibit space have been sold to date.

Pittsburgh, U.S.A.

Lima, Peru

ALACERO

November 10–12, 2013

Regional and global steel producers will meet to celebrate the 54 years of the Latin American Steel Association (ALACERO-54). At the same time, the most well-known companies in the steel industry will participate in the traditional exhibition ALACEROEXPO 2013. The venue for the event is The Westin Lima Hotel & Convention Center.

Mumbai, India

India Steel 2013

April 11–13, 2013, Bombay Exhibition Centre

India Steel 2013, organized by FICCI at Bombay Exhibition Centre in Mumbai, is the global platform for the promotion of India's steel industry. Over 130 exhibitors and 4,000 visitors are expected to attend India Steel 2013. Highlights include presentations of new technologies and a wide range of products. The event promises to be a great networking platform for all the major players in the industry.

Publisher: Siemens AG · Siemens VAI Metals Technologies GmbH · Turmstrasse 44
4031 Linz, Austria

Editorial responsibility in accordance with German press law: Heiko Hünsch

Editorial board: Ashish Gupta (Casting & Rolling), Andreas Flick (CTO), Heiko Hünsch (Communications), Michael Irnstorfer (Electrics/Automation), Norbert Petermaier (Steel Plants, Minimills, Environmental Technology), Dieter Siuka (Ironmaking), Dr. Anton Stallinger (Metallurgical Services)
Editorial staff: Julia Anselm, Dr. Rainer Schulze

Editorial assistance and contact:
Bettina Wimmer
Phone: +43 732 6592-4848
E-mail: wimmer.bettina@siemens.com

Publishing house: Agentur Feedback Corporate Publishing · Friedrichstr. 22
80801 Munich, Germany

Printed by Mediahaus Biering, Munich, Germany
Publication date: January 2013
Total circulation: 22,500
Order No. German editon:
E10001-M10-A18-V1
Order No. English edition:
E10001-M10-A18-V1-7600
ISSN 2194-5381
Dispo No.: 21661
K. No.: 28105
Photo credits:
Corbis: pages 18, 43 · Getty: cover, pages 20/21, 22/23, 24, 25, 26/27, 32/33 · iStockphoto: pages 28, 30/31, 38
All other photos courtesy of Siemens.
Metals Magazine is published quarterly.

Would you like to learn more about Siemens VAI Metals Technologies and our latest developments?

Then register for a subscription online at: www.siemens.com/metals-magazine.

Of course, you can also send us an e-mail to: metals@siemens.com.

SIEMENS
VAI

E10001-M1-Z45-V1-7600

Strand-guide rollers available on demand

Thanks to our innovative stock concept

www.siemens.com/metals

Would you like to reduce your tied-up capital? Well, now you can, using a new flexible concept from Siemens VAI to reduce stock quantities and times.

Exceptional quality is ensured for deliveries of new strand-guide rollers as well as for refurbishments carried out in our own in-house workshops.

With the innovative stock concept from Siemens VAI, we take some of the strain out of your maintenance planning.

Answers for industry.

As progress is made with new materials, demands are increasing on one of the classic manufacturing materials: steel. Thinner, highly resistant steel sheet not only benefits the automobile industry, which is able to produce vehicles that are more efficient and environmentally friendly; other industrial sectors also benefit, such as with stronger supporting systems and energy-absorbing structural components made from dual, multi-phase and high-strength steels like AHSS and UHSS. Steel with strengths and yield limits of more than 700 MPa – which previously were considered scarcely possible – can now be produced. And in many research labs of European steel producers, plans are already in place for the manufacture of better steel grades that meet customer demands.

Through rolling and in the cold section of a hot-rolling mill, all types of steel get the final microstructure characteristics that correspond to the required quality level. Technology packages from Siemens VAI Metals Technologies regulate roll pressure and the cooling intensity so that the desired microstructure of the rolled product can be precisely defined. Using newly developed cooling section automation and intensive cooling, it is now possible to produce the newest types of steel in older facilities.