Issue December 2024

STEEL+ TECHNOLOGY

04/24

THE TECHNICAL MAGAZINE FOR IRON AND STEEL PROFESSIONALS AROUND THE WORLD

STEEL CONFERENCE

HÜTTENTAG 2024 with trends on energy, hydrogen and artificial intelligence

STEEL COMPANIES

New main R&D centre and office building at SSAB Raahe works, Finland

STEEL TECHNOLOGY

Work roll conditioning – how to optimize roll shop performance and efficiency

STEEL MATERIALS

Seamless steel tubes and flat steel for pipelines for hydrogen transport

SMS group

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Challenges of the green transition

Arnt Hannewald,
Dipl.-Ing., Editor

Recently, in November, two major steel conferences took place in Essen, Germany – a city with a very long and rich mining and metallurgical heritage and the centre of the German Ruhr area. Firstly, the AIST European Member Chapter met for the European Steel Forum on 5-7 November (see **page 34**). This was followed on 19 November by HÜTTENTAG, the annual steel technology event in the heart of Europe. The latter event was initiated by our publishing house, DVS Media GmbH, in 2019, since we have the privilege of organising this gathering of the (mainly German) steel industry (see **page 18**).

Obviously, both conferences focused on the transition of the steel sector and the latest developments towards carbon neutrality and zero-carbon energy, no wonder. After attending these events, I came away with some general insights.

First, the decarbonisation of the steel sector is well underway, but the strategies differ. On the one hand, some steel companies are firmly on the DR-EAF path – in the future powered by zero-carbon electricity and using "green" hydrogen for their technologies (which will require even more zero-carbon electricity for H_2 generation). Still other steel companies are very cautious about the CAPEX and – even more so – the OPEX of such a radical shift from BF/BOF to DR/EAF. These steelmakers are reluctant to dismantle their existing hot metal production facilities, but they seriously acknowledge and promote the green transition. However, they are reflecting on the promising developments underway to reinvent the blast furnace by adapting low CO_2 technologies in several facets (bio char replacing fossil coke, hydrogen injection instead of PCI, CCSU, etc.).

Second, the global steel map is changing, at least from a European point of view. In particular, the availability of low-cost renewable energy and resources such as steel scrap and iron ore suitable for direct reduction will be critical aspects of a competitive steel value chain. Until now, the so-called integrated iron and steel complex – the processing of iron ore and coal into hot metal that is refined into liquid steel, continuously cast and later hot-rolled into steel products, all in the same location – has been considered the ultimate solution. Some experts believe that a future optimised value chain will have some steps in different locations: direct reduction of iron ore where renewable energy is available at the lowest cost, but steel making ('melting and pouring' and downstream processing) somewhere else, closer to the market. Time will tell.

However, the global phase-out of steel production from fossil coal has only just begun. For the foreseeable future, there are more new BF projects (in terms of production capacity) planned or under construction than conversion projects worldwide. The green transition will remain a challenge.

18 Energy supplies for the green transformation and the potential of artificial intelligence were the hot topics at HÜTTENTAG 2024

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The Nucor Steel QSP-DUE plant is under construction.

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QSP PLANTS

New Chief Human Ressource Officer at thyssenkrupp Steel

Dirk Schulte (59) has been appointed as the new Chief Human Resources Officer and Labor Director at Germany's leading steel company thyssenkrupp Steel. Currently serving as Labor Director at enercity AG, he will assume his new role at thyssenkrupp Steel on January 1, 2025. Previously, he held similar positions at Salzgitter AG and Berliner Verkehrsbetriebe, among others. The qualified power plant electronics technician and graduate economist commenced his professional career at Thyssen Stahl AG in Duisburg.

Ilse Henne, Chairwoman of the Supervisory Board at thyssenkrupp Steel: "With Dirk Schulte, we are welcoming an accomplished executive with experience across various industries. His expertise in reorganization and realignment processes will be invaluable as we address the forthcoming challenges at thyssenkrupp Steel in a structured and constructive way. We look forward to collaborating with him."

thyssenkrupp Steel

Dirk Schulte, CHRO of thyssenkrupp Steel Europe AG from January 1, 2025
(Picture: thyssenkrupp)

Tata Steel Nederland appoints Akash Latchman as Chief Project and Engineering Officer

In his role as CPEO, Akash Latchman is responsible for the technical realisation of Tata Steel's Green Steel plan at the IJmuiden site. He has also become the fifth member of the Board of Management of the company. In recent years, Akash Latchman worked at the South African chemicals and energy company Sasol, that has a global footprint. He has led several large, complex industrial projects in North America and Africa.

With the appointment of Akash Latchman, the Board of Management consists of five members: Hans van den Berg (CEO), Hans Turkesteen (CFO), Tom Eussen (Managing Director Tata Steel IJmuiden) and Gunilla Saltin (Managing Director Tata Steel Downstream Europe).

Tata Steel Nederland

Per Elfgren has been appointed new head of SSAB Special Steels

Per Elfgren has been promoted from his previous position as head of Market Development at SSAB Special Steels. He took up the new role on 1 November, when he also became a member of SSAB's Group Executive Committee. He succeeds Johnny Sjöström, who has recently been appointed President and CEO of SSAB.

"Per has played a major role in taking SSAB Special Steels forward to its present position and he knows both the company and the culture well. His experience of the market and an international customer focus will be important in continuing to strengthen our unique customer offering in high-strength steel, and on our journey towards becoming a fossil-free company," says Johnny Sjöström, President and CEO of SSAB.

Per Elfgren (MSc Material Physics) has extensive international experience of leading positions with responsibility for marketing, sales and product development, for example. For the past eight years, he has been a member of SSAB Special Steels' Management Team and has been responsible for market development and for Abraservice, a fully-owned SSAB company. Per Elfgren joined SSAB in 1996.

SSAB

Per Elfgren succeeds Johnny Sjöström as new head of SSAB Special Steels
(Picture: SSAB)

SETTING THE STANDARD FOR HIGH PRODUCTION MELTSHOPS

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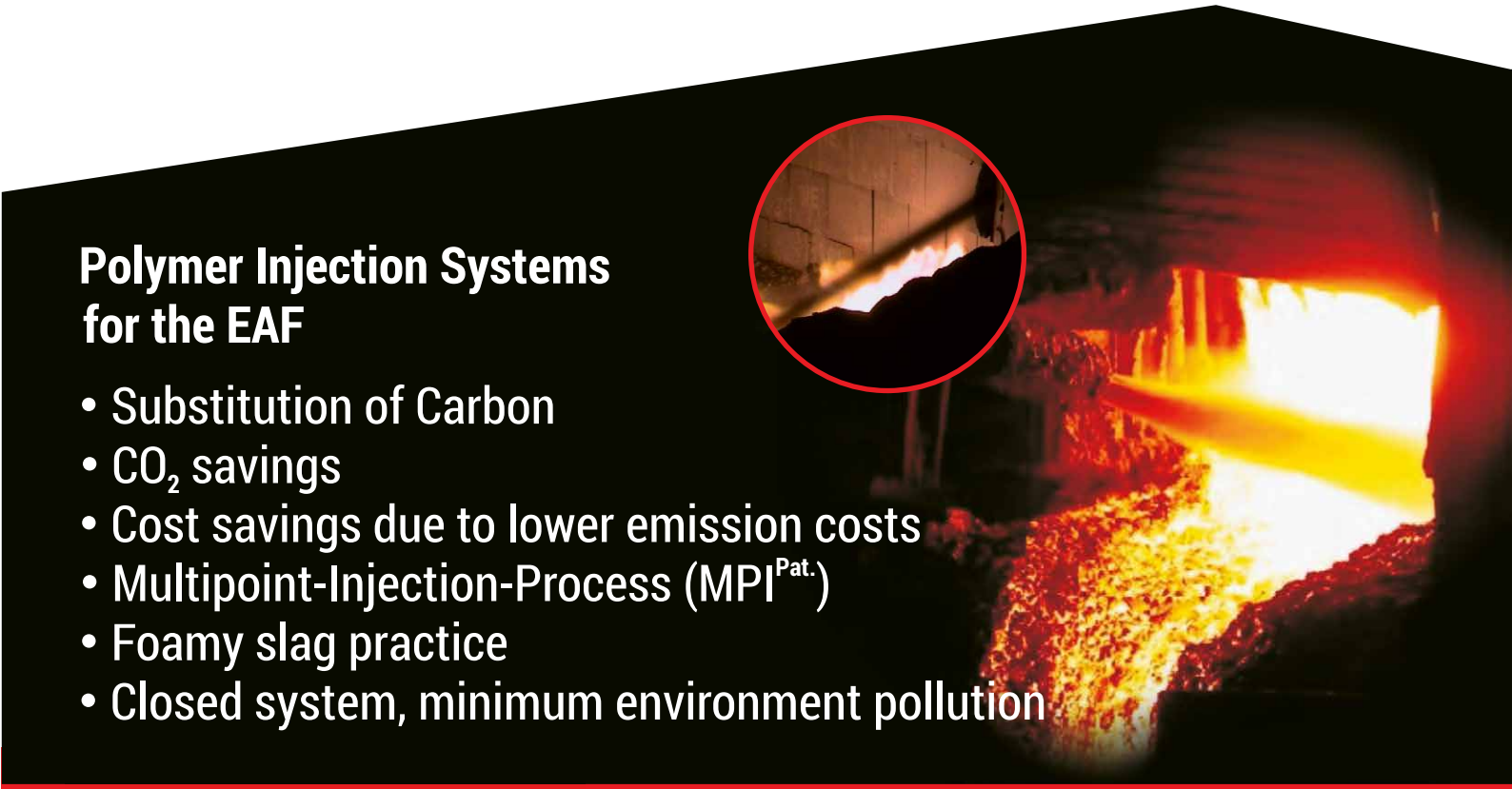

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Salzgitter Flachstahl appoints new management board chair

The supervisory board of Salzgitter Flachstahl GmbH (SZFG) has appointed Dr Heike Denecke-Arnold as the new chair of the management board. She will assume the position in January 2025, succeeding Ulrich Grethe who will leave the company to enter retirement.

Dr Heike Denecke-Arnold studied metallurgy and materials engineering at RWTH Aachen University where she subsequently completed her doctorate. Gunnar Groebler, chair of the supervisory board of SZFG and CEO of Salzgitter AG, commenting on the appointment. "We are delighted to have recruited a proven steel expert and natural leader for our group in Dr Denecke-Arnold. We are currently engaged in transitioning to low-carbon production processes. I am certain that with her extensive know-how, Dr Denecke-Arnold will integrate and drive the further implementation of SALCOS® – Salzgitter Low CO_2 Steelmaking forward, with the prime aim of creating value-added solutions for our customers."

Salzgitter AG

Dr Heike Denecke-Arnold takes over as the new chair of the management board of Salzgitter Flachstahl GmbH (SZFG) effective January 2025 (Picture from the archives: thyssenkrupp)

worldsteel elects new officers

The board of members of the World Steel Association (worldsteel) has elected the executive board of directors for the 2024/2025 period.

Chair of the executive board is T. V. Narendran, Chief Executive Officer & managing director of Tata Steel. Ugur Dalbeler, CEO, Çolakoglu Metalurji A.S. and Leon Topalian, president & CEO, Nucor Corporation, have been elected vice chairs, and Mark Vassella, managing director & CEO, BlueScope Steel Limited, treasurer of the board. Chair of worldstainless is Akihiko Inoue, representative director & president, Nippon Steel Stainless Steel Corporation. The newly elected individuals will hold office for one year.

worldsteel

T. V. Narendran, CEO & managing director of Tata Steel, is the new chair of the Executive Board of Directors of the World Steel Association (Picture: worldsteel)

Martin Lindquist new Chairman of the Board of Swiss Steel Group

Martin Lindqvist (62) has taken over as Chairman of the Board of Directors of Swiss Steel Group, succeeding Jens Alder, with effect from 30 October 2024. Lindqvist brings extensive industry experience as the former Chairman and CEO of the Swedish steel company SSAB. Jens Alder will continue to serve as Vice Chairman of the Board of Directors of Swiss Steel Group.

Lindqvist has a distinguished background in the steel industry, most recently leading SSAB in its transformative journey toward fossil-free steel production. During his years at SSAB, Martin Lindqvist held various Head of Business Area positions. Prior to his tenure at SSAB, he held key roles at renowned companies such as NCC and Outokumpu Copper Strip. Currently, Martin Lindqvist serves on the Board of Directors of SCA, Europe's largest private forest holding. He has also previously served on the board of INDUTRADE. Martin Lindqvist holds a degree in Economics from the University of Uppsala in Sweden.

Swiss Steel Group

Niklas Wass to leave Outokumpu

After more than 20 years with Outokumpu, Niklas Wass, President of the Stainless Europe business line and a member of the Outokumpu Leadership Team, has decided to leave the company to pursue a career opportunity outside Outokumpu. He will remain in his position until the end of March 2025. A process to find his successor has been initiated.

Outokumpu

BELGIUM

ArcelorMittal Belgium launches Magnelis® metallic coating line

ArcelorMittal has opened a new hot-dip galvanizing line at its Gent mill, producing 100% Magnelis® coated steel.

The Magnelis® process was launched in 2011 and has been adopted in many sectors such as construction, racking, electrical equipment and HVAC (cooling and heating techniques), agriculture and civil engineering. This continuous hot-dip galvanizing process uses a unique molten bath composed of zinc, 3.5% aluminium, and 3% magnesium.

Magnelis® is widely used in the solar energy segment producing profiles and structures for solar farms, industrial roof panels and concentrated parabolic towers. Manfred Van Vlierberghe, CEO of ArcelorMittal Belgium, commenting on the new production line: "Magnelis® offers more than 50 years of corrosion resistance. By combining it with ultra-high-strength steels, we are able to optimize steel usage and consequently reduce the carbon footprint."

ArcelorMittal

FRANCE

ArcelorMittal Fos-sur-Mer commissions ladle furnace

ArcelorMittal Fos-sur-Mer has commissioned its new ladle furnace, representing an important milestone in the site's contribution to energy transition.

The start-up of the ladle furnace marks an important milestone in ArcelorMittal Fos-sur-Mer's decarbonisation journey, which involves a major transformation of the steelmaking process. The two-year construction phase for the ladle furnace was completed in the first quarter of 2024 and has been undergoing tests since the summer. The new facility includes two ladle stands, for more than 330 t of liquid steel each. The liquid steel is heated by three electrodes to the temperature required for the manufacturing process. The ladle furnace will reduce the amount of hot metal used by 10%.

ArcelorMittal

(From left to right) François Sgro, CEO ArcelorMittal Méditerranée; René Raimondi, mayor of Fos; Isabelle Campagnola-Savon, representing the Sud region; Christophe Mirmand, region Préfet; and Bruno Ribo, former CEO ArcelorMittal Méditerranée, during the inauguration ceremony (Photo: ArcelorMittal)

GERMANY

voestalpine sells Buderus Edelstahl to Mutares

Aerial view of the Buderus Edelstahl facilities in Wetzlar, Germany (Photo: voestalpine)

voestalpine has concluded negotiations for the sale of its German group subsidiary Buderus Edelstahl to investment company Mutares SE & Co. KGaA.

With the sale of Buderus Edelstahl, voestalpine is concentrating the product portfolio of its High Performance Metals Division on the technologically demanding high performance materials segment, while simultaneously reducing its share of

standardized tool steel and high-grade engineering steel production. Restructuring and investments made by voestalpine over the past years have created the solid foundations for the future success of Buderus Edelstahl. "We are passing on a company with a good stock of production facilities and skilled employees. With its investment portfolio, Mutares is the best option for Buderus Edelstahl, and we are confident that, despite the current economic climate, the overwhelming majority of employees will have a long-term future at this location," explains Reinhard Nöbauer, Member of the Management Board of voestalpine AG and Head of the High Performance Metals Division. The sale now awaits approval from the relevant competition authorities, with the transaction expected to be concluded by the end of 2024.

voestalpine

ITALY

Feralpi upgrades continuous casting machine

Feralpi selected Danieli Service for the upgrade of its six-line continuous casting machine in Lonato with a new tundish changing system.

The project consisted of the installation of a 'fly-tundish' tundish changing system on a non-Danieli machine. The scope of supply included the engineering, mechanical, electrical, and automation components, assembly and startup assistance services, and on-site training.

The work was carried out during a six-week summer shutdown replacing the tundish without re-stranding the machine. A transfer device allows the transfer of the tundish car in a housing station, while simultaneously positioning another tundish car in the casting position. The continuous caster produces 150 mm x 150 mm billets. The newly achieved tundish-change time of 6 minutes and 42 seconds is 14 seconds better than the target time.

Danieli

ITALY

Delna to build acid regeneration plant

Delna S.p.A., a company of ArcelorMittal CLN Distribuzione Italia, has awarded Tenova the order for the supply of an acid regeneration plant for its coil and wire-rod pickling line.

The new acid regeneration plant will be designed for a capacity of 2,000 liters/hour. It will feature the BLUEdriven™ FlexCapacity process that allows adjustments to steel production according to demand, while maintaining uninterrupted and stable acid regeneration. This configuration optimizes energy consumption, reduces the plant's ecological footprint and extends its lifetime.

The fully automated ZeroWaste process recycles the rinsing and scrubber water from the pickling process at different concentrations, recovering the available chlorides of the production cycle and closing the loop. The emission control system employed complies with the strictest emission values, as the effluent-free, multiple-stage cleaning section will result in no environmental contamination.

The project team for the new acid regeneration plant (Photo: Tenova)

"The challenge of this specific project is the location of the plant itself, which is surrounded by a national park," says Gregor Kappacher, Project Director at Tenova Austria. "We have designed a plant that fully complies with the latest environmental standards, while being cost-effective and flexible for future development."

Tenova

ITALY

TII Kamag chooses sales and service partner for Italy

Movincar, specialists in handling solutions, is now the sales, rental and service partner for all TII Kamag yard logistics vehicles in Italy.

Movincar is a subsidiary of Aprolis, an international group of companies offering handling solutions. The company specializes in the distribution and trading of intra-logistics and yard logistics solutions from leading manufacturers. It covers all of Italy through its comprehensive sales and service network which includes eight branch offices, about one hundred field service technicians along with numerous other authorized partners. The product range handled for Kamag includes yard logistics vehicles such as the PrecisionMover and the PrecisionTractor.

Movincar is the sales, rental and service partner for TII Kamag yard logistics vehicles in Italy (Photo: TII Kamag)

TII Kamag

THE NETHERLANDS

Study on liquid hydrogen and CO_2 trade corridor between Norway and Amsterdam

Tata Steel Netherlands and Norwegian logistics company Ecolog have entered into an agreement to explore the import of liquid hydrogen and the export of liquid CO_2 from Amsterdam. They have announced a study into the economic viability of what is known as a "trade corridor."

Within this project, advanced technologies could lead to significant energy savings. CO_2 capture and hydrogen use are key components of Tata Steel's Green Steel initiative.

The hydrogen in this project is produced in Norway from hydropower. Subsequently, this hydrogen is cooled to liquefy it and then shipped in specialized vessels owned by ECOLOG. The liquid hydrogen is then transported to ECOLOG's terminal at the Port of Amsterdam and converted back into a gaseous state. Following this, the hydrogen can be delivered to Tata Steel and other companies via the planned pipeline network.

In the production of steel, even in the new Green Steel installations, a small amount of CO_2 is still emitted. By capturing and storing this CO_2, Tata Steel aims to produce climate-neutral steel. The CO_2 will be captured at Tata Steel and other companies in the region. The cold energy released during the conversion of liquid hydrogen to gas at ECOLOG's terminal will be used to liquefy the CO_2 at the same location. In this form, the CO_2 can be transported by ship to Horisont Energi's import terminal in Norway, where it will be permanently stored. This creates a liquid hydrogen/CO_2 corridor, with efficient management of energy.

Among the other partners involved in these studies are Norwegian producer Gen2 Energy, Horisont Energi, the Port of Amsterdam, OCAP, the Norwegian bank DNB, and ABN AMRO.

Tata Steel Netherlands

SWITZERLAND

Certified for Cyber-secure product development

Endress+Hauser receives the IEC 62443-4-1 certification for the secure development of products, thus laying a further building block for compliance with the European Cyber Resilience Act.

TÜV Rheinland, the German Technical Inspection Association in the Rhineland region of Germany, certified the secure product development process at Endress+Hauser in accordance with the IEC 62443-4-1 security standard, maturity level 3. Five product centers have received the certification and thus meet the requirements for the life cycle of the products.

The Council of the European Union passed the Cyber Resilience Act (CRA) in October 2024. This stipulates that products must demonstrate a high level of cybersecurity throughout their entire life cycle. Appropriate measures and methods must be implemented as early as the product development stage. Endress+Hauser follows this "Security by Design" approach to provide customers with the best possible support in protecting their systems.

One visible result of the cybersecurity measures is the development of secure access to Endress+Hauser measuring devices via Bluetooth. Even the internet standardization body IETF now recommends the CPace protocol used in the Endress+Hauser SmartBlue app for password-protected access.

Product security expertise: Mirko Brcic (third from right) and the product security managers of the Endress+Hauser product centers (from left: Manfred Niederer, Karsten Traub, Dr Claudia Nowak, Simon Merklin and Sushil Siddesh) played a key role in achieving IEC 62443-4-1 certification (Photo: Endress+Hauser)

Five of the Group's competence centers were certified: Endress+Hauser Flow, Endress+Hauser Level+Pressure, Endress+Hauser Liquid Analysis, Endress+Hauser Temperature+System Products, and Endress+Hauser Digital Solutions.

Endress+Hauser

TURKEY

Ízmir Demir Çelik issues FAC for new electric arc furnace

Ízmir Demir Çelik has issued the final acceptance certificate for the new 150 t AC electric arc furnace supplied by BSE. The EAF is part of a production line for large sections.

BSE's supply encompassed comprehensive BE & DE Engineering for the 150 t EAF, a 150 t ladle furnace, the dedusting system and all key components such as the furnace gantry, high-current line, columns and electrode arms, oxygen technology, electrode regulation, off-gas treatment and automation. Key safety features include a spray-cooled roof, elbow technology, and a smart leakage detection system. The new electric arc furnace, ladle furnace and dedusting system were commissioned in April 2024 and, within several weeks, achieved stable operation that met the expected performance standards. The final acceptance certificate was issued in September 2024.

The furnace concept includes various process tool upgrades designed to achieve manless operation around the EAF in a second phase.

BSE Badische Stahl-Engineering

SWEDEN

SSAB selects partner for digital renewal of its production management landscape

SSAB has selected PSI to design a digital template with modern processes and tools that can be leveraged to reach a more harmonized landscape within SSAB, and deploy new automated and integrated processes based on best-practice standard processes and tools.

The project will support SSAB's digital renewal journey and ensure that new business processes and systems are ready and tested for starting up the Luleå mill at the end of 2028. The PSImetals software solutions will cover SSAB's steelmaking processes in the new integrated mini-mill and cold rolling complex, from scrap supply to finished goods. The implementation will include planning, scheduling, production execution, quality, and logistics as well as a modern and standardized level-2 and level-4 integration.

"When we started looking for the right partner, we had a couple of criteria. First of all, where do we get the best experience? Who has the most dedicated software to the steel industry and who has standard processes and enables what we call the template approach? Production digitalization is really important for SSAB. We are building a greenfield mill, which means that we can design things from ground up based on better utilization of data, for example for better process control, for better predictive quality control. And there it's really important that we have the right partners and the right tools to support us in that change," says Niko Korte, Head of Fossil-Free Business Platforms at SSAB.

SSAB / PSI

Alleima to increase capacity for steam generator tubing

Alleima has decided to expand its steam generator tubing facilities in Sandviken to meet the growing global demand in the nuclear segment.

The expansion includes the refurbishment and reopening of one of Alleima's steam generator tubing facilities. The investment is expected to increase capacity for steam generator tubes by approximately 60%, with production ramp-up starting at the end of 2026.

"This is a unique opportunity to increase our capacity relatively quickly and meet the demand from our customers in the nuclear segment. We have recently delivered the first commercial order for steam generator tubes for small nuclear reactors, and we expect this technology to grow as the need for fossil-free energy continues to increase. Through this facility, we will be able to serve both conventional nuclear power plants and emerging technologies like small nuclear reactors", says Göran Björkman, President and CEO.

Alleima

CONFERENCE REPORT

HÜTTENTAG 2024 with steel industry trends on hydrogen and AI

On 19 November 2024, it was time again: around 300 participants from the steel sector came together at the HÜTTENTAG – steel's annual technology event in the heart of Europe – in the Congress Center East of Messe Essen, Germany, to discuss the current challenges facing the steel industry. The motto of the HÜTTENTAG set the tone: energy supplies for the green transformation and the potential of artificial intelligence are the topics of the hour.

Kerstin Maria Rippel, Managing Director of the German Steel Federation, kicked off the morning. In her opening speech, she set the tone for the conference by emphasising the importance of steel for Germany and the EU. "Steel contributes to economic and social stability [...] and to strategic autonomy," said Rippel. In particular, the social significance should not be neglected – in addition to its role as a brand core in the economy.

The current situation in the industry becomes clear when looking at the figures. In 2023, 35.4 million tonnes of crude steel were produced in Germany. In 2018, the figure was 42.4 million tonnes. But the economy uses the variety of 2,500 steel grades in the goods it produces.

There is therefore a need for action, and Rippel stresses: "The industry has already reinvented itself in the past." Hence, the German Steel Federation is calling politicians to account. The necessary political framework conditions are needed, first and foremost competitive electricity prices and effective protection in foreign trade. At the same time, Rippel appealed to member companies: "Engage in dialogue with political representatives, you will be listened to."

Ruhr Coal Choir performing the German miners' song Steigerlied by the light of the miners' lamps (Photo: DVS Media / Yasmin Bertemes)

German Steel Federation warns against faltering hydrogen uptake

The transition to more climate-friendly steel production remains the most pressing issue. Around a third of industrial CO_2 emissions come from the steel sector. "We have to get to work on this," says Rippel. Hydrogen is one of the most promising energy sources of the future; the German Steel Federation estimates that steel will account for the majority of hydrogen capacities in Germany by 2030. There are already numerous electrolyser projects, but this is not a reassuring signal. "Final investment decisions have been made for only 3% of these projects – the hydrogen ramp-up is stalling and there is no sign of affordable prices," warns the managing director. But in the meantime, around 60% of CO_2 emissions from steel production could be avoided by switching from coke-fired blast furnaces to direct reduction, with natural gas as an interim solution.

The German Steel Federation proposes concrete solutions for restructuring the industry: Electricity price compensation and electricity tax cuts must be made permanent. At the same time, public financing of the networks must be recognised as a public service. The industry must also be supported in its cooperation with energy suppliers, in particular in concluding power purchase agreements.

Call for a new EU trade policy

But even the most advanced steel product has to find its customers. This is where trade comes in. Internationally, the EU market is under increasing pressure from imports. Rippel points to the still inadequate protection and compares: "In the past, the situation was similar in the US under former President Ronald Reagan. The far-reaching effects in the Rust Belt mean that action needs to be taken now."

Kerstin Maria Rippel, Managing Director of the German Steel Federation, set the tone for the HÜTTENTAG by emphasising the importance of steel for Germany and the EU
(Photo: DVS Media / Yasmin Bertemes)

Till Schreiter, Chairman of the Board of VDMA Metallurgy and CEO of ABP Induction Systems GmbH, described the current complex field of transformation requirements
(Photo: DVS Media / Yasmin Bertemes)

Jens te Kaat, Managing Director of Kueppers Solutions, explained how a single invention can save 2,000 tonnes of CO_2 per year already in the its first applications
(Photo: DVS Media / Yasmin Bertemes)

This means rethinking EU trade policy. LESS – the new international Low Emission Steel Standard, for which an independent association in Brussels will be responsible – should contribute to this. This will give the industry a stronger voice in Europe.

One of the success factors for the green transformation of steel is undoubtedly the introduction of climate-friendly technologies. In his keynote speech, Till Schreiter, Chairman of the Board of VDMA Metallurgy and CEO of ABP Induction Systems GmbH, described the position of the metallurgical machinery and plant engineering industry in the complex field of transformation requirements, global market developments and technological solutions.

VDMA Metallurgy critical of trade barriers

Based on the current developments in the international economic areas and the energy market, including the hydrogen economy, the presentation highlighted the available lines of technological development, particularly in the field of industrial process heat for metal production and processing. He stressed: "As export-oriented companies, we need a free global market that thrives on technological competition. We cannot support trade barriers," said Till Schreiter. He sees the transformation as a great opportunity: "In the future, for example, trendy products will be expected to be 'green'. This will increase the demand for metals produced in an environmentally friendly way, which is why our advanced technologies are needed."

High energy prices are likely to remain a problem for Germany for the foreseeable future, even if renewable energy becomes cheaper in the long term. "Our energy prices are high because we don't have certain types of energy in Germany that are cheap in other countries." He also predicted that gas prices in Europe would not return to pre-crisis levels.

Regarding the future supply of hydrogen, Till Schreiter stressed: "The battle of the basic industries for hydrogen is in full swing. […] We have to be honest and examine which of these industries have a green future in Germany and build up the hydrogen supply for them". A key issue is the electrification of processes. "Combustion of hydrogen is not a solution." There is also no way around digitalisation, which is an important lever for future success.

Dr Thomas Bünger, CEO of ArcelorMittal Flachstahl Deutschland, explained that the decarbonisation challenge should initially be viewed in a technology-neutral way
(Photo: DVS Media / Yasmin Bertemes)

The panel engaged in a lively exchange on the themes of the keynote speeches (Photo: DVS Media / Yasmin Bertemes)

Practical applications in the spotlight

HÜTTENTAG has always focused on specific applications for the industry. The aim is to create added value for companies and visitors alike. Jens te Kaat, Managing Director of Kueppers Solutions, demonstrated one such application in burner technology in his presentation.

The company has developed an award-winning 3D printed heat exchanger (recuperator) for industrial furnace burners with a core unit that significantly improves the efficiency of the burner. This new burner is also designed for multi-fuel operation with different fuel gases. The burner can be operated with natural gas, hydrogen or any mixture of these gases. Flame temperature remains stable. This is an important aspect in view of the lack of sufficient availability of hydrogen.

An industry open to innovation

Jens te Kaat is determined: "If we want to take the energy transition seriously, we have to tackle the existing systems." The individual installation situation at the customer's premises is a constant challenge.

However, various applications show that the industry is open to new developments. Among the first movers, te Kaat mentioned a leading tinplate manufacturer and other companies in the German steel industry. According to the managing director, the burner technology presented is already saving a total of 2,000 tonnes of CO_2 per year in real operation. This is motivating news as it illustrates concrete savings potential and the innovative strength of the industry.

Dr Thomas Bünger, CEO of ArcelorMittal Flachstahl Deutschland, explained in his keynote speech that the decarbonisation of steel production should initially be viewed in a technology-neutral way. These include the increased use of scrap in the process, carbon capture and utilisation (CCSU), the further development of future technologies such as direct electrolysis and the wise introduction of DRI-EAF technology with natural gas and hydrogen.

ArcelorMittal argues for a technology-neutral approach

"It is absolutely possible to decarbonise the classic blast furnace route. You don't have to tear down highly productive plants and build a new industry," said Bünger. He also lamented the taboo surrounding certain technologies in Germany. Because CCS processes and their development are not classified as non-fossil in Germany, ArcelorMittal has implemented the Steelanol project in Belgium, which separates CO_2 from off gases to produce industrial ethanol. In addition to competitive energy prices and effective trade protection in Europe, the rapid establishment of green lead markets is another key building block on the road to transformation.

In a global company like ArcelorMittal, strategic investments that affect the next 5 to 15 years are made very carefully, says Bünger. For a production route with direct reduction and electric arc furnace, the location factors had to be assessed in an international comparison. This brought him back to the demand for fair competitive

Steel is ready to shape this change so that it continues to have a future in Germany, said Thomas Kufen, Lord Mayor of the City of Essen
(Photo: DVS Media / Yasmin Bertemes)

conditions. "The only thing that is growing in the European steel market is the volume of imports. […] If we have to bear the costs of CO_2 emissions for producing steel here, then imports should be charged the same amount." Similar rules would have to be introduced in the light of high energy prices. "The high cost of electricity is a fundamental threat to our industry," said Bünger. Public procurement guidelines and tenders should also "finally include clear general conditions for the use of green steel". Green lead markets are necessary because "there must be an incentive to bring green products to the market".

Nadine Pungs chaired a lively panel discussion

During the panel discussion participants engaged in a lively exchange on the themes of the keynote speeches. First, it got political, because Looking ahead to the Bundestag elections in 2025, Kerstin Maria Rippel stressed the need for the next German government to be pragmatic. It is important to be honest with other countries. "Europe must clarify its position on China," Rippel said.

Jens te Kaat pointed to the importance of entrepreneurship for change. "We need more entrepreneurial courage," sayd the managing director of Kueppers Solutions. Till Schreiter added that entrepreneurial risks should not be underestimated, referring to the foundry industry. According to Schreiter, companies in this sector often only have a single opportunity to make an investment decision. If there is no payback, the company risks insolvency.

Conference programme, exhibition and social event

Like the steel industry as a whole, the HÜTTENTAG conference is constantly evolving. This year, a third afternoon session was added to the programme. A total of 27 papers were presented in three parallel sessions. The sessions were arranged into the following topics:

- materials and smart material cycles
- hydrogen, energy and infrastructure
- artificial intelligence for the steel industry
- artificial intelligence in metrology and automation
- transforming the steel value chain
- safety and logistics in the steel industry

The HÜTTENTAG 2024 was complemented by a technical exhibition, in which 26 companies participated as exhibitors and sponsors. Here, not only were products presented, but concrete solutions to the challenges faced by companies were discussed in detail with the participants.

There were also two new additions to the HÜTTENABEND social event. A great highlight of the evening's programme was the performance by the Ruhr Coal Choir of the German miners' song Steigerlied by the light of the miners' lamps – a successful start which reminded everyone of the long industrial heritage and close links with the mining industry. Some of those singing in the choir used to be miners themselves.

Fresh ideas from young talents provide impetus

The transformation also has a social component. Experienced employees need to be encouraged to embrace new technologies, while fresh ideas from young professionals provide useful support. Adrian Plieth, a student of materials science at RWTH Aachen University, appealed on behalf of other students present to seek generation-spanning dialogue. He himself

Adrian Plieth, on behalf of the other students present, called for dialogue with the next generation
(Photo: DVS Media / Yasmin Bertemes)

is a good example of a fruitful exchange. He is currently working for a steel company as part of his master's thesis. He was given the opportunity to do this at HÜTTENTAG 2023.

The HÜTTENTAG is under the patronage of the Lord Mayor of the City of Essen, Thomas Kufen. In his welcoming speech this year, he referred to the Ruhr area and its miners, who have shaped the region for many decades and continue to do so. "An often quoted saying from the mines: It's always dark before the pick. This is as true today as it ever was: the future remains unknown. But the HÜTTENTAG is a positive example of how change can also be seen as an opportunity. Steel is ready to shape this change so that it continues to have a future in this country," said Thomas Kufen.

Afterwards, there was plenty of time and space for networking in a relaxed atmosphere – with exquisite catering and good music until late in the evening.

HÜTTENTAG 2025 will take place at the same venue on 13 November 2025. The get-together of the steel industry is organised by DVS Media GmbH in cooperation with Messe Essen.

STAHL+TECHNIK Editors

All photos: DVS Media / Yasmin Bertemes


HÜTTENTAG
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GREEN TRANSITION

New electric steelmaking technology for Tata Steel Port Talbot works in Wales

Tata Steel UK has ordered an Electric Arc Furnace (EAF) for its Port Talbot Site in Wales. The EAF will be operational from the end of 2027 and will reduce the site's steelmaking carbon emissions by 90%, with an annual capacity of 3 million tonnes of steel – similar to the output of the site's idled blast furnaces.

(From right:) Rajesh Nair (Tata Steel UK) and Paolo Argenta (Tenova) signing the contract for the new metallurgical equipment (Photo: Tata Steel UK)

Following the shutdown of the major heavy end operations, i.e. blast furnaces, coke ovens, steelmaking plant, etc. in recent months, Tata Steel UK is progressing with the project to rebuild the steelmaking complex at its Port Talbot steelworks in Wales. Basic engineering is now complete and initial equipment orders have been placed for the electric arc furnace (EAF) and ladle metallurgy furnaces.

Tata Steel signed a contract with Tenova to deliver a state-of-the-art electric arc furnace and additional advanced steelmaking equipment for its Port Talbot site. When it is commissioned from the end of 2027, the electric arc furnace (EAF) will reduce the site's steelmaking carbon emissions by 90%, equivalent to 5 million tonnes of CO_2 a year.

T V Narendran, CEO and MD of Tata Steel Limited, who joined the signing of the contract in Port Talbot following the project's Board-level approval, said: "This landmark agreement will enable us to transform our steelmaking site that will not only support the UK's decarbonisation journey but also provide economic development opportunities for South Wales.

High-productivity EAF to substitute two blast furnaces

Tenova will supply a mega-type Consteel EAF with an annual capacity of 3 million tonnes of steel – similar to the output of the site's blast furnaces. The EAF will recycle 2 - 2.5 million tonnes of UK-sourced scrap every year. The use of scrap will also significantly reduce the UK's reliance on imported iron ore, strengthening the resilience of the UK's manufacturing supply chains.

500 million pounds of funding from the UK government

Tata Steel has signed a £500 million Grant Funding Agreement with the UK government allowing it to proceed at pace with the £1.25 billion green steel project in Port Talbot, Wales.
As the largest investment in the UK steel industry for decades, project will safeguard UK's steel sovereignty, secure steel making in Port Talbot and preserve 5,000 jobs.
The new assets will reduce the UK's entire industrial carbon emissions by 8% (and Port Talbot's by 90%) while setting a benchmark in circularity, utilising UK scrap.

Alongside its planned £750 million investment, Tata Steel has put its significant global engineering and project capabilities behind this project, which will benefit from an additional £500 million in UK Government Grant Funding.
Despite the challenges inherent in the transformation, the company's workforce has demonstrated great commitment and resilience to wind down and close the blast furnaces and Morfa coke ovens and the wider heavy-end operations smoothly and safely in recent months.

Two new ladle metallurgy furnaces, also supplied by Tenova, will then refine the molten steel to make more complex grades required by manufacturers in the UK and other countries.

The core of the new production line is Tenova's Electric Arc Furnace equipped with its Consteel® continuous charging system and electromagnetic stirring system (EMS), which enables a productivity of 450 tonnes/hour. The supply also includes two ladle furnaces of the same capacity, a fume treatment plant, and a material handling system. Additionally, Tenova will provide an extensive engineering and assistance package to support Tata Steel UK throughout the construction and startup phases of the entire new production line.

The new EAF-based equipment is designed to seamlessly integrate into the existing downstream facilities, including the continuous casting plant while upgrading production capabilities and environmental performance. It will be installed in the buildings currently housing the BOF (Basic Oxygen Furnace) converters, which will be removed.

"We have been working with Tata Steel UK since spring 2022 building a solid technical and personal relationship. We are very proud to become part of the Port Talbot steelmaking history and contribute to a project so important to Tata Steel group and the local communities," said Paolo Argenta, Executive Vice President for the Tenova Upstream Business Unit.

Outlook

According to Tata Steel UK, the detailed engineering is now ongoing, and other equipment orders will soon be placed separately for the for casters life extension, a new coil box and crop shear for the hot strip mill, new pickling line, a crane package, and for construction management and civil engineering.

Tata Steel has completed the public consultation on the planning application and is working closely with the authorities to submit the application in November 2024, with a view to commencing major works around July 2025.

Tata Steel UK / Tenova

The new main building also serves as a showcase for the company's own products (Photo: SSAB/Jaakko Mylly)

PREPARING FOR THE FOSSIL-FREE STEEL PRODUCTION

New main R&D centre and office building at SSAB Raahe works in Finland

The new combined research centre and office at SSAB's Raahe steel mill is one of the largest laboratory in the Nordics. The building has a steel frame, a façade made of steel sandwich panels, and steel piles have been used in the foundations. As much SSAB steel as possible has been used for the construction of the building, which also serves as a showcase for the company's own products.

SSAB Raahe mills newest building is a combined main laboratory and office building. The new laboratory is one of the largest in the Nordic countries measured in terms of number or samples and is in operation 24/7.

The Raahe steel mill's new main laboratory, which has been gradually phased in, examines both the raw materials for steelmaking and the end products made at the mill. The fact that around 4.4 million assays are made from the some 240,000 samples analyzed each year gives an idea of the size of the fully automated spectral laboratory.

The new functional building, officially called the Mill Office and Main Laboratory, is located along the entrance route to the mill. The office part of the new building has meeting and visitor facilities as well as workspaces for about 100 office workers. The building has a total floor area of 7,836 m² and volume of 42,930 m³.

"This has been a huge project. Our new main laboratory and office building is preparing us for the future production of fossil-free steel. State-of-the-art laboratory facilities can be used to analyze both raw

materials and materials generated at different stages in the production process, as well as to conduct research related to product development," says Jarkko Matkala, Site Manager at SSAB Raahe.

Unique research facilities

The new main laboratory houses:

- a spectral laboratory and sample handling,
- development laboratories: sample handling, metallography (hardness measurements, microscopy, electron microscopy) corrosion laboratory and destructive testing (DT),
- a systems and equipment team supporting laboratory operations, i.e. mechanical and electrical maintenance of laboratory equipment and IT development and support of laboratory systems.

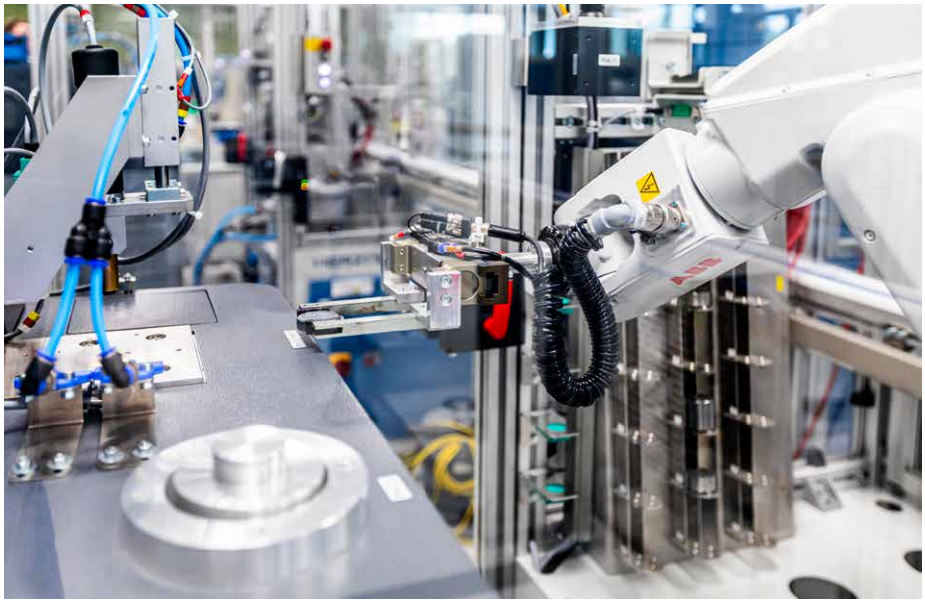
The production testing laboratory and NDT (non destructive testing), the chemical laboratory, the dimensional quantities calibration laboratory, the control of sampling and the material certificates' office are located on the mill site.

The samples reach the laboratory along a pneumatic tube bridge. A total of around six kilometres of new pneumatic tube line have been built to the mill.

"The new facilities are superb and have been designed based on material flows and also for future needs. The new premises have taken into account, for example, dust removal, soundproofing, lighting, safety, storage of various materials and transport routes. In future, it will be possible to carry out analyses in fewer intermediate steps when the equipment is replaced. In addition, the equipment has been positioned for easy maintenance," enthuses Minna-Maarit Valkama, Laboratory Manager.

A lot of completely new instruments have been introduced. For example, a new instrumented impact hammer has been installed and calibrated in the development laboratories. This is a rare set of instruments both nationally and further afield. The impact test hammer can record the fracturing event of the material.

Steel fatigue testing, on the other hand, is carried out using a drawing machine, the foundations of which have been piled all the way down to the rock. The device must be detached from the building structures so that testing does not cause resonance with them.



A robot places a steel sample into an OES analyzer (Photo: SSAB/Jaakko Mylly)

The steel structures are counterbalanced by a high moss-green wall and wood-surface battens (Photo: SSAB/Nick Tulinen)

SSAB's own steels feature prominently in the building

The new building is located by the road leading to the factory. As much steel as possible has been used in the building since it also serves as a showcase for the company's own products. The colour combination of grey and rusty brown is typical of the factory site.

The building has a steel frame, and steel piles have also been used in the foundations. The facade was supplied by SSAB's subsidiary Ruukki Construction. COR-TEN steel and GreenCoat-coated Ruukki Sandwich panels were used for the exterior cladding. On the east and south sides of the building, excessive heating and sunlight have been eliminated by using a separate solar protection wall with frame parts and cladding made of COR-TEN steel.

Perforated and backlit COR-TEN cassettes have been used to highlight the main entrance. The steel frame of the building enables functional adaptability of the space – the office section, for example, has a group of meeting rooms divided

The front of the reception desk is made with ballistic protection Ramor 500 W steel (Photo: SSAB/Nick Tulinen)

An artificial process was used to create a patina-like surface for this interior cladding (Photo: SSAB/Jaakko Mylly)

by movable partition walls which can be opened up to create a room for a hundred people if necessary. The ceilings are also made of color-coated steel plate from SSAB's Hämeenlinna factory.

Surprising choices of materials in interior design too

In the interior areas, steel is prominently displayed in the lobby. COR-TEN and GreenCoat-coated perforated panel cladding also improves the room's acoustics.

The front of the reception desk is made with ballistic protection Ramor 500 W steel. It combines the properties of protection steel and weathering steel in one product. This combination is ideal for applications such as public building facades.

Ramor 500 W steel has a good-looking surface without external corrosion protection. Weathering steel is a low-alloy steel with excellent corrosion resistance in outdoor conditions. Durability is based on an oxide layer that develops on the surface and forms a dense protective layer on the steel surface. This oxide layer is called patina. Normal patina formation requires outdoor conditions and alternating rain and sunshine. An artificial process was used to create a patina-like surface for this interior cladding.

The building takes both functionality and appearance into account. The high lobby is bright and airy. The "steel pipe forest" on the roof also highlights SSAB's pipe production. The walls are made of perforated steel plate and backlit or ballistic-protection COR-TEN plate. The steel structures are counterbalanced by a high moss-green wall and wood-surface battens.

The material used for the pneumatic tube bridge material is SSAB's weathering steel COR-TEN, which also works well with the building. The weathering steel pneumatic tube bridge requires no surface treatment and is maintenance-free, which also reduces maintenance costs. The project has involved building a total of approximately six kilometers of new pneumatic tubes at the factory, using old pneumatic tube bridges and routes.

The building is energy efficient and designed to last a long time. The environmentally-friendly aspect of the steel primarily relates to the absence of a need for maintenance and the long life of the material.

SSAB

Facts of the new main building at SSAB Raahe works

- The analysis laboratory analyses around 240,000 samples, from which some 4.4 million assays are made.
- The testing laboratory tests around 500,000 samples each year.
- The laboratories are in operation 24/7.
- The research laboratory conducts around 900 research commissions each year.
- The material certificates' office handles around 40,000 inspection documents each year.

GREEN TRANSFORMATION

Low-emission technology for Saarland's decarbonization project

German Stahl-Holding-Saar Group with its subsidiaries Dillinger, Saarstahl and ROGESA has specified the transformation project and awarded the contracts for the new metallurgical equipment, i.e. the direct reduction plant and the two electric arc furnaces.

Following the funding commitments from the federal and state governments for the decarbonization project, the order for the central components is a major milestone on the way to a "green" future for Saarland's steel industry in October. In a nutshell, a new direct reduction (DR) plant will supply DRI to two new smelting plants in Dillingen and Völklingen, which are also new.

Stefan Rauber, Chairman of the Board of Management of Dillinger and Saarstahl said: "We are making history in order to create the future. We will become a pioneer of decarbonization in Europe. To accomplish this, however, we need the unwavering backing and support of policymakers. We are firmly committed to climate protection. Companies that invest in Germany must also be supported by Germany."

The **DR plant** to be built at the Dillingen site will have an annual production capacity of around two million tons of direct reduced iron. The plant will be of the Midrex Flex type, which offers the flexibility to operate with different mix ratios of natural gas and hydrogen. The plant will be built by Primetals Technologies, Midrex Technologies Inc. and DSD Steel Group.

The contracts for the **electric arc furnaces** (EAF) for Dillingen and Saarstahl have also been awarded. These plants melt the DRI and additional recycling steel (scrap) to produce CO_2-reduced steel. The order for the EAF for heavy plate manufacturer Dillinger was awarded to Primetals Technologies and the DSD Steel Group. SMS Group was chosen to build the EAF for wire rod and bar manufacturer Saarstahl.

Reduction of 4.8 million of CO_2

In total, the decarbonisation project of Saarstahl, Dillinger and ROGESA covers a production capacity of 3.5 million tonnes of crude steel per year. The SHS Group is thus converting 70 per cent of its total capacity to CO_2-reduced production in a single step.

With the use of steel scrap and initial quantities of hydrogen, the systems enable carbon emissions to be cut by up to 55 percent by the early 2030s. This corresponds to an annual reduction of 4.8 million tons of CO_2. This means that these Saarland-based steel manufacturers are the only companies capable in the first step of achieving the EU's "Fit for 55" climate target by 2030, if the corresponding infrastructure and economic efficiency are in place. Because of the complexity of the system configuration and the additional infrastructure, the SHS Group has carried out extensive preliminary planning for Power4Steel. As a result, an exceptionally advanced level of detail was achieved in the planning phase of the project to prepare for the smoothest possible construction phase. Commissioning is planned for 2028/29.

The total investment for the conversion to "green" steel production, including environmental design, infrastructure and logistics measures, amounts to around EUR 4.6 billion. The companies are receiving EUR 2.6 billion in federal and state funding for this pioneering project, with the remaining funding being provided by the companies themselves.

SHS – Stahl-Holding-Saar

Team Power4Steel (Photo: SHS - Stahl-Holding-Saar)

NG-FUELLED STEAM GENERATOR ELIMINATED

Mill properties transition to fossil-free district heating in Finland

For Ovako's Imatra mill, the transition to fossil-free district heating will bring significant cost savings and reduce the mill's carbon dioxide emissions by approximately 1,600 tons per year.

The buildings outside Ovako Imatra's industrial area, such as the head office, were connected to district heating in 2023, and now Imatran Lämpö Oy is expanding its distribution network to include the industrial area as well. Imatran Lämpö is the local producer and supplier of district heating.

Previously, the buildings in the mill's industrial area were heated with steam, which required about 8 gigawatt hours (GWh) of natural gas annually. Going forward, the need for district heating will be roughly half of that.

"This is partly due to the fact that our previous steam-based system was much less efficient. Steam production resulted in a lot of waste heat, whereas the district heating system is more energy-efficient and better aligned with the heating needs of the properties," explains Ovako Imatra's Environmental Manager, Anssi Puruskainen.

> The previous investment in the mechanical vacuum pump system was a significant turning point.
>
> *Anssi Puruskainen, Environmental Manager at Ovako Imatra*

The Imatra steel complex will be connected to the local district heating network
(Picture: Ovako)

Secondary metallurgy no longer requires steam

The use of steam at Imatra mill was significantly reduced in 2019, when a mechanical vacuum pump system was installed. This system replaced a steam ejector-based solution, improving the energy efficiency of the vacuum generation by approximately 80%. Now, the use of steam can be completely phased out.

The transition to renewable district heating is an important step for the Imatra mill in achieving the climate targets set by the Ovako Group. The emissions at the Imatra mill have already been halved compared to 2015, and the target is to reduce them by 80% by 2030.

"This change also supports our long-term commitment to improving energy efficiency. The previous investment in the mechanical vacuum pump system was a significant turning point, and now the new district heating system complements this development and further strengthens our position as a leader in sustainable industry," says Puruskainen.

The construction of the new distribution line is underway and is expected to be completed in early 2025. Imatran Lämpö Oy is responsible for building the distribution pipeline outside the industrial area and will also install backup gas and pellet facilities, including fuel silos, on Ovako's premises. Ovako will oversee the construction of the district heating line within the industrial area.

"We are extremely pleased that our heating services for Ovako are expanding. For Imatran Lämpö and its owner, the City of Imatra, local industrial operators are key partners," says Vesa-Pekka Vainikka, CEO of Imatran Lämpö Oy.

Ovako Imatra

ADVERTISERS' INDEX

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ANNUAL COMPANY FIGURES

Stable performance and positive outlook for Danieli Group

The Danieli Group's fiscal year 2023/2024 ended with a net profit of 240.8 million euro and a gross operating margin (EBITDA) of 391.2 million euro, down over last year but largely sufficient to ensure financial coverage for the investments that were made and for the huge R&D expenditures incurred in the year. Good margin-to-sales ratio for the Plant Making segment while Steel Making continues to be positive but with decreased margins.

The control room of the QWR quality wire rod mill at ABS (Steel Making segment) (Photo: Danieli)

The Danieli Group essentially runs two main businesses: The first (Plant Making) is in the field of plant engineering and manufacturing of plants – including turnkey plants – for the production of metals. The second business (Steel Making), on the other hand, concerns the production of special steels through the companies of Acciaierie Bertoli Safau S.p.A. (ABS) in Italy and ABS Sisak d.o.o. in Croatia.

Revenues. Plant Making revenues are in line with the forecasts made at the beginning of the year and derive from fulfilled construction schedules contractually agreed with customers, with an EBITDA of 315.7 million euro, better than the result for the 2022/2023 year, in spite of the special reserves set aside in the year for the startup of several innovative plants.

On the other hand, Steel Making revenues are lower than last year (even if they are in line with the budget from the beginning of the year) and show a lower profit (EBITDA is 75.5 million euro) largely due to the negative effect of the costs of energy factors that in Italy are higher than in other European countries. This profit could increase in the next tax year but only if there is a normalization of energy factor costs, which have been high since the beginning of 2024, with prices per megawatt hour that are still far from the average prices in France and Germany.

Steel Making (ABS Group) products sold in the year reached about 1.3 million tons (5% more than last year), with the goal of increasing these volumes in the next tax year by bringing both ABS Sisak in Croatia and the new wirerod and ore grinding ball rolling mills at ABS S.p.A. to maximum production capacity. ABS S.p.A. supplies products whose quality and delivery times are in line with those of the best producers in the world, and its goal is to be the leading special steelmaker in Italy and among the first three in Europe. The 2023/2024 tax year therefore shows a consolidated operating profit (EBIT) that is in line with last year's figure, despite being penalized by the unsatisfactory results of ABS Steel Making.

Finance. Finally, liquidity management continued in the year according to the usual principles of low-risk, easily realizable investments, with good average remuneration on both investments in euro and those in foreign currencies (essentially the USD). Financial management reports a positive result of 73 million euro, while

exchange rate management shows a positive 13.2 million euro given the stable exchange rate of the US dollar against the euro in the period. Cash management continued efficiently in the year, maintaining a high level of solvency, with a positive net financial position at the end of the period, and taking into account the investments already made in the year, Danieli can predict a good financial result for 2024/2025 as well. The net profit for the year amounts to 240.8 million euro, slightly down by 1% compared to 243.6 million euro for the period ended June 30, 2023.

Note that, as usual, out of the net global value added of 908.0 million euro, as set out in the financial statements, the portion set aside for venture capital remuneration (shareholders including numerous company employees) is limited to 25.6 million euro, while the personnel portion is 564.3 million euro, the public administration 77.7 million euro, donations 2.6 million euro and, finally, the company portion is 215.2 million euro.

Human resources. For the year ended June 30, 2024, the Danieli Group employed 10,365 people, of which 1,596 in the Steel Making segment and 8,769 in the Plant Making segment, an increase of 633 over the figure of 9,732 employees for the year ended June 30, 2023. Danieli continues to pursue innovation, efficiency and quality of customer service at a fast pace, encouraging team excellence by promoting merit and teamwork. Danieli Academy will be expanded further to broaden the selection and training of junior employees, but will also provide refresher courses and professional improvement for senior employees.

Order book and forecasts

The performance of both the Plant Making (plant engineering and manufacturing) and Steel Making (production of special steels) segments and the continuing good level of orders in the order book allow the company to forecast positive results for the Group in 2024/2025 as well, with the goal of improving on what was done in the ABS Steel Making segment in 2023/2024.

For the Plant Making segment, in particular, Danieli predicts an operating result in line with or better than in 2023/2024, with steady volumes and good margins, equally distributed among the principal product lines (steelmaking shops, long and flat products) and evenly split among all the geographical areas where we have projects, and a better contribution to the Group's operating profit by the parent company Danieli & C Officine Meccaniche S.p.A.

Production volumes in the Steel Making segment are expected to grow slightly in 2024/2025, but with better margins and greater efficiency of manufacturing processes since we have at our disposal three vertically integrated lines: bars, wirerod and ore grinding balls, even if the energy variable could still negatively affect both volumes and margins of production.

The Group's order book is well diversified by geographical area and product line, and for the year ended June 30, 2024, amounts to 5,751 million euro (of which 296 million euro in the special steelmaking sector) compared to 6,200 million euro for the year ended June 30, 2023 (of which 369 million euro for ABS Steel Making). Not included are several major orders acquired by Danieli for which we are already developing the basic engineering, as we wait for them to come into force once our customers finalize the financial packages in support of investment. With these goals in mind, in the Plant Making segment, Danieli will continue to consolidate its international organization, while in the Steel Making segment Danieli will proceed with the construction of a new Digimelter at the ABS plant in Italy, which is an integral part of the new investment plan that also aims to renovate the other EAFs and double their installed production capacity, thereby improving competitiveness, quality and productivity by the end of 2025. Based on these considerations and prospects, the goals of the Danieli Group for the fiscal year 2024/2025 are:

- Sales 4,000 - 4,200 million euro
- EBITDA 380 - 420 million euro
- Net cash 1,500 - 1,600 million euro
- Order book 6,000 - 6,200 million euro

The Danieli Group continues to pursue its goals of efficiency such as increased productivity, lower fixed costs and innovation in order to be more competitive on the global market and ensure better service, especially for its customers in Southeast Asia, where most steel production is concentrated.

Danieli

CONFERENCE REPORT

European Steel Forum 2024 focuses on green transformation

Held in Germany for the first time, the annual meeting of the AIST European Member Chapter had the largest attendance and strongest global representation to date, with more than 200 participants

The European Steel Forum (ESF) – the annual meeting of the European Member Chapter of the North American Association for Iron and Steel Technology (AIST) – took place in Essen, Germany, in early November. At this international conference, steel industry leaders share their strategies and challenges for the steel sector as technology and production processes continue to evolve. This year's event, hosted by Hatch Küttner, focused on the latest developments in green steel, iron ore materials, carbon neutrality and zero-carbon energy, as well as the planning, financing and execution of steel projects and plants.

The conference opened with a tribute to Mauro Bianchi Ferri, Managing Director of Acciarium and one of the initiators, founding members and first Chairman of the AIST European Member Chapter, for his services to AIST and its work in Europe. The panel discussions offered candid conversations focused on key issues facing European and North American industry leaders.

DR-grade pellets markets

Speaking during the opening session of the ESF 2024, Hatch Advisory principal Siddhartha Sengupta said that although the DRI-EAF route is readily deployable, the specialized feedstock creates a pinch point, as it necessitates access to pellets with high iron content and low gangue content. And based on his firm's estimates, the world will need an additional 200 million tons of these pellets by 2040. Although there are 130 million tons' worth of projects in the pipeline, the risk is that CO_2 reduction targets are moved forward. "What the data is telling us is that DR pellets will become the choke point for the decarbonization of the steel industry," he said.

The demand for direct reduction (DR)-grade pellets is only set to grow and could potentially account for 40% to 50% of the seaborne market, said Tarraco Commodities Solutions chief executive officer Gilberto Cardoso. He said the winners in the new landscape will be regions such as the Middle East and North Africa, which have access to cheap natural gas, renewable

At the AIST European Steel Forum, steel industry leaders share their strategies and challenges for the steel sector as technology and production processes continue to evolve (Photo: Evgeniia Orlova, Evisible Foto Studio)

energy and growing hydrogen production capabilities. Given that, he said, major exporters of DR-grade pellets, such as Iran and Qatar, will likely play an increasingly important role in the global market, providing critical supplies to Europe and Asia. Also among the winners, he said, will be companies in countries with secure access to high-grade iron ore, such as in Brazil and Canada. The losers, he said, are likely to be traditional blast furnace operators that fail to adapt to new technologies, as rising carbon costs make them less competitive.

> Since we started telling our decarbonization story, it seems we're starting to drum up some interest from the younger generation.
>
> *Tom Toner, Vice Presiden Operations at SSAB Americas*

Decarbonization helps the planet and recruitment

The steel industry has long faced recruitment challenges arising from negative perceptions, but the industry's work on decarbonization might finally be shifting opinions, according to two industry leaders. Speaking during a panel discussion SSAB Americas vice president of operations Tom Toner and Michael Bott, decarbonization director and Power4Steel general project manager at Stahl-Holding-Saar, both noted that the work their respective companies have done seems to resonate. "Since we started to tell our decarbonization story, it seems like we're starting to drum up some interest from the younger generation," Toner said. Bott agreed. "If you (undertake) the transformation, (we've found) that young men and women are interested to join us," he said.

To speed up progress in the European steel industry, policymakers ought to work to reduce red tape, lower energy costs and coordinate more with industry, several finance experts said. Speaking during a discussion focused on financing transformational green steel projects, panelists agreed that those are among the bigger obstacles they see in bringing projects into reality. "For me there needs to be better coordination between industry and government to make sure that globally we have a level playing field," said Matthias Winkeler, vice president of metals and mining, ING.

Reimagining the blast furnace

ArcelorMittal is exploring another way to lower its carbon emissions — by building a better blast furnace. Speaking during a panel discussion, Kristian Notebaert, chief technology officer decarbonization for ArcelorMittal's European flat products business, said the company is conceptualizing what it is calling a "renaissance" blast furnace (BF), a furnace that would be enhanced with a variety of novel and carbon-mitigating features. Those features include top gas recycling, gas preheating and injection, biochar injection, and full oxygen injection.

As he explained, the company isn't prepared to abandon blast furnace production on account of productivity. Some of the company's products necessitate BF-BOF quality, and some of its downstream equipment is configured for large heats. Some of its casters, he said, demand 450 tons of liquid metal each hour.

The AIST European Steel Forum 2024 offered participants global networking and the opportunity to visit thyssenkrupp Steel Europe AG. Next year's event will take place in Bilbao, Spain.

AIST / STEEL + TECHNOLOGY editor

The panel discussions offered candid conversations focused on key issues facing European and North American industry leaders
(Photo: Evgeniia Orlova, Evisible Foto Studio)

THE AMERICAS – BRAZIL

Vale and Green Energy Park partner to develop green hydrogen supply chain

Vale and Green Energy Park (GEP), an integrated European hydrogen company, have joined forces to deliver decarbonization solutions for the global steel sector. This joint initiative is intended to provide an open platform for international partnerships in which global steel companies can source and produce hot-briquetted iron (HBI) in Brazil and accelerate the emerging low carbon steel industry.

Through this partnership the companies will work on feasibility studies to develop a green hydrogen production facility to supply a future Mega Hub in Brazil, an industrial complex aimed at manufacturing low-carbon steel products. Vale has been actively seeking partners to enable the construction of Mega Hubs in Brazil, aligned with its strategic objective to foster the country's low-carbon industry. In these industrial hubs, Vale expects to produce iron ore agglomerates (pellets or briquettes), which will serve as an input to produce HBI (a low-carbon emission steel pre-material) with renewable hydrogen as the reducing agent. The agreement with GEP is another important step in this direction.

"This is a win-win partnership for Brazil and Europe", says Ludmila Nascimento, Director of Energy and Decarbonization at Vale. "We are leveraging Brazil's competitive advantages, such as high-quality iron ore and abundant renewable energy, to potentially develop green hydrogen supply, which will enable the offer of a "green" HBI with high added value to European steelmakers. Meanwhile, we are fostering Brazil's new industrialization, based on the low-carbon economy, and contributing to the fight against climate change."

"The partnership with Vale is a major milestone on our journey to net zero. We are proud to work with the largest producer of direct reduction pellets in the world to help decarbonize the steel sector. The collaboration between our companies aims to bring our leading green hydrogen technology to the core of the hard-to-abate sectors, offering a highly competitive platform for green steel production in Europe and around the world," comments Bart Biebuyck, CEO of GEP.

Vale and GEP, which is supported by Europe's Global Gateway program, will also collaborate on various aspects of the hydrogen value chain, such as the deployment of electrolysers, the design of industrial plants for green hydrogen and its derivates, as well as other industrial decarbonization applications of renewable hydrogen.

Green Energy Park / Vale

THE AMERICAS – USA

Nucor to upgrade Steckel mill in Alabama

Nucor Steel Alabama has placed an order with SMS group for the modernization and expansion of the Steckel mill at its Tuscaloosa site to enhance the rolling mill's ability to produce thin, high-strength products.

Example of a state-of-the-art two-stand Steckel mill with Steckel furnace (Photo: SMS group)

The centerpiece of the project is the conversion of the existing plant into a highly advanced tandem Steckel mill. An additional high-performance mill stand will be installed downstream of the existing stand to create a tandem Steckel mill. Both stands will be employed simultaneously for reversing roughing passes and finishing passes. The tandem arrangement of the stands also allows the use of special work rolls in one stand to manufacture base plates and checker plates.

The existing entry and exit-side Steckel furnaces will be replaced with new furnaces in a state-of-the-art, closed-type design. Once the revamp has been completed, both mill stands will be equipped with CVC® plus technology to ensure maximum strip quality. A looper arranged between the stands optimizes the strip tension and assists with speed control. SMS group will also handle the modernization of the electrical and automation systems in the Steckel mill, including the main drives, sensors, measuring equipment and instrumentation, as well as the mill's basic and process automation. The existing mill stand will be retrofitted with a new twin drive that ensures the top and bottom work rolls can be operated independently.

The new mill stand will be equipped with independent AC motors for driving the top and bottom work rolls, double reduction gears, and drive shafts of the flat journal design with Genius CM® condition monitoring. Before being shipped, the automation system will be prepared and optimized for efficient commissioning as part of a Plug & Work integration test.

SMS group

THE AMERICAS – USA

Nippon Steel agrees to sell its interest in Calvert to ArcelorMittal

ArcelorMittal has entered into a definitive equity purchase agreement with Nippon Steel Corporation to purchase Nippon Steel's 50% equity interest in the AM/NS Calvert joint venture.

The transaction has been entered into at the request of Nippon Steel Corporation (NSC) to address regulatory concerns pursuant to its agreed acquisition of US Steel. The transaction is subject to NSC completing its pending acquisition of US Steel, which is subject to various other regulatory requirements.

Under the terms of the agreement, ArcelorMittal will pay US$ 1 consideration for the transaction; further, NSC will inject cash and forgive partner loans in an amount estimated to be approximately US$ 0.9 billion. There are no assurances or guarantees that NSC will complete its acquisition of US Steel. Should NSC not complete its acquisition of US Steel, then the agreement will not come into effect and the AM/NS Calvert joint venture will continue.

AM/NS Calvert is a joint venture between ArcelorMittal and NSC that acquired thyssenkrupp USA in 2014.The Calvert facility operates a state-of-the-art hot strip mill, a continuous pickling line and coupled pickle line-tandem cold mill optimized for auto production, including exposed; and coating lines, galvanized and aluminized. A new 1.5 million t/year electric arc furnace is currently under construction.

ArcelorMittal

THE AMERICAS – USA

Russel Metals to acquire Tampa Bay Steel

Russel Metals Inc. has entered into an agreement to acquire Tampa Bay Steel Corporation for US$79.5 million, subject to normal course adjustments. The purchase price includes working capital, buildings and equipment, and the related real estate.

John Reid, President and CEO of Russel Metals commented, "Our approach to acquisitions is to focus on opportunities that are complementary from a product mix and geographic perspective, but also aligned with our performance-based and decentralized culture. We believe that the transaction will allow us to extend our footprint into the Florida market with an experienced management team and a culture that is aligned with ours. In addition, Tampa Bay Steel has invested approximately US$ 20 million in value-added equipment and facility expansion over the past three years, and has a platform for further growth within the Florida market."

Russel Metals is one of the largest metals distribution companies in North America with a growing focus on value-added processing. Tampa Bay Steel has a long standing and well-respected management team in the central Florida region, and its business includes significant value-added processing and non-ferrous products.

The transaction will be financed from Russel Metal's cash on hand or drawings under its credit facility and is expected to close in December 2024.

Russel Metals

ASIA – CHINA

Baoshan Iron and Steel completes new combination mill installation

Baoshan Iron and Steel, Shanghai, has recently completed the installation of a new combination mill, featuring both a wire rod mill outlet and a bar-in-coil line. The mill was supplied and installed by Primetals Technologies.

One of the mini-finishing mills installed at Baoshan Iron and Steel
(Photo: Primetals Technologies)

The 600,000 t/year mill is specifically designed to increase rolling mill capacity and expand the size range, with the wire rod mill outlet handling 7.5 to 29 mm rod and the bar-in-coil line handling 8 to 50 mm bar. To reduce downtime, Primetals Technologies utilized four eDrive mini-finishing mills with 250 mm ultra heavy-duty roll housings for integrated single-family rolling from a standardized mill train and low-temperature thermomechanical rolling with quick-change roll units. The project scope comprised the equipment supply, engineering, and site supervision services as part of an open consortium between Baowu Steel Group and Primetals Technologies. The equipment supplied also included guide optics, a pinch roll and laying head, high-speed pouring reels, as well as a mechatronics package comprising of the mechanical software necessary for this key equipment.

Primetals Technologies

ASIA – INDIA

thyssenkrupp sells electrical steel business in India

thyssenkrupp has sold thyssenkrupp Electrical Steel India Private Ltd. to the Indian-Japanese consortium JSW Steel Limited and JFE Steel Corporation.

thyssenkrupp Electrical Steel India is part of the electrical steel business unit, which belongs to thyssenkrupp's steel division. The main site of thyssenkrupp Electrical Steel India is located in Nashik, around 150 kilometers from Mumbai. The consortium of buyers consists of the largest Indian steel manufacturer, JSW Steel Limited, which is part of the JSW Group, an Indian industrial conglomerate, and JFE Steel Corporation, the second largest steel manufacturer in Japan. The transaction is expected to be closed within the next few months.

The sale of the Indian company is taking place for market-strategic reasons. "The supply of raw materials from thyssenkrupp's German steelworks to India is cost-intensive and weakens our competitiveness in India in the long term," explains Dennis Grimm, Spokesman of the Executive Board of thyssenkrupp Steel. "Setting up our own local raw material production is not economically feasible for us. Compared to our local competitors, we will not be able to achieve the same economies of scale by supplying from Germany. This is why the sale is the right step for us at the right time."

The proceeds from the sale will strengthen the steel segment's capital base and will be used, among other things, for the green transformation. This also includes the activities of thyssenkrupp Electrical Steel. As demand for grain-oriented electrical steel remains high in the wake of the global energy transition, the company will increasingly focus on growth markets in Europe and North America in the future.

thyssenkrupp

ASIA – SOUTH KOREA

Hyundai Steel orders blast furnace gas injection study

Hyundai Steel has placed an order with Primetals Technologies for a blast furnace gas injection study to improve production and reduce carbon emissions.

The study will be executed in two phases. Phase 1 will focus on a process performance study which will evaluate the impact that injecting hydrogen-bearing gases into the furnace via the tuyeres will have on production stability, yield, and emission reduction. This phase will also investigate the impact of operating sequence impulse process technology on the furnace. This technology pulses high-pressure oxygen in a pre-determined sequence to each tuyere. Shock waves penetrate deep into the raceway of the blast furnace, combusting the fine char build-up and improving coke permeability. This process enhances gas utilization and improves furnace drainage. Phase 2 will explore the physical layout options at the plant for each technology, including necessary pipework and associated capital costs.

The completed report will enable Hyundai Steel to determine the most environmentally efficient operation of the three blast furnaces at its Dangjin plant. By replacing part of the traditional carbonaceous fuels with alternative gas injection, Hyundai Steel aims to reduce the CO_2 emissions from the blast furnace. This not only improves the plant's environmental credentials but is also expected to lower operating costs, reducing the cost per t of hot metal while maximizing furnace production.

Primetals Technologies

ASIA – MALAYSIA

Alleima to establish new production facility for medical wire

To further strengthen its medical wire manufacturing capacity, Alleima has decided to establish a new facility in Penang, Malaysia.

Alleima's ultra-fine medical wire is used in various fields of medical technology, such as remote patient monitoring, vascular therapy, sensing and neurostimulation. Penang is a growing Asian hub for medical companies. The new production facility will enable Alleima to capture opportunities from the growing demand in the region. Site preparations will start at the end of 2024, with first commercial deliveries in 2026. The new facility will become part of Alleima's Kanthal division.

Alleima

ASIA – TAIWAN

Dragon Steel to revamp blast furnace

Dragon Steel Corporation (DSC) is going to revamp its blast furnace No. 1 in Taichung. As part of the revamp, Primetals Technologies will supply new copper staves for the blast furnace.

Originally designed, supplied, built, and commissioned by Primetals Technologies in 2010, the blast furnace has exceeded its capacity with a performance of 15 percent above design. The furnace will be taken offline in 2025 for a revamp in preparation for another successful campaign. As part of the revamp, DSC is replacing the full set of staves to the original design with the addition of ten staves containing Primetals Technologies' patented wear-resistant copper staves and anti-bending solution in key areas of the furnace. This will support the continued reliable operation of the furnace cooling system, extend the campaign life, and minimize maintenance. The introduction of the wear-resistant technology also reduces operating costs and carbon emissions by lowering coke consumption.

Dragon Steel Corporation became a fully-owned subsidiary of China Steel Corporation in 2008. Located in Taichung, Taiwan, DSC is the country's only wholly integrated steel plant, equipped with both an electric arc furnace and two blast furnaces.

Primetals Technologies

New copper staves will be installed at Dragon Steel Corporation's blast furnace No. 1 (Photo: Primetals Technologies)

ASIA – VIETNAM

Phu My Steel overhauls cold-mill gearbox

Phu My Flat Steel, part of Viet Nam Steel Corporation, contracted Danieli Service Vietnam to refurbish the gearbox powering the cold rolling mill stand in Phu My.

The overhaul had become necessary as a result of a spindle failure that compromised the gearbox geometry. The activities carried out by Danieli Service Vietnam included on-site machining carried out by Danieli Service using special equipment.

In order to minimize the stoppage of the mill, the project was performed in three main phases. First, the problem was defined by means of an initial laser survey based on which the corrective actions necessary were determined. This was followed by the supply of a new set of spare gears and bearings, with dedicated bushings manufactured in Danieli workshops. The project execution phase consisting of on-site gearbox machining to reestablish gearbox geometries and installing all new components was performed in seven days, including running tests.

Danieli

Image: Generated with Adobe Firefly

Merry Christmas and a healthy and successful 2025
from the team at DVS Media GmbH

DVS MEDIA

DECARBONISATION

JSW Steel to start carbon capture pilot project in India

Together with BHP and Carbon Clean, JSW Steel start collaboration to explore carbon capture technology for at-scale implementation in conventional steelmaking

JSW Steel, India's leading private sector steel company, carbon capture solutions provider Carbon Clean, and leading global resources company, BHP, are collaborating to accelerate deployment of carbon capture technology for steelmaking decarbonisation, following the signing of a joint study agreement between the parties. Under this agreement, the parties will commence joint studies to explore the feasibility of Carbon Clean's CycloneCC modular technology to capture up to 100,000 tonnes per year of CO_2 emissions – the largest scale CycloneCC deployment to date in steelmaking.

There are several challenges with the adoption of carbon capture technology in the steel industry, including capital expenditure and ongoing operating costs, as well as the integration of new equipment into an existing operations site with space limitations. The CycloneCC rotating packed bed (RPB) technology in combination with Carbon Clean's proprietary APBS-CDRMax solvent aims to address these challenges through reducing total installed cost and the unit footprint by up to 50 per cent, and equipment that is ten times smaller in size than conventional carbon capture technologies.

This project is an important step towards supporting the scale-up of carbon capture, including understanding the potential performance, costs, and carbon abatement outcomes. It is anticipated that these joint studies will be completed during 2026, at which time the parties will consider installing CycloneCC at JSW Steel's Vijayanagar site in India's southern state of Karnataka. The utilisation of the CO_2 is a key component of the project. If the project is successful, JSW Steel intends to liquefy captured CO_2 so that it can be sold locally.

BHP's Chief Commercial Officer, Rag Udd, said: "We are actively studying multiple pathways for steel decarbonisation, including through use of hydrogen and renewable power, but we recognise that the blast furnace route will likely remain a pathway for the production of steel, particularly within India. Supporting the development of key abatement technologies is therefore critical."

Jayant Acharya, Joint Managing Director and CEO, JSW Steel, said "We remain committed to transforming our sustainability vision into reality and have already achieved a reduction of carbon emissions intensity by 30% against our 2005 baseline. At JSW Steel, we aim to further reduce our steelmaking intensity to 1.95 tonnes of CO_2 per tonne of steel by 2030 and achieving net neutral carbon emissions by 2050. We believe CCUS could be a financially viable decarbonisation lever which would be crucial to achieve near zero emissions in the steel sector and this collaboration for a scale-up application would help pave the way forward."

CycloneCC modular technology equipment is ten times smaller in size than conventional CC technologies (Photo: Carbon Clean)

Aniruddha Sharma, Chair and CEO, Carbon Clean, said: "The potential impact of carbon capture in decarbonising the steel industry will be huge. First projects are key to advancing technical innovation, providing valuable learnings that will benefit the entire steelmaking sector. Decarbonisation pioneers and early adopters of our modular CycloneCC solution will play a vital role in accelerating progress, with the aim for this technology to be fully commercialised and rolled out at scale."

Indian steel producers are collectively the world's second largest, with production potentially doubling by 2030 against 2023 figures, and will likely have a critical role in achieving India's target of net zero by 2070. With the increasing commissioning of blast furnaces in India with decades of life ahead of them, supporting longer term near zero decarbonisation routes is essential. Carbon capture, utilisation, and storage (CCUS) technology is anticipated to be a critical abatement to support a near zero CO_2 emissions intensity for this process route, as well as potentially for other hard-to-abate industrial sectors.

> We believe CCUS could be a financially viable decarbonisation lever which would be crucial to achieve near zero emissions in the steel sector.
>
> *Jayant Acharya, Joint Managing Director and CEO at JSW Steel*

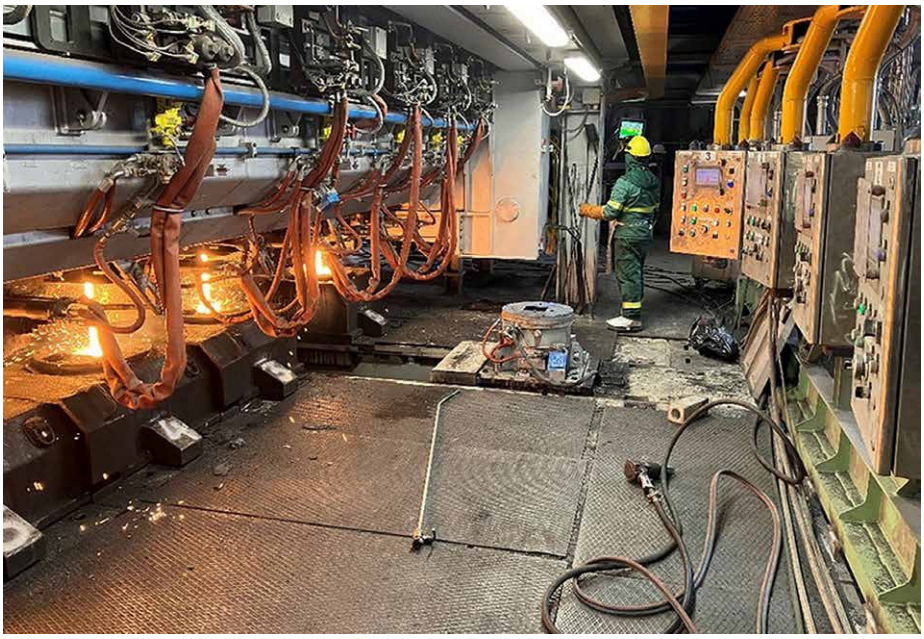
Headquartered in the UK and with offices in the US, Canada and India, Carbon Clean has developed carbon capture solutions for hard-to-abate industries including cement, steel, refineries, and energy from waste. The patented technology significantly reduces the costs of carbon capture when compared to conventional solutions the company states.

Carbon Clean / BHP / JSW

MODERNIZATION

Feralpi benefits from increased productivity after upgrading its billet caster

Italian steel producer Feralpi Siderurgica is implementing a "hot charge", i.e. a direct link between the continuous caster and the rolling mill. Following an article in the October issue on the reconfiguration of the long products rolling mill [1], this article focuses on the modernization of the billet caster.



Retractable oscillators allow for the exchange of moulds during casting sequences
(Photo: Primetals Technologies)

One-piece caster design to minimize the shutdown period
(Photo: Primetals Technologies)

Recently Feralpi Siderurgica (part of Feralpi Group) has granted the final acceptance certificate (FAC) to Primetals Technologies for a revamp of its 6-strand billet caster at the steel plant in Lonato del Garda, Italy. The upgraded caster was implemented within just six weeks during the planned summer shutdown of 2023. The project took only 12 months from contract signing to the first cast – usually, similar projects take at least 1.5 years until completion.

The extraordinarily swift implementation was achieved through tailored design features specific to Feralpi's needs, along with close collaboration and knowledge sharing between Feralpi's and Primetals Technologies' technicians. Primetals Technologies engineered the caster bow as a single piece for all six strands and preassembled the equipment before transportation to Feralpi's location. Moreover, the moulds and retractable oscillators were designed and built as a single unit, contributing to a smooth on-site implementation.

Individual mould change. The key data of the 6-strand billet caster at Feralpi Lonato are as following:

- dimension of billets: from 140 up to 160 millimetres width,
- casting speed: up to 3.25 metres per minute.

Primetals Technologies installed retractable oscillators as part of the project, resulting in increased productivity. For conventional billet caster designs, changing a mould requires a complete production stop on all strands. However, the retractable oscillators are mounted on mobile carriages, allowing each oscillator to be detached individually for mould changes. This configuration allows operators to

exchange moulds on one strand while keeping the other strands operational.

Improved centre quality. Primetals Technologies' scope of supply included key mechanical equipment such as the caster bow, retractable oscillators, strand guiding units, drive adoption of the withdrawal strand unit (WSU), and a pinch roll. The comprehensive electrics and automation solution for the mould/oscillator, including the LevCon Autostart function, and implementation services, rounds off the scope.

Increased mould level stability. As part of the project, Primetals Technologies' automation experts collaborated with Feralpi engineers to identify optimization areas that could enhance production performance. The evaluation revealed that response times for the withdrawal drives could be improved. The team implemented a new set of LevCon parameters based on a numerical optimization approach.

The new state-of-the-art LevCon function for open stream casting enables improved mould level control, resulting in an average 34 percent improvement for the standard deviation of the mould level, i.e. the value indicating mould level stability. Feralpi has expressed satisfaction with the project, noting that the new technology has set a new standard for precise mould-level control. LevCon's Autostart function has also become part of Feralpi's ongoing operations, minimizing the risk of breakouts.

Primetals Technologies

Reference

[1] Modernisation of the long products rolling mill at Feralpi Siderurgica Lonato. In: STEEL + TECHNOLOGY 3/2024 (October issue), pp. 50-54

STEELMAKING

EAF Quantum deployed for special steel production in China

Chinese special steel producer Huaigang Special Steel has achieved a new level of production flexibility in terms of raw material utilisation. The new steel melting plant started up with significantly reduced production costs, thanks to a certain proportion of hot metal input and highly efficient scrap pre-heating technology.

Huaigang Special Steel, a part of the Jiangsu Shagang Group, has recently granted the final acceptance certificate (FAC) to Primetals Technologies for an 80-t EAF Quantum electric arc furnace, implemented at a site in Huai'an, Jiangsu province. The first heat was poured in January 2024, just five months after Primetals Technologies and Huaigang Special Steel began on-site installation work.

Tap-to-tap times of 32 minutes

This EAF Quantum offers remarkable production flexibility, achieving single heats with tap-to-tap times of 32 minutes. In July, Huaigang operated the furnace on 25 percent hot metal and 75 percent scrap at a power consumption of 240 kilowatt-hours (kWh) per ton and an oxygen consumption of 23 to 25 cubic meters per ton. The following month, Huaigang switched to 100 percent scrap. Additionally, they have used a mix of 30 percent hot metal and 70 percent scrap, achieving power consumption figures of less than 230 kWh per ton. Huaigang also has the option to utilize 30 to 40 percent hot metal during the charging process.

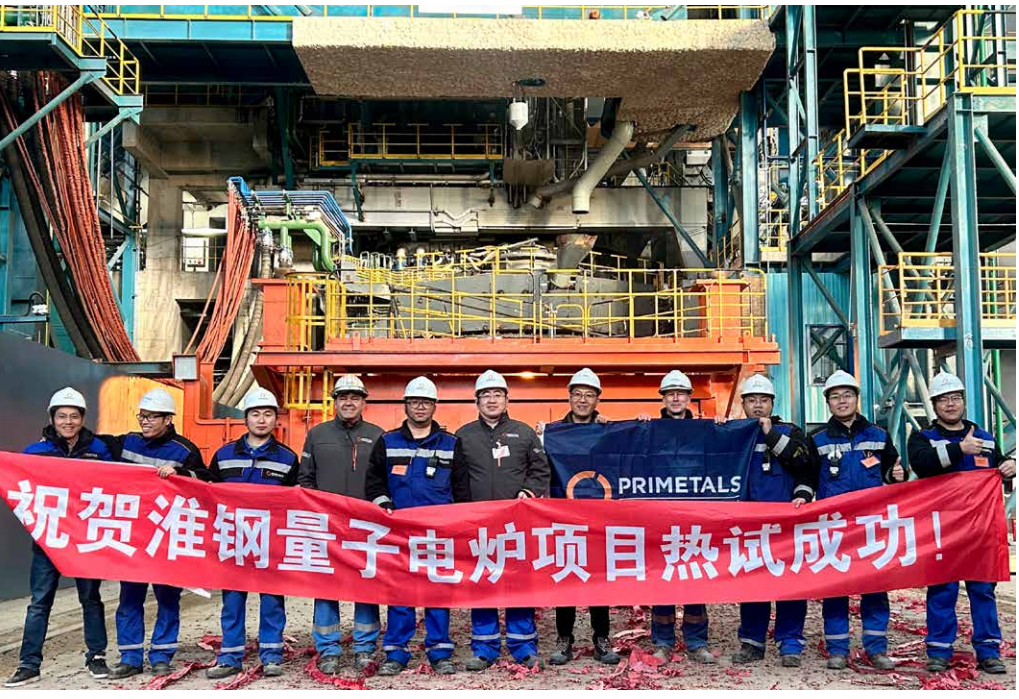
Primetals Technologies has supplied Huaigang with key mechanical and electrics process equipment, as well as a Level 1 automation system, an automated charging process, automation systems for oxygen injection and sand filling, and a Level 2 automation system.

Scrap preheating enables excellent power consumption figures

Back in 2021, Jiangsu Shagang Group ordered its first EAF Quantum from Primetals Technologies. Positive experiences with this project contributed to their decision to order a second EAF Quantum in 2022. Huaigang Special Steel's existing line produces 3.2 million tons of special steel annually. Focused on high-end special steels, such as spring steel and bearing steel, Huaigang is a leader in China's special steel market.

The flexible application of raw materials and the EAF Quantum's high melting efficiency ensure the production of high-quality special steel products, further reducing melting power consumption to less than 230 kWh per ton for single heats and significantly shortening melting times. Compared with conventional EAF plants, production costs are reduced by more than 20 percent.

One of the most significant differences between conventional EAF plants and the EAF Quantum is the scrap preheating process. The EAF Quantum features a trapezoidal shaft and a scrap retention system. This design optimizes scrap distribution and allows exhaust gas to preheat scrap. As a result, the EAF Quantum requires less time and energy to melt scrap, reducing power consumption and increasing productivity due to shorter processing times.



A part of Primetals Technologies' on-site team commemorating the first heat at Huaigang's new EAF Quantum electric arc furnace plant (Photo: Primetals Technologies)

Primetals Technologies

PRODUCTION UPGRADE

Expansion of reheating capacity at the hot strip mill to enhance overall performance

Çolakoglu Metalurji has commissioned the second reheating furnace to increase production capacity and meet the growing steel market demand. It eliminates a bottleneck for the existing hot strip mill.

Çolakoglu Metalurji is a leading steelmaker in Turkey producing slabs and hot rolled coils as well as blooms, billets and bars for the European and Asian markets. The company was looking for a new technology capable of reheating high-quality steel to meet the increasing demands of the automotive industry. They entrusted Fives with supplying a second Stein Digit@l Furnace®, following the successful installation of the first one.

"The Çolakoglu Metalurji's decision to invest in the second furnace was driven by market growth. We also had limitations on the existing furnace, creating a bottleneck for the existing hot strip mill. When looking for new reheating technology, we targeted capacity, efficiency, and decarbonization features in line with our commitment to meet market demands while prioritizing environmental sustainability," says Sercan Bahadir, Production Engineer – Hot Strip Mill at Çolakoglu Metalurji.

First high-quality product

The new Stein Digit@l Furnace® represents a significant step forward in terms of production capacity. It is capable of reheating slabs of up to 40 tonnes with a maximum capacity of 450 tonnes per hour, ensuring improved efficiency and performance.

"The main challenge in this project was meeting short deadlines: the production had to start quickly while ensuring precise and safe installation. Working closely together, we started the installation and stabilized it within five months, including the critical task of balancing the combustion airflow. The first high-quality hot product was sent directly to the mill for rolling," explains Dominique Resseguier, Project Manager at Fives Stein, a Fives subsidiary specializing in thermal technology.

Enhanced thermal operation is guaranteed by an innovative control solution to improve heating and energy efficiency (Photo: Fives)

Energy efficiency

The furnace is equipped with new-generation Central Wide Flame burners and Modulated Wide Flame burners that offers high operational flexibility and decreases gas consumption. Moreover, enhanced thermal operation is guaranteed by Virtuo™-R, an innovative furnace control solution to improve heating and energy efficiency.

"Virtuo™-R solution from Fives allows us to control the uniformity in the furnace and easily manage the process through an automation system. This advanced thermal solution has helped us reduce energy consumption up to 10% while improving uniformity and temperature accuracy," says Fatih Eker, Project Manager at Çolakoglu Metalurji.

The final acceptance certificate for the project was issued just four months after the furnace was installed, confirming that the state-of-the-art technology from Fives can meet required production schedules and final product quality.

Over the past decade, Fives has installed more than 100 reheating furnaces for leading steelmakers worldwide.

Fives – Steel & Glass Division

> We are commited to meet market demands while prioritizing environmental sustainability.
>
> *Sercan Bahadir, Production Engineer - Hot Strip Mill at Çolakoglu Metalurji*

DECARBONISATION

Trialling a hydrogen-fuelled reheating furnace at a steelworks

In a first of its kind in Italy, Tenova, Snam and TenarisDalmine will work together to test hydrogen in the steel industry to decarbonise hard-to-abate processes such as reheating

The collaboration between Snam, one of Europe's main energy infrastructure operators, TenarisDalmine, a Tenaris company and a global leader in pipe manufacturing and related services for the energy industry, and Tenova, a leading developer and supplier of sustainable solutions for the green transition of the metallurgical industry, will last six months with the aim of evaluating the performance and reliability of using hydrogen in the steel industry and, more broadly, the hard-to-abate sectors that are the most challenging to decarbonize.

The goal is to use hydrogen produced on-site to fuel a burner recently developed by Tenova (100% H_2 ready) installed in a reheating furnace to hot roll seamless pipes at the TenarisDalmine plant in Dalmine (Bergamo), Italy. The test will also help to define and implement safety guidelines and plant management procedures, thus developing integrated solutions that can significantly lower CO_2 emissions produced by the manufacturing processes of hard-to-abate industries. TenarisDalmine will provide the site and reheating furnace, contributing its know-how to the installation, operation, and performance monitoring of the steel plants. Using its expertise in hydrogen-related technologies and molecule transport, Snam will provide an alkaline electrolysis system to TenarisDalmine, which will operate it to produce the hydrogen needed for the test. Tenova, in turn, will complete the value chain of the process by pooling its know-how on combustion systems and, in particular, supplying burners specifically designed to be fuelled with hydrogen. The project also includes a significant contribution from Techint Engineering & Construction, a company that provides design and project management services and is continuously expanding in the energy transition field, with the development of general and detailed installation engineering, the development of risk analysis and verification of compliance with legal requirements and safety standards.

With this first collaboration at the Tenaris Dalmine plant, Snam is supporting a major industry player in the hydrogen as a service modality, an ad hoc service that enables the use of decarbonized hydrogen in industrial production plants or other application environments, with Snam leasing the electrolysis system to the end user, who operates it. The program is part of Snam's broader efforts as a system operator to guide industrial companies on their path to decarbonizing processes that need to be tested in view of future large-scale infrastructure solutions.

Three companies of the Techint Group (Tenaris Dalmine, Tenova, and Techint Engineering & Construction) will consolidate their know-how by developing, implementing, and validating the technologies required to decarbonize hard-to-abate industries by gradually replacing fossil fuels with green hydrogen.

Tenova

An on-site alkaline electrolysis system from Snam will produce the hydrogen needed for the test. From left, Piero Ercoli (Snam), Antonio Catalano (Tenova), Michele Della Briotta (Tenaris), and Andrea Cignoli (Techint E&C's) (Photo: Tenova)

QUALITY STRIP PRODUCTION

High-definition flatness correction for rolling mills

The proven Integral Solenoid Valve (ISV) is renowned for enabling rolling mills to achieve optimum flatness. The new ISV Electric Compact valve pushes the technology further by increasing the flow rate control from ten discrete cooling levels up to a possible 120 levels, all within a narrower 25-millimeters zone width – delivering true high-definition control.

ISV Spray System from Primetals Technologies installed on an aluminium foil mill (Picture: Primetals Technologies)

In a world where the demands for modern manufacture are ever-changing, rolling mills require the best technology to produce "flat" strip with minimal defects. The all-new Integral Solenoid Valve (ISV) Electric Compact from Primetals Technologies offers the highest definition control without the need for compressed air supply, reducing both the capital and operating expenditure costs.

Through 45 years of evolution, the Integral Solenoid Valve (ISV) spray system from Primetals Technologies has become the industry standard for cooling, enabling rolled steel and aluminium mills to achieve optimal flatness. Applying zone cooling and lubrication across the width of the work rolls addresses residual flatness errors and controls the bulk temperature of the mill during the rolling process. The new ISV Electric Compact valve pushes the technology further by increasing the flow rate control from ten discrete cooling levels up to a possible 120 levels, all within a narrower 25-millimeters zone width – delivering true high-definition control.

Operating principle

Each valve has its own 24V DC-driven solenoid mounted within the rear section of the valve body. By energizing and de-energizing the solenoid, an internal shuttle mounted in the front section of the valve can move back and forth to open and close the valve. In the open position, coolant passes through the inlets on the valve body to the outlet situated on the end of the valve. Engineers at Primetals Technologies have utilized extensive computational fluid dynamics (CFD) analysis to optimize the design of the valve body and internal shuttle, ensuring class-leading flow rates through the valve.

The outlet of each valve is connected to a nozzle plate to provide coolant to the mill rolls. Nozzle configurations are specifically designed using advanced thermal modelling, optimizing the spray patterns and coolant flow rates to suit the individual requirements. The optimal thermal performance may be achieved for each application, regardless of the rolling duty or individual pass schedules.

Compatible with non-ferrous strip mills and steel hot-strip mills

At Aluminium 2024 trade fair in Düsseldorf (Germany) Primetals Technologies exhibited a demonstration model that combined the cooling spray control and the Air Bearing ShapeMeter, which continuously identifies and measures deviations in metal flatness. Any flatness errors identified are communicated continuously to the mill's active flatness control system, which sends instructions to the ISV spray system. In this way, the ISV spray system has all the information needed to apply precisely modulated coolant to targeted zones on the work rolls to correct flatness errors.

Primetals Technologies

MATERIAL FLOW LOGISTICS

Retrofit ensures longer service life for heavy-duty transport vehicles

Poslogitec, a logistics service provider of POSCO, has modernised one of the first KAMAG industrial lift transporters (IHT). Thanks to the new drive unit, the special vehicle not only works efficiently, with low emissions and low noise, but is also considerably more economical. The supply of spare parts has also been secured for many years to come.

The South Korean transport and logistics service provider, Poslogitec, has been using KAMAG industrial lift transporters since the late 1990s. The vehicles have proved their extraordinary qualities time and time again. In the port of the Kwangyang steelworks which is owned by POSCO (Pohang Iron and Steel Company), one of the largest steel producers in the world, Poslogitec vehicles are in use 24/7 and primarily transport coils of steel strip. "The fact that we have been using KAMAG industrial transporters for so long proves that they are extremely durable and can be used economically and efficiently in the long term," explained Jung-Ju Choi, head of the Poslogitec maintenance team. "Before purchasing the first units, we compared vehicles from different manufacturers and chose the TII KAMAG models in particular because of their robustness," he said.

The number of KAMAG industrial lift transporters operating in the port of the Kwangyang steelworks has now increased to around 70. After a long period of use, more than four decades in some cases, it makes sense to bring the tried and tested vehicles up to the current state-of-the-art standard. Adaptation to accommodate new transport tasks, functional enhancements, performance optimisation and the best possible environmental compatibility speak heavily in favour of modernisation or retrofitting carried out by the specialists at TII KAMAG. In the process, modern components give these valuable vehicles an extended service life whereby the supply of spare parts is also guaranteed.

Training for technical experts from the regional partners

The oldest KAMAG vehicles in the Poslogitec fleet, for example, still have air-cooled engines which were replaced by Stage V PowerPacks (PPU) with modern exhaust after-treatment systems. Now, the first IHT – a model with five axle lines, 110-tonne payload capacity and an underfloor cabin – has undergone a comprehensive modernisation makeover. The retrofit was carried out by trained experts from the South Korean KAMAG sales and service partner, KILWOO. The Korean importer has been working with the industry experts from the TII Group for more than 20 years. In addition to KAMAG industrial vehicles such as the industrial lift transporters and slag pot carriers, the pro-

First transporter at Poslogitiec underwent a complete modernisation (Picture: TII KAMAG)

Sales and service partner KILWOO was responsible for the retrofit activities
(Picture: TII KAMAG)

gramme also includes shipyard transporters and SPMT modules from TII SCHEUERLE.

The retrofit included the welding on of a new rear end with space for an exhaust gas after-treatment unit and replacing the existing engine with a new PPU complete with a modern status display. TII KAMAG had previously pre-assembled and tested the PowerPack (PPU) consisting of the engine, pump assembly, cooling unit and tanks. KILWOO also installed the engine's electrical system and repainted the IHT.

Pollutant and noise emissions significantly reduced

The time and effort were worth it. Service expert Jung-Ju Choi is very satisfied with the results: "The new drive unit has reduced noise and pollutant emissions. This not only protects the environment but also reduces stress levels for the operators," he explained. His service technicians are particularly impressed with the new display which makes any diagnostic analysis of the drive unit considerably easier to carry out.

Poslogitec has already been able to determine one important aspect: fuel consumption has decreased by around 30 per cent which, at the same time, significantly improves the environmental and economic balance of the industrial lift transporters. The head of Poslogitec's maintenance team praised the durability and safe operation of the industrial lift transporter as well as the low maintenance costs when compared to similar products from other brands.

Fast service and high parts availability

Jung-Ju Choi is also very impressed by the professional and fast service provided by TII KAMAG and its contract partner KILWOO. The technicians of the TII Group's Korean partner usually carry out repairs and maintenance directly at the customer's site. However, very complex work such as retrofitting is carried out in their own workshops near Dangjin, a city on the west coast of South Korea in the Chungcheongnam-do province. In addition, KILWOO maintains its own components warehouse thus ensuring high and fast availability of spare parts. "It is a great advantage that KAMAG can train KILWOO's technicians. This is not the case for all service companies in this segment," stated Jung-Ju Choi. The transport and logistics specialist's verdict carries a lot of weight. After all, the company operates many of the 70 units in the steelworks most of which have payloads of 110 and 150 tonnes.

TII KAMAG's retrofit offer applies to almost all of its own vehicle types. In addition to functional and sustainability upgrades, it is also used after accidents, for example to repair fire damage. Before the actual retrofitting takes place, TII KAMAG's experts inspect the vehicle on site in order to estimate the work required. Exactly where the vehicle is modernised depends on the customer's options and transport budget.

TII KAMAG

WORK ROLL RECONDITIONING

Optimizing performance and improving efficiency in roll grinding

Grinding of work rolls is a critical process, helping to maintain the accuracy of roll dimensions, surface quality, and the integrity of the roll – which are all essential to achieving high-quality, consistent results in production.

Achieving success in roll grinding requires careful attention to several factors. Proper alignment, reducing vibration and selecting the right grinding wheel for the specific roll material are key to producing an even surface without introducing new imperfections. Additionally, regular maintenance and inspection of both the grinding equipment and the rolls themselves can extend the life of the machinery and prevent costly downtime.

Inspecting work rolls in the roll shop at SIJ Acroni, Slovenia (Picture: Weiler Abrasives)

What is a roll grinding process and when is it used?

Roll grinding is a surface finishing process that reconditions or repairs surface defects such as cracks or cuts on large work or backup rolls that are used in rolling mills where sheet goods are formed and shaped using materials like steel, aluminum, paper, and more. The process is common in many industries, including steel, brass, copper, aluminum and paper mills; textile plants; and for the production of hydraulic cylinders. Roll grinding wheels are typically used when rolls show signs of wear, such as surface defects or inconsistencies in their roundness, and it is essential for keeping machinery running efficiently. It can be used on all roll types whether they are cast or forged, including work rolls, backup rolls, new rolls or old rolls that need renewal.

This process uses a roll mill grinding wheel to remove cracks or surface damage and restore a used roll to its original state or to apply the proper surface finish to a new roll. The time between grinding or reconditioning of the rolls depends on the material that is being processed. For example, mills rolling hot steel require the most maintenance on their working rolls due to the high pressures and thermal exposure associated with that rolling process.

Work rolls for hot vs. cold rolling

When metal is processed in a rolling mill, the operation uses either hot rolling or cold rolling. The primary difference between the two types lies in the temperature at which the metal is processed and the properties it imparts to the material.

Hot mill work rolls are exposed to extreme heat and pressure conditions, requiring frequent grinding. The material is more malleable at higher temperatures, making it easier to shape and form. Hot rolling allows for the production of large, complex shapes and reduces the need for additional processing. Hot rolled steel is typically less expensive to produce. However, the surface finish of hot rolled metal is usually rough, and the tolerances are less precise due to the cooling process.

Cold mill work rolls need consistent refinishing to hold a specific roll profile or surface finish to ensure tight tolerances on the end product. In cold rolling, the metal is processed at or near room temperature. Initially hot rolled material is fur-

Kyle Thompson, Sector Manager, Industrial Production Americas; Inja Skrinjar, Product Manager; Weiler Abrasives – Contacts: KThompson@weilerabrasives.com; ISkrinjar@weilerabrasives.com

ther processed by passing it through rollers to improve surface finish and dimensional accuracy when thinner dimensions are required. Cold rolling results in a smoother surface finish, tighter tolerances and increased strength due to strain hardening. This makes it ideal for more visually and functionally demanding products.

When choosing grinding wheels for each process type, the main difference is the grain size. Wheels with much finer granulations are used for cold rolling since a smoother surface finish is required. Wheels for hot rolling typically have granulations of 36 to 46, while wheels for cold rolling often use 60 to 80 grit.

Positioning of a grinding wheel on a roll grinder (Picture: Weiler Abrasives)

Roll grinding challenges

While it is essential for maintaining high-quality production in various industries, roll grinding involves several challenges that can impact the precision, efficiency and longevity of both the rolls and the grinding machinery. Common challenges include:

Material composition and differences. The variety of roll material being ground significantly impacts wheel performance and abrasive consumable costs for users. Different materials require specific grinding wheels and techniques. The hardness and composition of the roll material can cause excessive wear on the grinding wheel, leading to inconsistent surface finishes or the need for frequent wheel dressing and replacement. Designing a single grinding wheel to cover all roll types being ground within a given facility can be challenging. Look for a wheel manufacturer that can offer vast capabilities — from technical resources to manufacturing — so solutions can be developed that achieve the quality needed while helping to reduce consumable expenditure.

Vibration and chatter. Vibration during grinding can cause surface imperfections known as chatter, leading to an uneven roll surface. This issue can occur due to running hard specifications and pushing grinders to max. loads in order to grind rolls faster. Chatter not only affects product quality but also reduces the life of both the rolls and the grinding equipment.

Cycle times and operating costs. The performance of abrasive consumables ties directly to the bottom line in most rolling applications, and many end users want to reduce cycle times. As a mill's output increases, grinders can become backlogged. If the next set of rolls aren't ready for a roll change, costly production downtime can occur. In addition, the rolls themselves can be quite expensive, and every layer removed for reconditioning means the roll is getting smaller each time. This makes it important for end users to remove as little material as possible when renewing the surface.

Precision and tolerances. Roll grinding can achieve extreme accuracy and tolerance, down to thousandths of an inch. But achieving and maintaining tight tolerances can be a challenge, especially for rolls used in industries requiring high precision. Even small variations in roll geometry or surface finish can lead to defects in the final product, making it crucial to maintain accuracy throughout the grinding process.

Machine wear and maintenance. Regular maintenance of roll grinding equipment is vital to preventing issues like misalignment, uneven wear or poor surface finishes. Maintaining the precision of large, complex machines over time can be difficult and requires skilled operators and consistent monitoring.

To address many of these challenges, it's important to choose a high-performing grinding wheel designed for optimal performance for each specific application. A wheel that cuts properly with a long wheel life will reduce the number of wheel changes and help improve uptime for the end user.

Abrasive products for roll grinding

When choosing the proper grinding wheel for roll grinding, consider the material and specifics of the application. Primarily, organic/resin bonded grinding wheels are used in both hot and cold rolling mills. Some vitrified products are used in specific applications where special roll profiles and surface finishes are required. In hot rolling applications, abrasives with ceramic grains are commonly used to recondition rolls due to roll material hardness and the amount of stock removal required. In cold rolling, abrasives with premium aluminum oxide grains are used to hold a tight roll profile tolerance and apply a specific surface finish to the roll.

Wheel size is usually predetermined by the maximum wheel size the grinder can accommodate. Grinding wheel thickness is also sometimes limited by the grinder specifications, but it can be altered to

accommodate custom widths needed for a specific roll profile. Some wheel manufacturers offer features that provide flexibility. Weiler Abrasives, for example, can use an economic center wheel section adjusted to the size when the user removes the wheel from the grinder at "stub out". This prevents unused high-cost abrasive grains in that section from being discarded, helping reduce abrasive consumable costs.

Wheel shapes and dimensions are also dependent on the application. Wheels ranging from 30 inches (762 mm) up to 48 inches (1,220 mm) in diameter and in widths from 2 inches (50.8 mm) to 6 inches (152.4 mm) are found in hot and cold rolling mills.

Another important consideration when choosing a grinding wheel is the product's G-ratio, which measures the amount of material that one wheel can remove during its life. A higher G-ratio equals a wheel with a better return on investment.

High-performing roll grinding solutions

Selecting high-performance abrasives can offer faster material removal rates, longer wheel life and fewer wheel changeovers. Using the right combination of abrasives, bond, wheel hardness and wheel structure provides the ultimate solution for specific application needs. High-performance abrasives allow greater flexibility in fine-tuning a grinding wheel for maximum end user performance.

Grinding wheel solutions from Weiler Abrasives can address many of the challenges associated with roll grinding, including vibration and chatter. New, innovative bond and wheel formulation technologies allow Weiler to design end user-specific grinding wheel formulations, providing wheels that hold form while carrying sufficient coolant to prevent burning the roll or loading on the wheel face. Technical experts aid end users in determining the best specification based upon material type, grinder and grinding parameters.

Wheel manufacturers must be able to adapt to variances and requirements of the end user and their operation. Dialing the wheel in for the specific grinding application is key. Look for a wheel manufacturer that can develop an appropriate wheel matrix that is suitable for the specific grinder or specific material type being ground.

Grinding of a work roll at the SIJ Acoroni hot strip mill (Picture: Weiler Abrasives)

Also, every mill is set up with unique wheel handling equipment or specific wheel mounting operations. It's important to work with a wheel manufacturer that can design specific user packaging methods that will eliminate extra steps the end user may be struggling with. This can help ensure safety and speed in mounting new grinding wheels for end users. For example, Weiler Abrasives has machined recesses on both sides of a wheel to accommodate an end user's specific flange or mounting conditions.

In addition, companies can partner with Weiler Abrasives for technical expertise and on-site support to help optimize grinding wheel performance and machine throughput. By utilizing the Weiler Process Solutions (WPS) program, product experts work alongside end users to collect valuable data and help address pain points. They analyze that information to provide feedback and offer process improvements that can help users reduce abrasive consumable costs and improve efficiency. For example, cycle time reduction is a key factor that is analyzed as part of the program. Cost savings go beyond the initial cost of the wheel. The longer a wheel lasts, the fewer wheel changes users must make. This can save 30 to 40 minutes with each wheel change, adding up to significant savings over time. By utilizing the WPS program, one end user was able to grind longer using high-performing wheels. They used 15 fewer grinding wheels per year, resulting in savings of €21,000.

The capability to measure and track vibrations during the grinding process is also important. Vibration during grinding can be caused by many factors, and it's an issue that can damage the rolls themselves or the finished product and reduce the life of the grinding wheel. Utilizing technical expertise in addition to choosing high-performing products can help end users correct vibration issues.

Lastly, it's key to make adjustments to improve the grinding process. Each wheel from different manufacturers performs differently, so be sure to monitor and analyze performance and work with technical experts to continually improve the process, rather than just sticking with the initial parameters set on the machine. Of course, it's also critical to follow all safety requirements, choosing products that meet or exceed EN 12413 & ANSI B7.1.

Optimizing roll grinding

Because roll grinding is a critical process in many industries, it's important to choose the right solutions that can help provide faster material removal rates, longer wheel life and fewer wheel changeovers. Look for grinding wheels that are engineered for the precision requirements and roll surface integrity demands of roll grinding. This can help end users improve finishes, reduce production costs and enhance productivity.

Weiler Abrasives

STRIP PROCESSING

Perfectly uniform oil film on the strip

Limax has developed a new modular oiling machine for metal strip that combines the proven atomization system with a flexible width adjustment system, a new, integrated smoothing roller, and an inline oil film measuring system. This unique combination of components guarantees a perfectly uniform oil film, while markedly reducing oil consumption and providing high process security.

German engineering works Limax has introduced its new modular electrostatic oiling machine for metal strip. The new machine design is the result of a close collaboration between Amepa, Danieli and Limax. It combines the advantages of high-performance electrostatic oiling with high-precision oil film measurement within one device. The first unit of this new-generation oiling system has been sold to a North American strip processing company.

As in its previous machines, Limax uses the proven design of arranging additional, secondary electrodes above the strip. These electrodes produce and spread out oil droplets as ultra-fine as of a hundredth of a millimeter. The thus obtained atomized spray is much finer and more uniformly spreadable than achievable with systems that operate without secondary electrodes.

A highlight of the new system is its flexible width adjustment feature. The spraying width can be adjusted to the width of the strip processed at increments of 100 mm. Thus, Limax reliably avoids overspraying of narrow strips. The operator can rest assured that not more oil than absolutely necessary will be sprayed.

The new inline oil film measurement (OFM) sensors from Amepa form an integral part of the new Limax machine. They make the overall oiling process more reliable, because in combination with the values from the electrostatic oiling process the infrared spectrometer sensors of the OFM system can issue a warning early on in the event of "dry stripes" on the strip or localized overoiling. By applying a constant pressure across the entire strip width the newly developed smoothing roller ensures that all of the strip surface is covered by a uniformly thick oil layer.

According to Cedric Maresch, Managing Director of Limax GmbH, the collaboration with Amepa and Danieli provides great benefits for his customers: "Our new machine brings down the amount of oil used in strip oiling operations, while ensuring a perfectly uniform oil film. Integrating the Amepa inline measurement system into our machine made a big difference. The data exchange between both measuring systems ensures that any oil film anomalies are readily recognized, giving the operator the opportunity to react without delay. This makes sure that only perfectly oiled strip enters the press line."

Limax GmbH

Electrostatic oiling, a smoothing roller and inline oil film measurement have been integrated within the compact unit (Picture: Limax)

CERTIFIED PRODUCT CARBON FOOTPRINT

Stainless steel environmental product declarations

Outokumpu supports its customers' green transition with verified environmental data of the stainless steel produced. The published EPDs cover austenitic, ferritic and duplex stainless steels for both, hot and cold rolled products.

To support its customers' targets to reduce their carbon emissions from supply chain, global stainless steel producer Outokumpu has published new environmental product declarations (EPDs) that provide externally verified environmental data on its stainless steel products. Outokumpu is driving the green transition by providing stainless steel with up to 75% lower carbon footprint compared to the global industry average*. In 2023, Outokumpu's products reduced its customers' emissions globally by 12 million tons compared to the global average of stainless steel.

"Outokumpu aims to be its customers' first choice in sustainable stainless steel. These externally verified EPDs help to improve data transparency in the stainless steel value chain and make it easier for our customers, for example in the construction, energy and marine industries, to choose materials that help them to reduce their carbon emissions. We at Outokumpu see the EPDs as an important opportunity to communicate the impact of our products in a highly transparent way", says Heidi Peltonen, Vice President for Sustainability at Outokumpu.

For each product group – austenitic, ferritic and duplex – the EPDs will cover both cold and hot rolled stainless steels (Picture from the Archives: Outokumpu / Jan Lönnberg)

Based on vast lifecycle analysis

The EPDs are a standardized** way of providing data about the environmental impacts of a product. The published EPDs cover three stainless steel product groups:

- austenitic,
- ferritic and
- duplex.

For each product group, the EPDs will cover both hot and cold rolled stainless steels, totaling the number of EPD documents to six.

The EPDs give information on a wide range of environmental impact indicators including carbon emissions, resource use, outflows and waste indicators. The calculations are based on vast lifecycle analysis that cover the stainless steel lifecycle from raw material extraction to manufacturing as well as end-of-life processing and recycling potential.

"The global demand for low carbon footprint materials is expected to grow. We are answering the demand by publishing these EPDs that provide even more specific data than before by covering a wider variety of stainless steel grades. Even though these new EPDs are not directly comparable to our previous ones, we can see that the carbon footprint of our stainless steel continues to be among the lowest in the industry", Peltonen continues.

In addition to the EPDs, which cover a wide perspective on the environmental impact of Outokumpu's products, Outokumpu also provides product carbon footprint calculations. Both data sources provide Outokumpu's customers verified and transparent data that help them to calculate their supply chain emissions.

**) Outokumpu stainless steel CO_2 emissions (2023): 1.52 kg CO_{2e} per kg of stainless steel. Global average CO_2 emissions (2023): 7 kg CO_{2e} per kg of stainless steel. (Outokumpu's calculation based on data provided by CRU, worldstainless and Kobolde & Partners AB)*

***) The process for verification and establishing the validity of an EPD is in accordance with EN ISO 14025 and ISO 21930 standards.*

Outokumpu

ARTIFICIAL INTELLIGENCE APPLICATION

Intelligent pricing for blanks

thyssenkrupp Materials Services has launched an AI platform that not only optimizes material nesting to reduce waste. Based on the nesting the solution offers automated pricing of the blanks. When integrated with an online shop this saves material, costs and time and provides customers with quotes very quickly.

Thyssenkrupp Materials Services has developed an AI platform that digitizes the nesting process – the intelligent placement of blanks on sheet metal – and the pricing process. It is called smart.processing and is integrated into the new online shop of Max Cochius, one of the leading metal distribution providers in Germany. Thanks to smart.processing, Max Cochius customers can purchase material in any desired free-form 24 hours a day, 7 days a week, from anywhere. By optimally placing the blanks, smart.processing minimizes material consumption and therefore costs.

smart.processing digitizes the intelligent placement of blanks on a sheet metal format
(Picture: thyssenkrupp Materials Services)

From quote to order in just one click

Telephone inquiries as well as manual price calculations for blanks and quotes are still common in materials distribution. The AI platform smart.processing ensures that customers can now get prices for their blanks in seconds and complete the purchase online. The complexity of the shape is no obstacle to the automated price calculation: Any shape is possible, from tubes and sheets to fully personalized free-forms. Customers can upload their technical drawing as a CAD file. Materials can be selected from all metals, from aluminium to stainless steel to copper and brass as well as special materials. In total, over 11,000 semi-finished products are listed in the Max Cochius online shop, all of which are displayed in a moveable 3D model. These can be cut to size using vertical and horizontal sawing as well as waterjet cutting.

As part of thyssenkrupp Materials Services, Max Cochius GmbH is an associated company of thyssenkrupp Schulte GmbH. thyssenkrupp Schulte has been an independent materials partner for many decades. Together with its customers, it has successfully developed and expanded business solutions in Germany. The company stores, delivers and processes suitable materials made of steel, stainless steel and non-ferrous metals. The basis for this is a wide range of flat products, profiles and tubes for all requirements. Competent technical advice and comprehensive services round off the profile of thyssenkrupp Schulte. The company's promise to "Move Industries for Generations" is both its own ambition and a sustainable promise to be a reliable partner for customers from a wide range of industries, today and in the future.

The idea for smart.processing was developed as part of a thyssenkrupp hackathon called "hack4tk". The Digital Technology Office (DTO) of thyssenkrupp Materials Services then took over the development of the platform in collaboration with internal customers. The plan is to introduce smart.processing in other thyssenkrupp companies, further develop the functions and use the intelligent placement of blanks in machine guidance.

thyssenkrupp Materials Services

SALZGITTER SHIPS "GREEN STEEL" TO AUTOMOTIVE SUPPLIERS

Salzgitter Group companies are supplying SALCOS® "green steel" to Allied Steelrode and Malben Engineering in South Africa for testing purposes.

Within the context of the SALCOS® program, Salzgitter Flachstahl and Salzgitter Mannesmann International are joining forces with Allied Steelrode and Malben Engineering in the value chain to promote sustainable automotive production by way of low-CO_2 steel products. The SALCOS® steel has obtained the necessary approvals, been provided with environmentally compatible packaging and shipped on a biofuel-powered ocean-going vessel with a reduced CO_2 footprint. "This collaboration supports the sustainability goals and associated innovations in the automotive industry as well as with its supply chain", says Alexander Soboll, managing director Salzgitter Mannesmann International GmbH.

Allied Steelrode ranks as one of the leading steel service centers in South Africa. As a tier 1 supplier, with 50 years of manufacturing experience to numerous OEMs, Malben Engineering will be stamping and processing components using the SALCOS® material.

Coil of "green steel" supplied to South African tier 1 automotive suppliers (Picture: Salzgitter AG)

Salzgitter AG

ROSSO STEEL INVESTS IN LASER BLANKING LINE

The Czech steel service center Rosso Steel has ordered a laser blanking line from Schuler. The line, installed at the Zajecí site, will be used for the production of body panels.

Rosso Steel is one of the largest family-owned companies in the Czech Republic. It operates two service centers in Zajecí and Mirošov equipped with state-of-the-art, partly automated technology and processing ultra-high-strength materials up to 1,200 MPa.

The new blanking line will be able to handle coil weights of up to 30 t, strip widths from 400 mm to 2,150 mm and strip thicknesses from 0.6 mm to 3.0 mm at a maximum strip speed of 60 m/min. It will have two laser cutting heads, each with a rated output of 4 kW and for a maximum cutting speed of 100 m/min. Blanking lines with lasers are particularly suitable for production processes with frequent product changes. The system can be used to produce both outer skin blanks and structural parts in high product quality.

Schuler

Rosso Steel will be using its new laser blanking line for the cutting of body panels (Picture: Schuler)

THYSSENKRUPP MATERIALS PROCESSING EUROPE TAKES OVER 2A-BUSINESS

In a strategic step to further develop the thyssenkrupp Materials Services segment, thyssenkrupp Materials Processing Europe has taken over the 2A business from thyssenkrupp Stahlkontor.

thyssenkrupp Materials Processing Europe, a specialist in the service center sector, already trades in declassified cold-rolled strip and surface-coated material. By expanding its product portfolio to include declassified hot-rolled strip, the company will be able to offer its customers an even more comprehensive range from a single source. thyssenkrupp Materials Processing Europe serves processors from the automotive, electrical, construction and solar industries at ten locations in six countries. thyssenkrupp Stahlkontor will continue its other business activities unchanged.

thyssenkrupp Materials Processing

ARCELORMITTAL AND VELUX SIGN AGREEMENT ON LOW CARBON-EMISSION STEEL

The Velux group has concluded a 10-year agreement with ArcelorMittal concerning the supply of recycled and renewably produced steel.

In 2023, ArcelorMittal and Velux agreed to enter into a partnership to lower the carbon footprint of the steels used in Velux roof windows by up to 70%, compared with conventionally produced steel. This co-operation involved the testing and validation of ArcelorMittal's XCarb® recycled and renewably produced steel and its performance in Velux roof window hinges and installation brackets.

Successful results have now culminated in the signing of a 10-year commercial agreement which outlines a framework for steel supply. Velux is now gradually increasing order intake so that by 2025, XCarb® will be used in several steel components for Velux roof windows, replacing the conventionally produced steel that was previously used.

XCarb® is manufactured with a minimum of 75% recycled steel and by using 100% renewable electricity. An electric arc furnace powered by renewable energy sources is used to manufacture the steel at an ArcelorMittal production facility in Northern Spain.

ArcelorMittal / Velux

SANDVIK EXITS NON-STRATEGIC BUSINESSES

Sandvik has decided to revise its additive manufacturing strategy, focussing mainly on metal powders. As a consequence, the engineer-to-order business of DWFritz Automation has been divested and the decision to seek an exit of the minority stake in BEAMIT has been made.

Sandvik has divested the engineer-to-order business of DWFritz to the U.S.-based private equity firm Balmoral Funds. Sandvik acquired DWFritz in 2021, with the intention to grow the ZeroTouch® business of DWFritz. The ZeroTouch® platform, an inspection gauging equipment enabling near-line and in-line metrology, will not be part of the divestment but remain a part of Sandvik.

Additionally, Sandvik has decided to seek an exit of its minority stake of approx. 30% in the Italian additive manufacturing service provider BEAMIT. This decision is in line with Sandvik's revised additive manufacturing strategy to focus mainly on metal powders.

Sandvik

RWE SIGNS CAPACITY RESERVATION AGREEMENT FOR MONOPILE FOUNDATIONS

Jost Backhaus, managing director of Steelwind Nordenham, (left) and Dr Holger Himmel, CFO RWE Offshore Wind, signed the framework agreement (Picture: RWE)

RWE has signed a capacity reservation agreement with Dillinger group company Steelwind Nordenham for up to 300 monopile foundations to be used in its future offshore wind projects in Europe.

Through this contract, RWE has secured production capacities in a tight market. Dr Holger Himmel, CFO RWE Offshore Wind: "Europe needs more offshore wind power to reach its ambitious climate targets. We are making our contribution and resolutely driving forward the expansion of offshore wind in Europe and globally. By signing an agreement with Steelwind, RWE has taken a big step towards securing the necessary production capacity for monopile foundations and delivering our European offshore wind development projects. This type of framework agreement is exactly what we need given the challenging market conditions."

Steelwind will reserve capacity at its German monopile production plant in Nordenham for 320,000 t of steel, equivalent to approximately 200 monopiles, over a 24-month period starting in 2027. The contract has an option to be extended for a further 12 months and provides an additional capacity of 160,000 t of steel, the equivalent of around 100 monopiles. The monopiles made by Steelwind are to be used at offshore wind farms which RWE plans to commission in Europe from the end of 2029 onwards.

Jost Backhaus, managing director of Steelwind Nordenham: "This framework agreement is yet another forward-looking step – for us as well as for Germany and Europe, whose ambitious climate targets can only be achieved with a major contribution from offshore wind." Steelwind has been manufacturing monopiles and single-piece monopile foundations with unit weights of up to 2,400 t for offshore wind farms since 2014. The steel for these highly advanced monopile foundations comes from Dillinger.

RWE / Steelwind Nordenham

VOESTALPINE REORGANIZES AUTOMOTIVE COMPONENTS BUSINESS IN GERMANY

The metal forming division of voestalpine is responding to structural changes and falling customer demand in the automotive sector by reorganizing its automotive components locations in Germany.

In future, the plants in Dettingen, Schmölln, Schwäbisch Gmünd, and Böhmenkirch will form a joint production network, with each contributing their specialist technology and product knowledge. The Dettingen location, which develops and produces ready-to-install stamped and formed parts, complex assemblies as well as safety and impact protection components for renowned automotive manufacturers, will in future increasingly focus on assembly. There are plans to adjust the number of personnel at the location. Around a third of the current workforce of 650 employees could be affected by this personnel adjustment. Over the coming weeks, a socially acceptable solution for these employees will be developed in cooperation with the works council.

Despite ongoing investment and improvement measures at voestalpine Automotive Components Birkenfeld, the long-term slowing in the macroeconomic environment and associated drop in orders from the automotive industry mean that it is no longer financially feasible to continue operations at the location. Over the coming weeks extensive discussions will be held with the trade union IG Metall and works council representatives to find a socially acceptable solution for all employees. The aim of the measures announced is to secure the future of the automotive supply segment of the metal forming division in the long term, and with it around 2,000 jobs in Germany.

Only minor changes are planned at the European locations outside Germany such as the Automotive Components plant in Linz, and the locations in Asia and South Africa. A program to reduce costs and raise efficiency is currently being implemented at the US location in Cartersville, Georgia, with around 650 employees.

voestalpine

VARSTEEL ACQUIRES PACIFIC STEEL

North American service center and metal processor Varsteel has acquired Pacific Steel, a leading distributor of structural steel located in Québec, Ontario/Canada.

Headquartered in Lethbridge, Alberta, Varsteel has offered supplies and service to its customers for over 70 years. The steel and pipe service center and metal processor has over 800 employees and 32 locations in western Canada and the United States.

Pacific Steel, founded in the 1950s, has built a reputation as a trusted source for both fabricators and construction contractors throughout Canada and in the northeastern U.S. The company is a full-range supplier, fabricator, and installer of rebar used in construction markets.

Varsteel / Pacific Steel

RESPONSIBLE STEEL CERTIFICATION FOR BIG RIVER STEEL

U. S. Steel's Big River Steel passed a rigorous set of standards in environmental, social and governance categories making it the first steel company in the world to qualify to sell its products as ResponsibleSteel™ certified steel.

The Big River Steel facility in Osceola, Arkansas, received the first ResponsibleSteel Site Certification in North America in 2022 and is once again at the forefront of innovation by achieving certification for sustainably sourced and manufactured steel. ResponsibleSteel is a global multi-stakeholder standards body, enabling certification at the site level – and now for the first-time – steel certification.

The standard incorporates environmental, social and governance requirements across its thirteen principles, which include over 500 criteria for the responsible sourcing and production of steel. It is constructed not only to encourage decarbonization progress at the site, but also to drive responsible sourcing and a rigorous supply chain analysis.

U.S. Steel / ResponsibleSteel™

HYDROGEN STEEL INFRASTRUCTURE

Steel tubes and pipes for hydrogen transport

The certification from Bureau Veritas demonstrates that seamless steel tubes produced by ArcelorMittal in Romania are suitable for transport of natural gas mixtures containing hydrogen. In addition, ArcelorMittal announced the launch of a new steel offer for the construction of hydrogen pipelines. For the latter, research programmes on the use of steel in hydrogen infrastructure are underway.

Hydrogen pipelines are crucial for the transition to a sustainable energy future. They enable the safe and efficient transport of hydrogen, which is a clean and renewable energy source. These pipelines help reduce greenhouse gas emissions and dependence on fossil fuels. By integrating hydrogen pipelines, industries can achieve higher energy efficiency and support the global efforts toward carbon neutrality.

H_2-ready certification for seamless tubes

ArcelorMittal Tubular Products Roman mill has successfully passed the Slow Strain Rate Test (SSRT) for hydrogen-ready certification provided by Bureau Veritas. This significant achievement shows that the seamless steel pipes produced in Roman are suitable for use in natural gas mixtures, with hydrogen percentages up to 100% pure hydrogen at a pressure of 45 bar (Scope 2).

The rigorous testing process covered both grades B/X42 and X52 acc. to API5L (L245NE/L290NE L360NE/L360NE as per $ISO_3$183), with full conformity achieved for both grades. This certification signifies the product's high performance and safety standards in demanding conditions, aligning with the latest industry requirements for hydrogen readiness.

"Bureau Veritas is supporting the growing renewables sector and accelerating the sustainable energy transition process. In this context, we are delighted to announce that we have successfully passed the Slow Strain Rate Test (SSRT) for H_2 ready certification provided by Bureau Veritas to ArcelorMittal Tubular Products Roman. This H_2 ready certification will provide transparency to foster investment in hydrogen production, transport and commercialization paving the way to reach global consensus concerning hydrogen standards and compliance." said Razvan Rusu, Industry Manager Bureau Veritas Romania.

ArcelorMittal's pipes play a vital role in the extraction, processing and distribution of oil and gas, as well as renewable energy resources (Picture: ArcelorMittal)

> The H_2 ready certification will provide transparency to foster investment in hydrogen production, transport and commercialization paving the way to reach global consensus concerning hydrogen standards and compliance.
>
> *Razvan Rusu, Industry Manager Bureau Veritas Romania.*

Seamless pipes are uniquely suitable for the transport of hydrogen. "We are very proud of the hard work and dedication that our team has given over the last two years, into obtaining the ASME B31.12 option B certification for our hydrogen pipes. This achievement not only reflects our commitment to quality and safety but also positions us as leaders in the hydrogen transport solutions market.

This certification opens new avenues for our product's application in hydrogen markets. Our products will provide the reliability and efficiency necessary for companies looking to integrate hydrogen into their energy mix.

Additionally, our customers have expressed great satisfaction with the pipes they have already acquired for hydrogen transport, which reinforces our confidence in the quality and efficiency of our products", said Adrian Ojogel, CMO ArcelorMittal Tubular Products, Roman.

Steel for hydrogen pipelines

ArcelorMittal announces the launch of a new steel offer for the construction of hydrogen pipelines to support the roll-out of hydrogen gas infrastructure. The company's R&D efforts are focused on providing higher-value products that align with customer needs. Furthermore, customers can benefit from reduced Scope 3 carbon emissions thanks to XCarb® steel certificates.

The European Union has ambitious production targets for renewable hydrogen, with a target of producing 10 million tonnes by 2030. Transporting hydrogen presents unique challenges that ArcelorMittal is addressing, by developing new steel grades to support pipe manufacturers. It is in this context that HyMatch® was created, with all grades in the product family featuring fine and homogeneous microstructure and good cleanliness, resulting in low risk of hydrogen embrittlement.

Dedicated research activities. Through ArcelorMittal Global R&D, research programmes for the use of steel in the hydrogen infrastructure are underway in a number of ArcelorMittal production sites, including Fos-sur-Mer in France, Bremen in Germany, and R&D laboratories including in Gent in Belgium. Production in Fos-sur-Mer and Bremen offers proximity to pipe manufacturers based in the Mediterranean countries and North Sea region respectively.

Furthermore, ArcelorMittal is improving the performance of its hydrogen-focused steel offer through continuous investments in internal research and development efforts, and active participation in international joint industrial projects (DNV H_2Pipes JIP, ARCOR MRC13, EWI New H_2 pipes JIP) and European funded projects (SafeH_2pipe, HyWay, PilgrHYm). The overall aim is to ensure the customers meet or exceed the last technical requirements for efficient and safe hydrogen infrastructure operations.

HyMatch® flat steel. Natural gas pipelines – including existing and new infrastructure – are expected to be used in the future for the transportation of hydrogen from the production facilities to the main consumption sites. ArcelorMittal HyMatch® steel fulfil the requirements of industry standards such as ASME B31.12 option B, and are being tested according to the latest industry guidelines.

"We are proud to announce the launch of HyMatch®, which presents our customers with the family of steel grades available for use in the construction of hydrogen-ready pipelines. While we have been producing line pipe steel for many decades, the new challenge the energy transition brings to pipelines is to safely transport H_2 and CO_2. We are therefore using our R&D and engineering expertise to develop the steel grades needed in these new applications, and are excited to be working with a number of different partners to trial our newest steel grades for the planned hydrogen pipelines", said Laurent Plasman, CMO Industry, ArcelorMittal Europe – Flat Products.

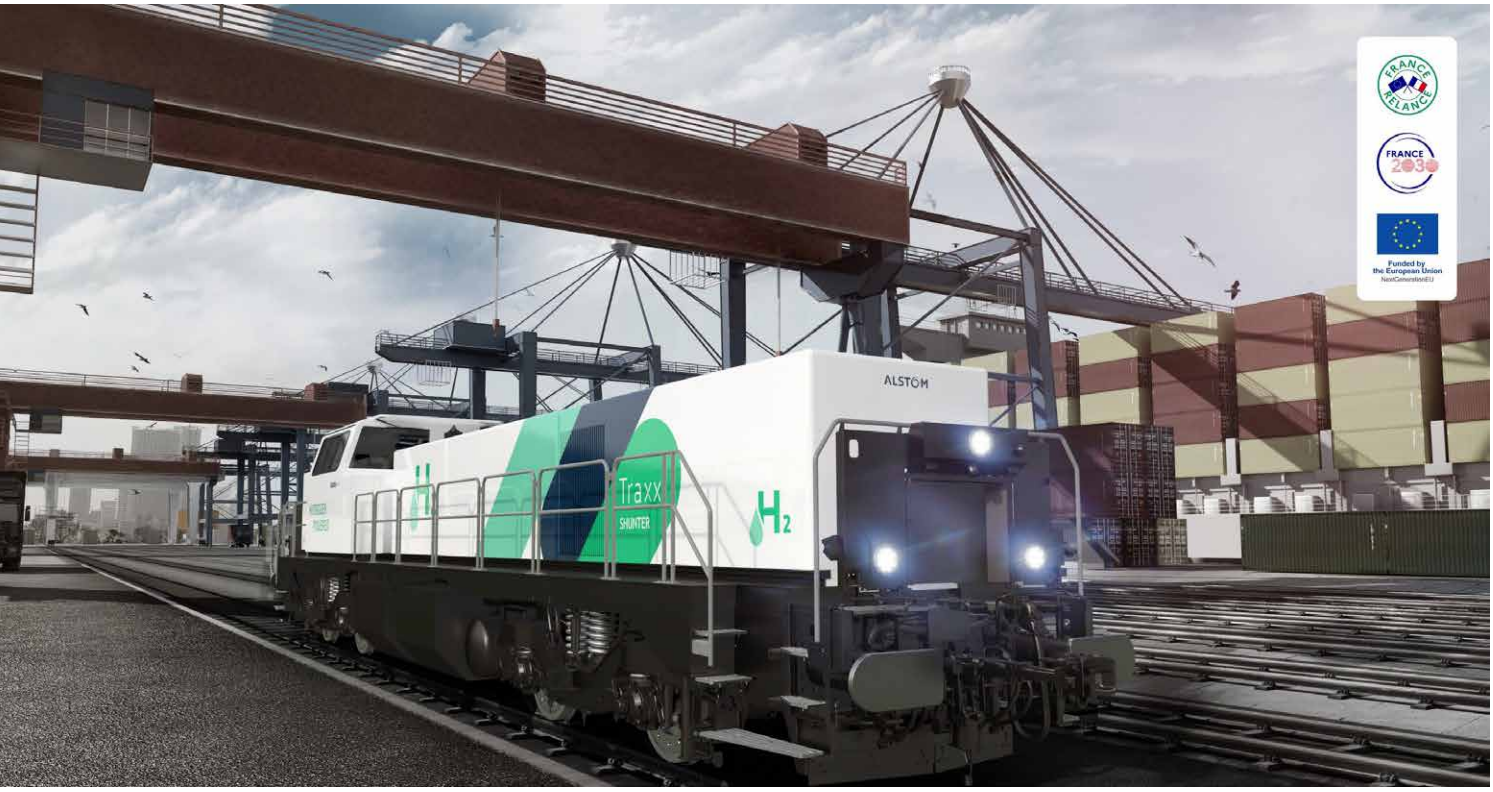
HyMatch® steels for hydrogen transmission pipelines can be purchased alongside XCarb® steel certificates: industry-first certificates which allow customers of ArcelorMittal to report an equivalent reduction in their Scope 3 emissions. The certificates represent the additional CO_2 emissions reductions that ArcelorMittal has achieved from third-party audited CO_2 abatement projects in its steel production plants.

ArcelorMittal

GROWING DEMAND FOR GREEN STEEL

Nordic steel for a fossil-free value chain

SSAB has entered into partnerships with steel processing companies for the supply of near-zero fossil carbon steel for a wide range of applications. Together with its partners, SSAB plans to reinvent the value chain from the mine to the end customer, largely eliminating carbon dioxide emissions from its own operations.



The first delivery of fossil emission-free steel for the new shunting locomotives will take place before the end of this year
(Picture: Alstom)

Huy Nguyen, Sales Director for SSAB in Southern Europe is excited: "At SSAB, we are committed to largely eliminating CO_2 emissions from the steelmaking process and to create a fossil-free value chain with our customers and partners," he says. "We are proud to work with companies like Alstom that prioritize reducing fossil carbon emissions in their materials with a clear and ambitious target to decarbonize."

Hydrogen locomotives

SSAB and Alstom have entered into a partnership to supply steel produced with almost zero fossil carbon emissions. The first delivery of SSAB Zero™ has been agreed for use in Alstom's first Traxx Shunter™ locomotives by the end of 2024.

SSAB Zero™ is commercial steel made of recycled steel and produced with fossil-free electricity and biogas. By using SSAB Zero™ instead of traditional steel, Alstom will significantly reduce the embodied carbon footprint in the material of their new locomotive platform, which is compatible with hydrogen, battery and catenary systems. The Traxx Shunter H™ hydrogen locomotive is an innovative shunting solution designed by Alstom, with funding from France Relance, France 2030 and NextGenerationEU, as part of the IPCEI Hy2Tech programme. It combines the latest hydrogen fuel cell and battery technologies to achieve zero direct carbon emissions.

Cable management systems

Meka Pro Oy is a Finnish family-owned company that manufactures long life-cycle cable management systems. It has a history of over 70 years and is now led by the third generation. SSAB and Meka Pro Oy have agreed on deliveries of fossil-free steel that will be used to manufacture cable management systems, such as cable ladders and cable trays. As part of the agreement, Meka Pro will receive small batches of steel produced virtually without carbon dioxide emissions from 2026. The

Shims are manufactured by combining different materials, mainly rubber and metal, and attached to the brake pads
(Picture: Trelleborg Sealing Solutions Kalmar)

volumes will increase annually as SSAB's fossil-free production capacity grows. By using fossil-free steel, Meka Pro Oy will be able to reduce carbon dioxide emissions in these products by up to 95%.

Meka® products are of modular design, which facilitates the construction of versatile cable management systems. "Fossil-free steel makes it possible to significantly reduce the carbon footprint of our products. We definitely want to offer this to our customers as quickly as possible," says Oskari Ylimaula, production, logistics and sustainability director at Meka Pro Oy.

> A common goal towards a fossil-free future gives us all the incentive to develop a more sustainable value chain together.
>
> *Lotta Ruottinen, Sales Director SSAB Europe*

Concept building

SSAB and Switzerland-based Parmaco have entered into a fossil-free steel partnership, which includes the ambition to construct the world's first concept building made of fossil-free steel in 2025. In this project, Parmaco intends to use pilot deliveries of fossil-free steel, developed with the HYBRIT® technology, throughout the entire structure. Parmaco expects to start construction in early 2025, with completion later the same year. The building is intended to serve as a model for future sustainable construction projects worldwide, demonstrating that it is possible to meet the growing demands for urban development without fuelling climate change.

Parmaco has long specialized in creating versatile spaces for schools, daycares, offices, residential complexes, and government facilities. Central to Parmaco's portfolio is its Fixcel product, a cutting-edge steel cell that forms the frame of the buildings and has advantageous properties that support indoor air quality and low energy consumption.

The HYBRIT technology, developed by SSAB in partnership with LKAB and Vattenfall, replaces traditional coal with hydrogen and fossil-free electricity in the iron ore reduction process. The by-product is water instead of CO_2 emissions.

Brake pad shims

SSAB has reached an agreement with Trelleborg Sealing Solutions Kalmar AB to deliver fossil-free steel to be used in anti-squeal plates, so-called shims for brake pads. Demand for sustainable components is high among vehicle manufacturers. This is especially true in the growing electric car segment, where the materials in the car account for a large part of the remaining carbon dioxide emissions after the exhaust gases have been eliminated. Shims are an important part used for eliminating brake noise, especially in electric cars where annoying sounds are heard more clearly. Therefore, Trelleborg Sealing Solutions Kalmar AB, a leading manufacturer of sound damping shims, wants to offer brake shims with a significantly lower carbon footprint than standard. This agreement with SSAB on future deliveries of fossil-free steel is an important part of that goal.

SSAB

CONSTRUCTION APPLICATION

Invespanel launches new range of sandwich panels with recycled steel

There are many solutions for use in construction made from or containing flat steel products, usually produced via the BF-BOF route, known for its high CO_2 emissions. ArcelorMittal offers an alternative material with a reduced carbon footprint that meets the demand for more sustainable buildings.

Kingspan | Invespanel has become the first sandwich panel producer in Spain and Portugal to use ArcelorMittal's organic coated XCarb® recycled and renewably produced steel. This partnership is the result of co-engineering focused on construction solutions with a reduced carbon footprint in the building sector.

"At Invespanel, we continue to progress towards a more sustainable future with the launch of our new 'Higher Recycled Content' range of sandwich panels. This innovative product not only meets the industry's requirements in terms of quality and performance but also offers outstanding environmentally-friendly characteristics," said Carlos Lanza, Plant Director at Kingspan | Teczone – Kingspan | Invespanel.

What makes this new range so special?

The 'Higher Recycled Content' panels are manufactured with pre-painted XCarb® recycled and renewably produced steel that is manufactured in an electric arc furnace (EAF) using 100% renewable electricity, and at least 75% scrap steel in the EAF. This combination of recycled materials and clean energy is a step forward in our mission to reduce the environmental impact of manufacturing processes.

"Moreover, construction companies who choose this new range will receive a certificate for their sandwich panel solution ensuring the traceability of the material as well as the related emissions savings (more than 60% reduction in the case of pre-painted XCarb® recycled and renewably produced steel)," Carlos Lanza added.

"Using low-carbon emissions steel in the construction sector is a highly effective way to reduce the carbon intensity of the materials used in our built environment. We are therefore very pleased to be partnering with Invespanel by supplying them with XCarb® recycled and renewably produced steel, which delivers a 60% reduction in carbon emissions compared with the same product made via the conventional steelmaking route. The possibility of offering this new range is the result of some impressive co-engineering work between our companies and I would like to congratulate all involved in this project," said Laurent Plasman, CMO Industry, ArcelorMittal Europe – Flat Products.

The Higher Recycled Content panels are tailor-made, with the following specifications:

- steel colour: Blanco pirineo 1006
- thickness: 0.5 or 0.6 mm
- coating: 25 micra PS organic coating

"At Invespanel we are committed to offering innovative solutions combining quality and sustainability. This launch strengthens our commitment to the environment and positions us as a benchmark for the production of sandwich panels with reduced environmental impact. We are here to help our customers build a more sustainable future," Carlos Lanza resumes.

ArcelorMittal

Carlos Lanza (Plant Director, Kingspan | Teczone - Kingspan | Invespanel) and Esther Márquez (CTS, ArcelorMittal Europe – Flat Products) (Picture: ArcelorMittal and Kingspan | Invespanel)

AUTOMOTIVE APPLICATION

Stainless steel materials for automotive exterior trim in a variety of finishes

Nippon Kinzoku has introduced a variety of high surface quality, surface finish and materials for automotive exterior trims. A technology has been developed for the specific rolling of thin stainless steel materials.

Nippon Kinzoku's stainless steel for automotive exterior trims can be continuously processed from coil (steel strip). Processing by forming and pressing can be executed for all finishes. Since these products achieve their high surface quality through rolling technology, there is no need for polishing, painting, or surface treatment as required for aluminium products. This contributes to a high efficiency and yield improvement. The products meet the new requirements associated with the "near net performance" approach (i.e. products that achieve the performance required for the end product through materials).

In addition, these automotive exterior trim materials are environmentally friendly products that enable OEMs to reduce their environmental impact.

Stainless steel grades in use

NK-430MA and NK-436L-NB stainless steel grades from Nippon Kinzoku are used for the exterior trims. Both grades have corrosion resistance equivalent to SUS304, a typical stainless steel grade. The low Nickel content makes it with low price fluctuation. Compared to aluminium, which is widely used for automotive exterior trims in Europe, stainless steel has higher corrosion resistance and does not require surface treatment (anodizing) like aluminum, thus reducing environmental impact and costs through process reduction.

NK-430MA is a grade based on SUS430 with improved corrosion resistance and deep drawing formability for automotive exterior moldings. It has an equivalent level of corrosion resistance to SUS304, but with low Ni content (0.6% or less) and lower cost than SUS304.

NK-436L series steel grade contains molybdenum (Mo) to improve corrosion resistance. It is specified for automotive exterior trim materials by European and American automobile manufacturers, and this steel grade was developed to meet European and American specifications. It provides equivalent level of corrosion resistance as SUS304. NK-436L-NB is the only Japanese material approved by European and American automobile manufacturers.

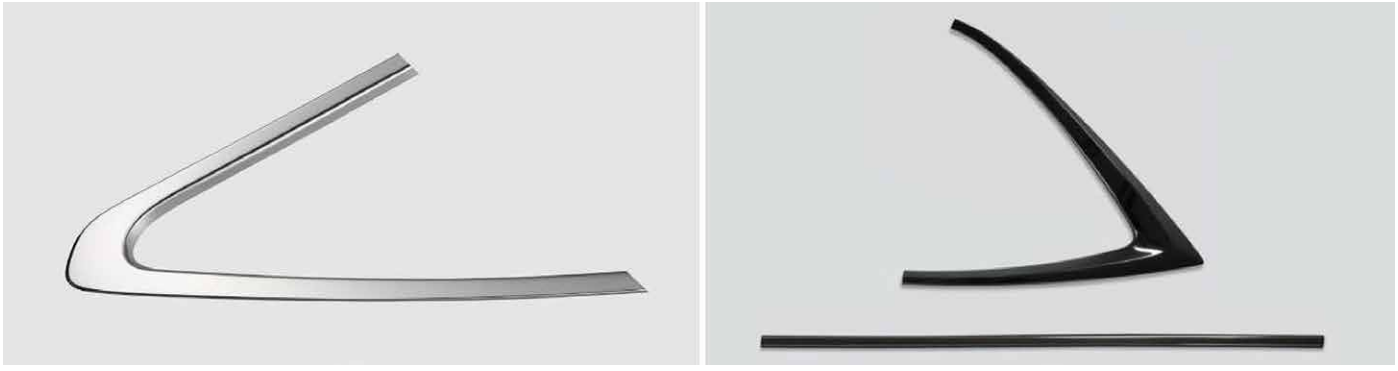
Range of finishes

As the market for automotive exterior trims has been diversifying in colours and designs, Nippon Kinzoku is able to supply a wide variety of surface finishes. In particular, "Fine Black" is a finish developed with Toyo Rikagaku Kenkyusho, a company specializing in electrolytic polishing of stainless steel, to meet the market need for a "metallic black" surface finish. The range of surface finishes comprise the grades as following:

- Bright Anealed (BA5), with even higher glossy,
- Pearly White (PW), with a calm satin tone,
- Fine Black® (FB), with an extremely thin transparent oxide film to achieve a metallic look and deep black color through light interference and absorption phenomena,
- Matte Fine Black (M-FB), to meet the market demand for matte products.

All finishes can be continuously processed from coil (steel strip, 0.3 to 0.5mm thick, max. 550mm width) or sheet formats at the OEM's site. Processing dies for forming and pressing can be shared for all finishes. Initial and processing costs can be reduced compared to painting or taping.

Nippon Kinzoku



Samples of exterior trims– left: Pearly White finish; right: Fine Black finish (Picture: Nippon Kinzoku)

The next issue of STAHL + TECHNIK in German will be out in February covering the following topics:

SPECIAL SECTION ON CRANES AND HOISTING

New crane for Salzgitter Mannesmann Grobblech

The steel company has taken delivery of a new plate handling crane with a span of 35.5 metres and a load capacity of 20 tonnes for its Mülheim/Ruhr plant in Germany. The crane is equipped with a special telescopic magnetic lifting beam, which allows the attached plates to be rotated by up to 270 degrees and placed in the correct position.

STEEL TECHNOLOGY

Optimised strip production for future automotive application

The conversion of the thin slab casting and rolling plant at thyssenkrupp Steel's Duisburg site is on target. The plant was decommissioned earlier than planned. After more than 25 years of production operation, the plant will be replaced by a continuous slab caster and a modernised hot strip mill. The conversion is due to be completed in April and the ramp-up of the new facilities is planned from May 2025. The focus will be on the future production of premium steels for lightweight construction and high surface quality as well as silicon steels for electrical steel.

STEEL PROCESSING AND APPLICATION

Sustainable and circular steel solutions for beams, sheet piling, façade greening and solar systems

At construction expo BAU in Munich, ArcelorMittal presents the entire range of products for future-orientated and efficient construction. Products made of 'XCarb® steels ensure a significantly reduced CO_2 footprint and enable circular construction in many areas. The innovative Helioroof® solar roof solution combines insulated roof elements with an integrated photovoltaic system.

ARTIFICIAL INTELLIGENCE

Siemens and Microsoft scale industrial AI

Siemens and Microsoft have taken the Siemens Industrial Copilot to the next level. Since the product's availability in July 2024, over 100 companies, including Schaeffler and thyssenkrupp Automation Engineering have started using the Siemens Industrial Copilot for Engineering to boost efficiency. Engineers can now create panel visualizations in 30 seconds and generate code that requires only 20% adaptation. This streamlines workflows, reducing manual effort and addressing the skilled labour shortage. The chat function also provides instant, precise answers, eliminating the need for lengthy searches.

STEEL+ TECHNOLOGY

Publishing House
DVS Media GmbH
PO Box 10 19 65, 40010 Düsseldorf, Germany
Aachener Straße 172, 40223 Düsseldorf, Germany
Phone +49 211 1591-0
Fax +49 211 1591-200
E-mail media@dvs-media.info
www.dvs-media.eu · www.home-of-steel.de

Management: Dirk Sieben

Editorial Team
Dipl.-Ing. Arnt Hannewald (responsible)
Phone +49 211 1591-232
E-mail arnt.hannewald@dvs-media.info

Lucas Möllers
Phone +49 211 1591-283
E-mail lucas.moellers@dvs-media.info

Advertising
Markus Winterhalter (responsible)
Phone +49 211 1591-142
E-mail markus.winterhalter@dvs-media.info

Katrin Küchler
Phone +49 211 1591-146
E-mail katrin.kuechler@dvs-media.info

Christian Lang
Phone +49 211 1591-291
E-mail christian.lang@dvs-media.info

Henning Schneider
Phone +49 211 1591-223
Mobile +49 151 74 41 46 57
E-mail henning.schneider@dvs-media.info

Claudia Wolff
Phone +49 211 1591-224
Mobile +49 173 66 32 808
E-mail claudia.wolff@dvs-media.info

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Reader Service
DVS Media GmbH
Phone +49 6123 92 38-242
Fax +49 6123 92 38-244
E-mail dvsmedia@vuservice.de

Production
Mike Reschke (responsible)
mike.reschke@dvs-media.info

Laura Sieben (graphic design)
laura.sieben@dvs-media.info

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740 Mixers/core sand mixers

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74736 Hardheim, Germany
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🖷 +49 6283 51-325
E-Mail: eirich@eirich.de
Internet: www.eirich.de

03 Iron making

03.01 Blast furnaces

1150 Heat recovery systems

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

03.02 Direct reduction plants

1160 Direct reduction plants

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

04 Steelmaking

1668 Equipment for steelmaking plants

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

1699 Steel mill equipment

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

04.04 Electric steel plant

1875 Electric arc ladle furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

04.07 Secondary metallurgy

2028 Equipment for chemical heating

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

2030 Argon purging equipment

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

04.07 Secondary metallurgy

2080 Ladle metallurgical plants

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

2110 Secondary metallurgical plants

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

2120 Steel degassing plants

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

2130 Steel desulfurization plants

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

2140 T+P lance equipment

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

04.09 Components

2150 Deslagging machines

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
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2180 Break-out machines for electric furnaces, converters, ladles, etc.

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Hagener Str. 103
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2182 Burning lances (oxygen) for tundish and ladle gate valves

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

2230 Charging machines (trough and tongs)

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

2270 Injection plants for argon

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

04.09 Components

2440 Handling equipment for oxygen/carbon lances

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

04.09 Components

2490 Coal dust injection lances

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

2530 Lance robots/-manipulators

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

2580 Oxygen nozzles

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

04.09 Components

2600 Oxygen lance equipment

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

2655 Fuses (multifunction) for burners

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

2660 Special safety oxygen hose reels

BEDA-Oxygentechnik GmbH
An der Pönt 59
40885 Ratingen, Germany
☎ +49 2102 9109-0
E-Mail: info@BEDA-com
Internet: www.BEDA.com

07 Hot rolling

07.10 Components

4430 Decoilers and rewinders

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

08 Forging, extrusion

08.03 Components

5150 Forging manipulators

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

Glama Maschinenbau GmbH
Hornstr. 19
45964 Gladbeck, Germany
☎ +49 2043 9738-0
🖷 +49 2043 47268
Internet: www.glama.de

5155 Forging manipulators, rail-mounted

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

Glama Maschinenbau GmbH
Hornstr. 19
45964 Gladbeck, Germany
☎ +49 2043 9738-0
🖷 +49 2043 47268
Internet: www.glama.de

5160 Forging robots

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

Glama Maschinenbau GmbH
Hornstr. 19
45964 Gladbeck, Germany
☎ +49 2043 9738-0
🖷 +49 2043 47268
Internet: www.glama.de

5180 Transport manipulators

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

10 Cold rolling

10.01 Cold rolling mills

5490 Strip, sheet, cold and metal rolling mills

hpl-Neugnadenfelder Maschinenfabrik GmbH
Spangenbergstr. 20
49824 Ringe/Neugnadenfeld, Germany
☎ +49 5944 9301-0
E-Mail: info@hpl-group.de
Internet: www.hpl-group.de

10.04 Annealing lines

5670 Annealing lines

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

11 Surface treatment

11.04 Surface treatment plants

6270 Strip edge trimming

hpl-Neugnadenfelder Maschinenfabrik GmbH
Spangenbergstr. 20
49824 Ringe/Neugnadenfeld, Germany
☎ +49 5944 9301-0
E-Mail: info@hpl-group.de
Internet: www.hpl-group.de

11.04 Surface treatment plants

6280 Strip processing and finishing lines

hpl-Neugnadenfelder Maschinenfabrik GmbH
Spangenbergstr. 20
49824 Ringe/Neugnadenfeld, Germany
☎ +49 5944 9301-0
E-Mail: info@hpl-group.de
Internet: www.hpl-group.de

11.05 Aluminizing, tin plating, galvanizing

6630 Hot dip galvanizing lines

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

13 Production of tubes/pipes

13.04 Finishing lines for tubes

7520 Tube bending machines

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

7544 Tube straightening machines

DANGO & DIENENTHAL Group
Hagener Str. 103
57072 Siegen, Germany
☎ +49 271 401-0
E-Mail: contact@dango-dienenthal.de
Internet: www.dango-dienenthal.de

14 Sheet metal processing

14.03 Welding technology

8120 Strip welding machines

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

14.03 Welding technology

8205 Laser welding machines

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

8210 Laser beam welding machines

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

8220 MIG, MAG and TIG\057TIG welding torches

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

8257 Rolling seam resistance welding equipment

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

14.03 Welding technology

8330 Welding machines, general

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

8360 Welding accessories, general

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

8380 Butt welding machines, electric

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

8400 Resistance welding equipment

GUILD International
7273 Division Street
Bedford, OH 44146, USA
☎ +1 440-232-5887
E-Mail: sales@guildint.com

16 Furnace and energy technology

10170 Furnace optimization (conversion to low NOx combustion)

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

WS Wärmeprozesstechnik GmbH
Dornierstr. 14
71272 Renningen, Germany
☎ +49 7159 1632-0
🖷 +49 7159 2738
E-Mail: ws@flox.com
Internet: www.flox.com

10190 Rational use of energy

WS Wärmeprozesstechnik GmbH
Dornierstr. 14
71272 Renningen, Germany
☎ +49 7159 1632-0
🖷 +49 7159 2738
E-Mail: ws@flox.com
Internet: www.flox.com

16.02 Forging furnaces

10230 Forging furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

16.03 Roller Hearth Continuous Furnaces

10260 Roller Hearth Continuous Furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10270 Roller hearth and walking beam furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

16.05 Top-hat furnaces

10310 Top-hat furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

16.08 Heating furnaces and heat treatment plants

10408 Continuous furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10410 Co-step furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10430 Bogie hearth furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10460 Chamber furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

16.08 Heating furnaces and heat treatment plants

10510 Roller hearth and walking beam furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10540 Pusher-type, roller and rotary hearth furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10560 Heat treatment plants

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10562 Heat treatment furnaces (continuous and discontinuous)

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10570 Heat treatment furnaces for batch operation, open heated

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

16.09 Bath furnaces

10580 Aluminum melting furnaces

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

16.13 Components

10890 Natural gas burners

WS Wärmeprozesstechnik GmbH
Dornierstr. 14
71272 Renningen, Germany
☎ +49 7159 1632-0
🖷 +49 7159 2738
E-Mail: ws@flox.com
Internet: www.flox.com

11010 Regenerative burners

WS Wärmeprozesstechnik GmbH
Dornierstr. 14
71272 Renningen, Germany
☎ +49 7159 1632-0
🖷 +49 7159 2738
E-Mail: ws@flox.com
Internet: www.flox.com

11020 Recuperative burners

WS Wärmeprozesstechnik GmbH
Dornierstr. 14
71272 Renningen, Germany
☎ +49 7159 1632-0
🖷 +49 7159 2738
E-Mail: ws@flox.com
Internet: www.flox.com

16.13 Components

11070 Radiant tube burners

WS Wärmeprozesstechnik GmbH
Dornierstr. 14
71272 Renningen, Germany
☎ +49 7159 1632-0
🖷 +49 7159 2738
E-Mail: ws@flox.com
Internet: www.flox.com

18 Machinery and plant engineering

12210 Plant engineering, general

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

18.10 Power and work machines

13160 Vacuum pumps

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

21 Measuring and testing technique

16488 Multichannel measuring systems

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

21.02 Measurement of physical properties

16608 Strip thickness control (AGC)

POLYTEC GmbH
Polytec-Platz 1-7
76337 Waldbronn, Germany
☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

16612 Strip flatness measurement

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

21.02 Measurement of physical properties

16652 Dressing degree and mass flow measuring systems

POLYTEC GmbH
Polytec-Platz 1-7
76337 Waldbronn, Germany
☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

16660 Thickness measuring systems and devices

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

21.02 Measurement of physical properties

16830 Speed measuring devices

POLYTEC GmbH
Polytec-Platz 1-7
76337 Waldbronn, Germany
☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

16892 Force measuring systems

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

21.02 Measurement of physical properties

16910 Length measuring devices for tubes

POLYTEC GmbH
Polytec-Platz 1-7
76337 Waldbronn, Germany
☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

16950 Length and speed measuring systems (optical)

POLYTEC GmbH
Polytec-Platz 1-7
76337 Waldbronn, Germany
☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

16960 Laser speed and length measuring systems

POLYTEC GmbH
Polytec-Platz 1-7
76337 Waldbronn, Germany
☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

21.02 Measurement of physical properties

17300 Rolling mill measuring systems

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

21.03 Quality management

17380 Measuring instruments for quality management

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

17409 Surface inspection systems

IMS Messsysteme GmbH
Germany
Postfach: 100352, 42568 Heiligenhaus
☎ +49 2056 975-0
🖷 +49 2056 975-140
E-Mail: info@ims-gmbh.de
Internet: www.ims-gmbh.de

24 Environmental protection and disposal

24.01 Dedusting and gas cleaning

18360 Exhaust gas cooling systems

LOI Thermprocess GmbH
Schifferstraße 80
47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

18400 Treatment of dusts from steel mills and foundries

Maschinenfabrik
Gustav Eirich GmbH & Co KG
Walldürner Str. 50
74736 Hardheim, Germany
☎ +49 6283 51-0
🖷 +49 6283 51-325
E-Mail: eirich@eirich.de
Internet: www.eirich.de

List of Products

01 Raw materials, auxiliary materials and operating materials

01.01. Ores
10 Chrome ore
20 Iron ores
30 Ores
40 Manganese ore
50 Steel mill ores

01.02. Coal, coke
60 Lignite coke
62 Injection coal
65 Foundry coke
67 Coal / coke conveyor
70 Coke
80 Coke breeze
90 Coke breeze, dry
100 Petroleum coke
110 Hard coal, anthracite

01.03. Scrap
120 Scrap metal

01.04. Sponge iron
128 Sponge iron
130 Sponge iron

01.05. Metals and alloys
140 Cermix metal
150 Chromium metal
160 Cobalt
170 Deoxidation alloys
180 Iron granules
190 Iron powder
200 Ferrobor
210 Ferrochrome
220 Ferromanganese
230 Ferromolybdenum
240 Ferronickel
250 Ferroniobium
260 Ferro-niobium carbide
270 Ferroniob powder
280 Ferrophosphorus
290 Ferro-selenium
300 Ferrosilicon
310 Ferro-silicon-magnesium
315 Ferro-silicon-manganese
320 Ferrotitanium
330 Ferrovanadium
340 Ferrotungsten
350 Ferrozinc
380 Alloys
385 Magnesium alloys
390 Manganese metal
400 Metals and alloys
410 Metal powder
420 Molybdenum
430 Molybdenum oxide
435 Non-ferrous metals
440 Nickel
450 Nickel-based alloys
460 Nickel niobium
470 Niobium, metals and alloys
475 Pure iron
480 Silicon carbide
490 Silicon and silicon alloys
500 Special metals
510 Special alloys
520 Tantalum
530 Titanium and titanium alloys
540 Vanadium metal
550 Vanadium pentoxide
560 Master alloys
570 Tungsten
572 Tungsten granules for C and S analysis
610 Alloying additions

01.06. Additives and fluxes
580 Carburizing agent
590 Fluorspar
600 Lime and limestone
612 Slag conditioner
616 Olivine
618 Raw bauxite

01.07. Gases
620 Acetylene
625 Argon
630 Gases, technical
640 Carbonic acid
650 Oxygen
660 Protective gas
670 Nitrogen
675 Hydrogen

01.08. Lubricants
680 Coating powder
690 Lubricants

01.09. Composite materials
678 Bimetal for saws

01.10. Water
691 River water / additional water

01.11. Other
695 Glass granules
698 Titanium dioxide for hearth protection / repair

02 Raw material pretreatment

700 Engineering and technical assistance
703 Engineering and project management

02.01. Ore dressing
710 Ore and aggregate processing plants
720 Crushing plants
730 Grinding and mixing plants
740 Mixers / core sand mixers
750 Screens
760 Screens and screening plants

02.02. Coal preparation
770 Coal preparation plants
780 Coal grinding plants

02.03. Coal burden preparation
790 Coal burden preparation

02.04. Pelletizing plants
795 Ore preparation plants
797 Conveying plants for pellets
800 Pelletizing plants
810 Pelletizing plants with ore preparation plants

02.05. Sintering plants
820 Sintering plants
822 Sinter hot material conveyors
826 Grate bars for sinter plants

02.06. Briquetting plants
830 Briquetting plants
840 Briquetting of coal and coke
850 Compacting plants

02.07. Coke plants
858 Emission control in coking plants, charging and discharging
859 Heat-recovery coking plants
860 Coke plants, general
870 Coke crushing and screening plants
890 Coke ovens
900 Coke oven operating machines
910 Coke oven gas treatment plants
920 Coke ramming and extruding machines
950 Heat exchangers

02.08. Scrap processing plants
968 Coil magnets
970 Lifting magnets
980 Magnetic drums
990 Packing presses
999 Scrap drying plants
1000 Scrap mills, licker-ins
1010 Scrap shears
1015 Scrap shear blades
1017 Scrap magnets
1020 Shredder plants
1021 Safety equipment for electric load lifting magnets
1022 Separation magnets
1030 Chip crusher

02.09. Other equipment
1041 Equipment for granulation of sludges and dusts
1050 Ferroalloying plants
1058 Lime burning plants
1060 Lime slaking plants
1070 Roasting plants

03 Iron making

1080 Engineering and technical assistance
1090 Pig iron production plants
1100 Smelter reduction plants

03.01. Blast furnaces
1105 Energy recovery
1107 Expansion turbine
1110 Blast furnaces
1120 Blast furnace linings
1123 Blast furnace hearth protection / repair
1125 Blast furnace channel lining
1130 Blast furnace hot blast stoves
1140 Ceramic burners for hot blast stoves
1145 Shaft melting furnaces
1150 Heat recovery systems
1152 Hot blast stoves

03.02. Direct reduction plants
1160 Direct reduction plants
1170 Direct reduction plants with coal as reducing agent
1172 DRI hot material conveyor
1174 Fine ore reduction with coal or gas

03.03. Cupola furnaces
1180 Hot blast cupola furnaces
1190 Cold blast cupola furnaces
1195 Shaft furnaces for metallurgical residues

03.04. Components
1200 Valves for blast furnace reheaters
1205 Fittings for cupola furnaces
1207 Copper fittings for cupolas
1210 Slide gate maintenance
1220 Gassing systems for blast furnaces, cupolas and steel mills
1230 Blow mold changing and nozzle block removal carriages
1240 boring bar changing devices
1250 Nozzle bars
1260 Injection plants for carbon
1270 Equipment for injecting coal, oil or gas into the blast furnace
1280 Equipment for injecting oil or gas into the blast furnace
1285 Blast furnace gas expansion turbines
1290 Hood manipulators for use on iron channels
1295 Hot gas generators for blast furnace and coke gas
1300 Hot blast valves
1310 Blast furnace blowers
1320 Blast furnace stands and shells
1330 Blast furnace burdening / also burdening carriages
1340 Blast furnace probes
1350 Coal grinding, drying and injection systems
1351 Copper fittings for cupola furnaces
1353 Ladles and mixers, liquid pig iron, engineering and supply
1355 Process gas screw compressors
1360 Radar level measuring equipment
1370 Rest and shaft cooling plates for blast furnaces
1380 Pig iron bulk pouring machines
1390 Pig iron mixers
1400 Pig iron ladle, mixer and transfer cars
1410 Slag molds
1420 Slag ladles
1425 Hoses for blast furnace cooling
1430 Special fittings for blast furnace cooling
1432 Copper staves for blast furnace cooling
1440 Taphole tamping machines
1450 Tap hole and slag hole drilling machines
1458 Distributor systems for charging burden / ore / coke into the blast furnace
1460 Heat exchangers
1467 Weighing systems for torpedo cars
1470 Wind molds and nozzle stacks
1480 Wind vane

03.05. Blast furnace products for foundries
1490 Foundry pig iron
1500 Hematite pig iron
1510 Hematite pig iron for GG
1520 Blast furnace ferro-manganese
1550 Special pig iron for GGG
1560 Mirror Iron
1570 Steel iron

03.06. By-products
1580 Ferrous sulfate
1589 Blast furnace slag
1590 Blast furnace slag as a road construction material
1600 Blast furnace slag and LD slag
1620 Slag lime
1630 Slag Sand
1639 Converter lime
1640 Converter lime057 Thomas lime
1643 LD slag
1650 Thomas phosphate

04 Steelmaking

1668 Equipment for steelmaking plants
1670 Engineering and technical assistance
1680 Compact steelmaking equipment
1690 Second-hand steelmaking plant and equipment
1698 Steel mill plants and equipment
1699 Steel mill equipment
1700 Steel mill plants and equipment (stainless)
1710 Steel mill plants and equipment (complete)

04.01. Hot metal preparation plants
1715 Desulfurization plants with slag regeneration
1720 Hot metal desulfurization plants

04.02. Converter
1730 Blown steelmaking plants
1740 KTB (Kawasaki Top Blowing) equipment
1745 Combined bottom blowing at converter
1750 Converter plants
1755 Converter sealing plugs
1758 Setting machines for converter sealing plugs
1760 Purging stones

04.03. Energy optimization furnaces
1770 Energy optimization furnaces

04.04. Electric steel plant
1780 Charging equipment for electric furnaces
1788 Bottom blowing equipment for electric arc furnaces (nitrogen and argon)
1790 Bottom tapping
1795 CO post-combustion
1800 Three-phase arc furnaces
1810 Injection systems for electric furnaces
1820 Electrode holders and contact jaws for electric furnaces
1830 Electrode control for electric arc furnaces and ladle heating systems
1840 Electrode extruders
1850 Electrode support arms
1855 Aluminum electrode support arms, current-carrying (Hot Arms)
1860 Electrode support arms, current-carrying (Hot Arms)
1865 Electrode discharge arm insulation
1870 Electric arc furnaces
1875 Electric arc ladle furnaces
1880 Electric arc furnaces with integrated scrap preheating (shaft furnaces)
1885 Spare and wear parts, consumables
1890 Direct current arc furnaces
1900 Graphite electrodes
1908 Jet Box Technology
1910 Cooling elements (tube wall segments, bay covers, plate coolers)
1920 Oil / 057gas oxygen burners (also post-combustion)
1930 Scrap baskets
1938 Scrap dryers
1940 Scrap preheating systems
1945 Poking machines for electric furnaces
1950 Electric tube systems for electric furnaces
1960 Water cooled cables
1970 Water cooling systems
1980 AC arc furnaces
1981 EAF high current insulation
1982 Power supplies for AC arc furnaces
1983 Power supplies for direct current arc furnaces

04.05. Induction furnaces
1990 Induction furnaces
1995 Protection system for induction coils
1996 Induction furnaces \ 057Repairs
2000 Water cooled cables

04.06. Vacuum furnaces
2008 High vacuum furnaces
2010 High vacuum furnaces (also electron beam melting furnaces)
2020 Vacuum induction melting furnaces
2021 Vacuum pumps, dry running, for vacuum furnaces
2025 Vacuum investment casting plants

04.07. Secondary metallurgy

2028 Equipment for chemical heating
2030 Argon purging equipment
2040 Blow and injection conveying systems for filter dusts
2042 blowing lances, combined, for RH
2050 CAS, CAS-OB and CAB-plants
2060 Injection plants for metallurgical processes
2070 Electroslag remelting plants
2080 Ladle metallurgical plants
2090 Plasma arc plants
2100 Plasma ladle furnaces
2110 Secondary metallurgical plants
2120 Steel degassing plants
2130 Steel desulfurization plants
2140 T+P lance equipment
2145 Induction stirrers for ladle furnaces
2147 Vacuum degassing plants
2148 Vacuum arc furnace

04.08. Tertiary metallurgy

2141 Electroslag remelting plant ESU plant
2142 Vacuum arc remelting/VAR plant
2143 Vacuum induction furnace/VIM plant
2144 Vacuum degassing equipment

04.09. Components

2150 Deslagging machines
2155 Tap hole sealing equipment for converters
2156 Converter tap hole drilling and setting machines
2160 Tapping gate for converters and electric arc furnaces
2170 Andromat manipulator
2175 Burning machines for ladles
2180 Break-out machines for electric furnaces, converters, ladles, etc.
2182 Burning lances (oxygen) for tundish and ladle gate valves
2184 CO injection equipment
2190 Handling equipment for oxygen/carbon lances
2200 Automatic purging gas dome stations
2210 Heating equipment for ladles, mixers, converters and tundishes
2215 Feeding equipment for metallurgical plants
2220 Brakes
2230 Charging machines (trough and tongs)
2235 Steam jet vacuum pumps for steel degassing
2240 Dolomite centrifugal machines
2250 Wire spooling machines
2268 Injection plants for argon in ladles
2270 Injection plants for argon
2280 Injection plants for iron carbide dusts
2290 Injection plants for Hy/DRI dusts
2300 Injection plants for lime granules
2310 Injection plants for carbon (electric arc furnaces)
2312 Injection plants for alloying materials
2320 Electric heating elements for steel degassing plants
2340 Electromagnet. Conveying and dosing troughs for liquid metals
2350 Desulfurization equipment
2360 Oriel tapping fillers, electric arc furnaces
2370 Casting ladles, general
2380 Casting ladle heaters
2390 Ladles for steel mills
2400 Casting ladle gates (also slide gate gates)
2410 Pouring stream protection
2420 Casting carriages
2430 Handling equipment
2440 Handling equipment for oxygen/carbon lances
2450 Metallurgical and rolling mill hydraulics
2460 Lime-oxygen dosing and injection systems
2480 Tilting chairs for ladles
2490 Coal dust injection lances
2500 Ingot molds and casting molds for steel mills
2510 Ingot mold cars
2514 Continuous optical analysis equipment for process vessels
2515 Continuous optical temperature measurement for process vessels
2520 Converter blowing lance changing device
2525 Converter temperature and sampling equipment
2530 Lance robots \ 057-manipulators
2540 Alloying equipment for steel mills
2541 Multifunction lances and burners for electric furnaces
2542 Ladles and mixers, liquid pig iron, engineering and supply
2543 Mixer ladles
2545 Ladle sliders (steel mill ladle slider material)
2550 Ladle cars
2560 Robots for cutting slag
2570 Sand feeding devices for ladle tap hole
2580 Oxygen nozzles
2590 Oxygen lances
2600 Oxygen lance equipment
2610 Oxygen tubes, heat protected
2615 Shadow tube manipulators
2618 Slag with space resistant property
2620 Slag bucket
2630 Slag retaining device for converter
2640 Slag carts
2650 Hose reels
2655 Fuses (multifunction) for burners
2660 Special safety oxygen hose reels
2665 Stone coating agent for ladle gate valves
2666 Stone coating agents for slide gate systems
2668 Poking machines for electric furnaces
2669 Sublances
2670 Immersion tube spraying devices
2680 Torpedo car radar level measuring devices
2686 Vacuum pumps, dry running, for vacuum furnaces
2690 Preheating and drying stations for ladles and tundishes
2695 Weighing systems for scrap and alloying elements
2700 Heat exchangers for steel mills
2702 Flame cutting machines for ladles
2704 Crucibles for remelting furnaces
2705 Process gas analyzer

04.10. Steel mill supplies

2706 Sealing cords and packings up to 1260 °C
2710 Carburizing agents of all kinds
2720 Deoxidizing agent
2730 Deoxidation technology
2735 EBT taphole plugging compound
2740 Dephosphorizing agents
2750 Desulfurization and deoxidation agents
2760 desulfurization agents (also magnesium)
2770 ESU slags
2780 Ferroniob cored wires
2790 Cored wires
2798 Casting heads
2800 Casting powder
2801 Casting powders, granulated and powdered
2810 Graphite
2820 Graphite powder
2825 Heat protection fabric to 1260 °C
2827 Insulating covering agents for tundishes, ladles and troughs
2830 Molds
2840 Mould inserts
2845 Chill putty, -filler up to 1600 °C
2850 Ingot mold spray and plate protection
2855 Oxygen nozzles and blowing lances
2860 Blowhole powder
2865 Mats and felts up to 1260 °C
2868 Olivine slag conditioner
2870 Ladle covering agent
2871 Ladle covering agents, granulated and powdered
2880 Ladle slide sand
2885 Rotary slide gate for steel ladles
2888 Slag granulation
2890 Slag sands
2900 Slag foaming
2904 Protective blankets made of textile fabric up to 1260 °C
2905 Special adhesives up to 1200 °C
2910 Steel mill ladle slide material
2915 Crucibles for ESR, VAR and casting rolls
2920 Tundish covering material, granulated and powdered

04.11. Preparation of steel mill materials

2930 Processing of used refractory materials
2940 Processing of steel mill dusts, fines and oil-containing steel mill sludges
2950 Slag preparation (slag transport and recycling)
2954 Separation magnets

04.12. Services

2956 Engineering for steel mill plants and equipment
2957 Hydraulic cylinder repair
2958 Slag bucket maintenance

05 Continuous casting

2960 Engineering and technical assistance

05.01. Continuous casting plants of various designs

2962 Flat ingots
2965 Casting platform robot
2970 Casting wheel plants
2980 Casting wheels

2982 Casting rolls, rollers
2990 Horizontal continuous casting plants
3000 Continuous casting plants, general
3010 Vertical continuous casting plants

05.02. Continuous casting plants for different product dimensions

3020 Beam-blank continuous casters
3030 Continuous slab casters
3035 High-speed continuous billet casters
3040 Continuous billet casters
3043 Continuous billet casters, horizontal
3045 Combined continuous slab casters
3050 Round continuous casters
3055 Round continuous casting machines, horizontal
3058 Continuous bloom casting plants
3060 Continuous bloom and slab casters
3070 Continuous bloom and billet casting plants
3075 Continuous bloom and billet casting plants, horizontal
3080 bloom and round continuous casting plants
3085 bloom and billet continuous casting plants, horizontal

05.03. Spray compacting plants

3090 Spray compacting plants

05.04. Components

3100 Al wire injection plants
3110 Slab edge adjustment
3120 Slab edge heating, inductive
3130 Slab cooling plants
3140 Slab cooling boiler / heat recovery plants
3150 Slab cross-cutting and slitting lines
3160 Slab grinding machines
3166 Soft slab turning and transporting magnets
3170 Brakes
3180 Flame removal equipment
3190 Flame cutting equipment
3200 Slewing ring for water cooled rolls
3210 DS stamping machine
3216 Electromagnetic brakes, EMBR
3220 Single material nozzles for continuous casting cooling
3230 Deburrer
3240 Inks for marking equipment
3250 Paint signing equipment
3260 Casting powder feeder
3262 Casting stream protection by argon
3270 Inductive stirring
3280 Cold distribution plates (tundish plates)
3290 Marking equipment for slabs, ingots and billets
3292 Billet grinding machines
3300 Billet processing machines
3310 Billet sawing machines
3320 Billet grinding machines
3330 Mould flow measuring equipment
3340 Reading systems for automatic identification of impact and directly applied marks
3345 Air atomization nozzles for continuous casting cooling
3346 Marking machines
3350 Emergency cutting torches
3355 Optical product recognition (OPR) for marked billets
3360 Plasma tundish heating
3370 Plate molds
3380 Precision stopper device
3390 Tube molds
3400 Shadow tube manipulators
3405 Safety device for electrolift magnets
3410 Marking colors
3415 Slab magnets
3420 Stamping machines
3422 Stamping machines, hydraulic or pneumatic drive
3429 Continuous casting molds
3430 Continuous casting molds (also made of electrographite)
3440 Continuous casting rolls
3450 Tundish heating
3460 Tundish (manifold) plasma heater
3470 Tundish flow control
3480 Tundish gate valve (Tundish gate valve)
3490 bloom and billet adjustments
3500 Heat exchangers
3503 Weighing systems for ladles, tundish etc.
3510 Two-substance nozzles for continuous casting cooling

05.05. Operating materials

3520 Casting powder
3530 Lubricants for continuous casting plants
3535 Welding consumables for regeneration and against wear

05.06. Services

3537 Grinding and scarfing of slabs, billets and blooms

06 Near net shape casting

3540 Engineering and technical assistance

06.01. Equipment

3550 Strip casting lines
3560 Thin strip casting plants
3570 Thin slab casting plants
3572 Thin slab casting and rolling lines with direct bond
3573 EUROSTRIP strip casting plants
3574 EUROSTRIP direct strip casting and rolling lines
3575 Continuous billet casting plants

06.02. Components

3590 Flame cutting equipment
3600 Flame cutting equipment
3610 DS stamping machine
3630 Thin slab cross and slitting lines
3640 Thin slab grinding machines
3670 Color marking equipment
3680 Casting powder feeder
3690 Ingot molds
3700 Reading systems for automatic identification of impact and directly applied characters
3710 Marking inks
3712 Stamping machines, hydraulic or pneumatic drive

06.03. Operating supplies

3750 Coolant
3760 Lubricants

07 Hot rolling

3770 Engineering and technical assistance
3780 Second-hand hot rolling mills

07.01. Hot strip mills

3773 Flat block plants
3776 Flat block plants for rolling
3790 Thin slab mills
3805 Modernization of hot rolling mills
3820 Steckel rolling mills, complete
3830 Rolling mills, complete
3840 Hot rolling mills for slab products

07.02. Heavy plate mills

3850 Hot rolling mills, complete

07.03. Billet and semi-finished product mills

3860 Ingot, billet and plate mills
3861 Ingot, billet and semi-finished product mills

07.04. Section mills

3870 Rolling mills for light sectional steel
3875 Roll forming mills
3880 Special section rolling mills
3881 Rail rolling mills
3890 Beam and other section mills

07.05. Bar and wire rod mills

3900 Automatic coil handling
3910 Guide equipment for wire rod, bar and fine iron mills
3920 Calibrating mills
3930 Precision rolling systems
3940 Reducing and sizing mills
3944 Reducing and sizing mills
3950 Bar and wire rod mills
3955 Bar and wire rod mills for carbon and stainless steels
3960 Bar mills
3968 Rolling mills for flat products
3970 Rolling mills for long products
3974 Rolling mills for wire rod, rebars and bars

07.06. Ring rolling mills

3980 Ring rolling machines and plants
3981 Wheel rolling machines and plants

07.07. Finishing lines

3990 Finishing lines
4000 Finishing machines

4010 Chamfering machines for round and square billets
4017 Flat block plants for rolling
4020 Flying shears
4030 Hot / cold cut-off grinding machines
4040 Cold circular sawing machines
4050 Profile steel roller straightening machines
4060 Rotary saws
4065 Second-hand finishing lines
4070 Packing lines
4080 Hot straightening and cutting-off machines

07.08. Rolls for hot rolling mills

4090 Work rolls
4100 Plate rolls
4110 Ingot rolls
4120 Slab rolls
4128 EcoRolls
4130 Fine iron and wire rolls
4135 Ferrous cast rolls
4140 Forged rolls
4160 Chilled cast iron rolls
4170 Tungsten carbide \ 057steel rolls
4180 Caliber rolls
4190 Billet and semi-finished rolls
4200 Straightening rolls
4210 Ductile iron rolls
4220 Cast steel rolls
4230 Back-up rolls
4240 Composite casting rolls
4250 Composite casting rolls in high chrome and indefinite materials
4260 Composite chilled cast rolls
4270 Composite rolls
4280 Rolls for tube mills
4290 Roll rings

07.09. Roll machining and machines

4300 EDT systems
4320 High wear resistant coatings on rolls etc.
4330 Caliber processing machines
4340 Caliber groove grinding and milling machines
4350 Groove milling machines
4355 Ring expanders
4360 Special machines
4370 Roll machining machines
4380 Roll turning machines
4390 Roll grinding machines
4395 Roll grinding wheels
4400 Roll blasting machines
4410 Lines for roll forming
4420 Roll surface, services

07.10. Components

4430 Decoilers and rewinders
4432 Decoiler components
4440 Drives, gearboxes and comb mill stands
4450 Strip cooling equipment
4460 Belt grinding machines
4470 Brakes
4479 Coil magnets
4490 Nozzles for descaling
4500 Nozzles for roll cooling
4503 Roll cooling (stainless steel)
4510 Electric rolls and roller tables
4515 Scrapers for hot strip lines up to 1000 °C
4520 Descaling systems with solid abrasives
4528 Descaling systems with high pressure water
4530 Descaling systems with liquid abrasives
4540 Colors for marking equipment
4550 Paint marking systems
4560 Grease lubrication systems
4570 Scarfing systems, hot and cold
4580 Scarfing equipment, machines and plants
4582 Scarfing plants, robot controlled
4590 Gear rollers
4600 Semi-finished product testing, sorting and fettling lines
4610 Decoilers
4630 Edging and shifting devices
4640 Marking lines for plates, slabs and tubes
4650 Marking systems for profiles, strips and sheets
4660 Marking lines for slabs and blocks
4680 Compactor and press binding lines for wire rod
4690 Cooling beds
4700 Reading systems for automatic identification of impact and directly applied marks
4710 Oil-hydraulic setting devices
4720 Oil and emulsion circulation systems
4730 Roller tables
4740 Rotating and stationary shear blades
4750 Lubrication systems
4760 Quick change stands
4770 Safety device for electrolift magnets
4780 Marking inks
4790 Marking pins for hot surfaces
4800 Steel strapping
4810 Stamping machines
4820 Stamping machines and stamps for hot and cold operation (also fully automatic)
4830 Stamps and tools
4840 Transport equipment for wide strapping
4850 Strapping machines for coils
4860 Heat exchangers
4870 Roll transport devices
4880 Roll cooling systems, controllable
4890 Roll matting systems
4892 Roll guides
4893 Roll rings
4897 Weighing systems for coils and bundles

07.11. Operating fluids

4900 Lubricants for hot rolling mills

07.12. Services

4920 High wear resistant coating on rolls etc.

08 Forging, extrusion

4930 Engineering and technical assistance
4940 Modernization of water hydraulic control systems

08.01. Forging machines

4950 CNC precision forging machines
4960 Open-die forging lines
4970 Die forging lines
4980 Die spraying plants
4985 Hot isothermal forging plants (HIF)
4990 Hydraulic forging presses
5000 Cold extrusion presses
5020 Presses, general
5030 Pressing and forging machines
5040 Radial forging machines
5050 Radial and axial die rolling machines and plants
5060 Radial forging machines
5061 Radial forging machines, hydraulic
5070 Ring blank presses
5080 cNC precision forging machines
5084 Forging rolls
5090 horizontal forging machines, upsetting machines

08.02. Extrusion presses

5100 Metal pipe and tube extrusion presses
5110 Steel pipe extrusion presses
5120 Extrusion presses for profiles

08.03. Components

5130 Brakes
5150 Forging manipulators
5155 Forging manipulators, rail-mounted
5160 Forging robots
5180 Transport manipulators
5184 Water hydraulic drive and control technology

08.04. Operating materials

5190 Lubricants for extrusion presses
5195 Heat resistant sliding materials

09 Powder metallurgy

5200 Engineering and technical assistance
5210 Powder Metallurgy

09.01. Hard alloys

5220 Hard alloys, general
5230 Machinable and hardenable hard alloys

09.02. Hard materials

5290 Tungsten carbide

09.03. Hard metal powders

5300 Iron, steel, alloy powders, non-ferrous metal powders
5310 Carbide powder

09.04. Additives

5320 Binder metals
5330 Organic additives

09.05. Machines and equipment for powder production

5340 Machines and equipment for water atomization
5350 Machinery and equipment for melt atomization
5360 Machines and equipment for spray drying
5370 Powder manufacturers

09.06. Machines and equipment for production of powder metallurgical products
5370 Plants, complete
5380 Hot and cold isostatic presses and plants
5390 Metal powder presses
5400 Presses
5405 Powder presses, hydraulic, mechanical, hybrid
5410 Protective gas furnaces
5420 Vacuum furnaces
5422 Vacuum pumps, dry running, for vacuum furnaces

09.07. Powder metallurgy manufactured products
5430 PM metals / sintered metals
5432 PM rolling rings
5440 PM steels
5450 Composite materials

09.08. Further processing of powder metallurgy products
5460 Plasma powder cladding
5470 Thermal spraying

09.09. Additive manufacturing
5475 3-D printing
5476 Additive manufacturing processes

10 Cold rolling

5480 Engineering and technical assistance

10.01. Cold rolling mills
5490 Strip, sheet, cold and metal rolling mills
5510 cold rolling blocks for wire
5520 Cold rolling mills, complete
5523 Modernization of cold rolling mills
5530 Second-hand cold rolling mills
5540 Rolling mills for flat products

10.02. Skin pass mills
5550 Skin pass mills
5555 Skin pass mills for hot and cold strip

10.03. Finishing lines
5560 Finishing lines
5570 Finishing machines
5580 Strip edge trimming lines
5590 Strip processing lines
5595 Spreader rolls
5600 Slitting and cut-to-length lines
5610 Slitting and cut-to-length machines
5620 Straightening machines for strips and sheets
5630 Roller levelers
5640 Stretch levelers for strip
5650 Current guide rolls
5660 Packaging lines

10.04. Annealing lines
5668 Continuous annealing
5670 Annealing lines
5672 Annealing and pickling lines
5680 Annealing lines, inductive
5682 Annealing plants, continuous
5685 Modernization of annealing and pickling lines

10.05. Rolls for cold rolling mills
5686 Squeeze rolls
5690 Work rolls
5695 Spreader rolls
5700 Dressing rolls
5710 Polishing rolls
5715 Straightening rolls
5720 Straightening rolls
5730 Backing rolls
5750 Nonwoven rolls
5760 Rolls
5763 Roll sealing sleeves
5766 Roll core production and machining
5770 Rolls with polyurethane coating

10.06. Components
5780 Drives, gears and comb mill stands
5784 Strip guiding
5790 Tape remover
5800 Brakes
5803 Brake felt, stripper felt
5810 Letter and number types for stamping machines
5814 Labeling machines for rolled profiles (cold)
5830 Labeling machines
5840 Color marking machines
5845 Reel covers
5850 Reading systems for automatic identification of impact and directly applied characters
5860 Marking systems
5870 Oil circulation systems
5880 Rotating and stationary shear blades
5890 Marking inks for stamping machines
5900 Marking devices
5910 Marking pens for metals
5920 Steel strapping
5930 Stamping machines and stamps for hot and cold operation (also fully automatic)
5932 Roller cooling systems for high demands
5940 Heat exchangers
5950 Winding coils
5952 Weighing systems for bundles and coils

10.07. Operating materials
5960 Lubricants for cold rolling

11 Surface treatment

5970 Engineering and technical assistance
5980 Descaling of sheet metal parts
5988 Titanium processing

11.01. Descaling equipment
5990 Bend descaling for strip
6000 Bending descaling for wire
6010 Descaling systems with solid abrasives
6018 Descaling systems with high pressure water
6020 Descaling systems with liquid abrasives
6030 Free blasting systems
6040 Chamber blasting systems
6050 Shot peening systems
6060 Trough belt blast cleaning systems
6070 Roller table systems

11.02. Pickling plants
6080 Preparation of pickling baths
6088 Pickling lines, exhaust gas free, for stainless steel
6090 Pickling lines, complete
6100 Pickling lines for strip and wire
6109 Pickling tanks for high mechanical stress
6110 Pickling tanks and electrolysis cells for high mechanical stress
6120 Pickling baskets and hooks
6130 Pickling agents
6140 Pickling products for stainless steel
6150 Pickling products for stainless steels
6160 Pickling and surface treatment plants, general
6170 Pickling and surface treatment plants for wire
6180 Pickling additives
6190 Contract pickling plants
6192 Pumps for steel and stainless steel pickling
6200 Regeneration plants for pickling solutions
6203 Push pickling lines

11.03. Grinding and polishing machines
6210 Belt grinding machines
6230 Centrifugal grinding plants
6240 Polishing plants
6250 Drag grinding plants

11.04. Surface treatment plants
6260 Coil coating lines
6270 Strip edge trimming
6280 Strip processing and finishing lines
6282 Electrolytic strip pre-cleaning plants
6285 Strip washing lines
6290 Coating plants
6295 Burnishing plants and means
6300 CVD coating plants
6310 Services pickling and electropolishing of steel and stainless steel
6320 Oiling machines
6330 Electropolishing plants
6340 Deburring
6350 Deburring machines
6360 Color coating machines
6370 Paint spraying plants
6380 Vibratory finishing machines for surface treatment of metal parts
6386 High pressure water jet cleaning technology
6390 Shot peening
6400 Plastic coating plants
6410 Metal working equipment, electrochemical
6420 Metal degreasing lines
6430 Degreasing lines for metal strip
6440 Lines for cleaning and drying of metal
6450 Surface treatment, surface technology
6460 Surface treatment lines
6470 Surface drying, general
6480 Surface drying, inductive

6490 Surface finishing
6500 Phosphating plants
6510 Phosphating process
6520 Plasma CVD coating systems
6525 Plasma generators, power supply
6527 Blank washing systems
6530 Plating plants
6540 Plasma CVD systems
6550 PVD coating systems
6565 Blasting plants
6570 Pretreatment plants for galvanizing plants
6580 Water demineralization for surface treatment

11.05. Aluminizing, tin plating, galvanizing
6600 Equipment for hot-dip galvanizing and aluminizing of strip
6603 Equipment for hot-dip galvanizing, tin-plating and aluminizing of strip
6610 Electrolytic galvanizing equipment
6620 Electrolytic galvanizing lines
6630 Hot dip galvanizing lines
6640 Hot dip galvanizing lines, accessories
6642 Hot dip galvanizing lines, zinc bath equipment
6648 Galvannealing
6650 Galvannealing, inductive
6660 High current lines for electrolytic galvanizing plants
6670 Galvanizing
6675 Tin plating plants
6680 Tin fusion, inductive

11.06. Corrosion protection
6690 Linings and coatings
6700 Coatings, inorganic
6702 Coatings, overlays, expert opinions
6710 Burnishing and corrosion protection
6720 Oilers
6730 Electrophoretic dip coatings
6740 Rubber coatings
6744 Corrosion protection systems
6750 Corrosion and oxidation protection
6755 Oil felt
6760 Powder coatings
6770 Rust protection paints
6780 VPI/VCI corrosion protection papers and films

11.07. Components
6790 Nozzles (also blow-off and descaling nozzles)
6795 Rubber and PU reel covers
6800 Rubber and PU roller covers for the sheet metal finishing industry
6810 Rubber rollers for the sheet metal finishing industry
6820 Spray pipes
6826 Weighing systems for coils and bundles

11.08. Operating materials
6830 Chips and compounds for vibratory finishing
6840 Wire grit
6860 Electrocorundum abrasives
6865 Bonded coatings
6870 Metal cleaners
6880 Phosphating agents
6890 Blasting glass beads
6898 Steel blasting media
6900 Blasting media and technology, general

11.09. Services
6906 Large format surface grinding
6910 Contract finishing

11.10. Wear protection
6914 Ceramic wear protection
6916 Linings and coatings
6918 Wear protection, metallic
6919 Wear protection, general

12 Production of bright steel and wire

6920 Engineering and technical assistance
6925 Second-hand equipment

12.01. Wire rod mills
6930 Wire and fine steel rolling mills
6940 Wire stretching machines
6950 Guiding equipment for wire rod and fine iron rolling mills
6960 Rolling machines for flat wires and wire profiles

12.02. Wire, bar and profile drawing
6965 Drawing tools
6970 Wire drawing machines
6980 Wire drawing machines
6990 Bar and profile drawing machines
7000 Bar drawing benches

12.03. Finishing lines for drawing shops
7010 Automatic stirrup bending machines
7020 Combi automatic machines
7030 Wire straightening and cutting machines
7040 Rotary peeling machines for bars and wire
7050 Bar straightening and polishing machines
7060 Peeling machines for bars
7065 Grinding machines
7070 Grinding machines for bars

12.04. Components
7080 Binding machines for wire rod, concrete and bar steel
7090 Brakes
7100 Seals for rolling mills
7110 Wire cooling lines
7120 Wire coil and coiling machines
7140 Wire and bar pointing machines
7150 Electric rolls and roller tables
7160 Colors for marking equipment
7170 Ink marking systems
7180 Hook web systems
7200 Compactor and press binding systems for wire rod
7210 Reading systems for automatic identification of impact and directly applied characters
7220 Marking systems
7230 Marking inks
7235 Spools for winding and unwinding, rewinding
7240 Stamping machines and stamps for hot and cold operation (also fully automatic)
7250 Heat exchangers

12.05. Operating supplies
7270 Lubricants and process materials
7280 Drawing agents (greases, oils, soaps, etc.)

13 Production of tubes / pipes

7290 Engineering and technical assistance
7295 Second-hand equipment

13.01. Tube rolling mills
7300 Expanding mills
7310 Diescher rolling mills
7320 Forming mills
7330 Sizing mills
7340 Reducing mills
7350 Pipe and expander mills
7360 Pipe rolling mills with planetary piercing mill
7370 Pitch rolling mills
7380 Plug rolling mills
7390 Stretch-reducing mills

13.02. Tube drawing machines
7400 Continuous drawing machines
7410 Tube drawing machines
7420 Drum drawing machines
7430 Drawing benches

13.03. Pipe welding machines
7440 Longitudinal seam pipe welding machines
7450 Pipe welding plants
7460 Spiral pipe plants

13.04. Finishing lines for tubes
7480 Finishing lines
7490 Finishing lines for tubes
7495 Deburring machines for tubes, profiles and solid bars
7500 Travelling cut-off machines
7510 Straightening machines for tubes, sections and bars
7520 Tube bending machines
7530 Pipe end calibrating and upsetting presses
7540 Pipe deburring equipment
7542 Pipe deburring machines
7544 Pipe straightening machines
7550 Pipe straightening presses
7560 Pipe straightening and cutting machines
7570 Pipe grinding machines (internal and external)

13.05. Components
7580 Binding machines
7600 Colors for marking equipment
7610 Paint signing machines
7615 Cleaning machines for tubes, profiles and solids

7620 Pipe pointing machines
7630 Pipe marking equipment
7640 Pipe testing equipment
7650 Pipe sawing machines
7660 Pipe spooling machines
7663 Automatic sawing machines
7665 Technical brushes

14 Sheet metal processing

7690 CAD constructions
7700 Spinning of sheet metal parts
7710 Spinning of sheet metal parts
7720 Engineering and technical assistance
7730 Cold forming of sheet metal parts and panels

14.01. Plants, presses, machines

7740 Bending machines
7750 Strip edge trimming machines
7760 Strip straightening machines
7765 Strip preparation lines for profilers
7780 Sheet metal round bending machines
7790 Sheet metal stacking machines, automatic
7800 Sheet metal forming
7810 Sheet metal working machines, general
7820 Flanging machines
7825 Pressure joining machines
7830 Deburring machines
7835 Deburring machines for tubes, profiles and solid bars
7840 Die bending presses
7845 Hot and cold riveting machines
7848 Hydraulic high-pressure sheet metal forming presses and lines
7849 Hydroforming (IHU)
7850 Hydraulic presses and plants
7860 Hydraulic presses for raw forming
7868 Internal high pressure forming
7870 Cold extrusion presses
7880 Cold forming lines
7882 Press feeding systems
7910 Roller profiling lines
7920 Round forming presses (presses)
7921 Wobble forming presses
7922 Special lines for coil processing
7924 Punching and pre-punching lines
7926 Dividing levelers
7930 Deep drawing presses
7940 Pre-rounding presses (presses)
7945 Feed straightening machines
7947 Roll feeders
7950 Roll forming of strip
7960 Tooling and sheet metal working machines, used

14.02. Slitting lines

7970 Strip slitting lines
7980 Sheet metal cut-to-length and cut-to-length lines
7990 Sheet metal cutting, laser cut
7995 Slitting blades and accessories for slitting lines
8010 Fine blanking lines
8015 High pressure water jet cutting technology
8020 Slitting and cut-to-length lines
8030 Slitting and cut-to-length machines
8040 Laser cutting systems
8050 Plasma cutting systems
8070 Cut-to-length lines
8072 Shears
8075 Shears (standing and flying) for sheet metal working
8080 Second-hand laser beam cutting machines
8090 Blast machine performance tuning
8100 Waste optimization systems

14.03. Welding technology

8110 Deposition welding on rollers etc.
8115 Fire protection blankets made of textile fabric
8120 Strip welding machines
8130 Stud welding machines
8140 Electron and laser beam welding (service)
8150 Electron beam welding machines
8170 Gouging machines
8180 Lattice girder welding machines
8190 Carbon electrodes (welding carbons)
8200 Mould welding
8205 Laser welding machines
8210 Laser beam welding machines
8215 Solder protection mats made of textile fabric
8220 MIG, MAG and TIG \ 057TIG welding torches
8230 Peripheral devices for robots
8250 Repair of cracks and engravings
8257 Rolling seam resistance welding equipment
8260 Repair welding
8280 Welding, general
8288 Welding wire
8290 Welding wire, stainless
8300 Welding wire and filler metals (also from CuAl alloys)
8310 Welding electrodes
8312 Welding protection blankets made of textile fabric
8314 Welding protection fabric up to 1250 °C
8316 Welding protection mats and curtains made of textile fabric up to 1250 °C
8318 Welding protection paste up to 1400 °C
8320 Welding constructions
8330 Welding machines, general
8340 Welding robots
8350 Welding technology, general
8360 Welding accessories, general
8363 Wire mesh welding
8370 Sensor systems for automated welding
8380 Butt welding machines, electric
8400 Resistance welding equipment

14.04. Components

8410 Brakes
8415 Color marking systems
8420 Laser marking equipment
8430 Plate stretcher
8435 Profile Stretchers
8440 Rotary shear blades and accessories
8450 Cutting and punching tools
8470 Marking pins for metals
8480 Deep drawing tools

14.05. Services

8481 Electron and laser beam welding
8482 Laser cutting of steels and sheet metal processing
8483 Laser welding
8484 Water jet cutting of steels
8485 Tube laser cutting
8486 Large format surface grinding

15 Steel products

15.01. Rolled steel

8489 Folded profiles, welded structural elements
8490 Aluminized sheet (hot-dip aluminized or roll clad)
8500 Aluminum-zinc coated steel sheet
8510 Antiphon sheets
8520 Elevator guide rails
8530 Strip steel, hot rolled
8540 Machined sheet
8550 Container bottoms
8560 Coated sheet (painted, foil coated)
8570 Reinforcing steel
8580 Reinforcing steel in coils, cold-rolled
8590 Reinforcing steel in coils, hot rolled
8600 Reinforcing steel in bars
8610 Reinforcing steel in bars and coils
8620 Reinforcing steel (stainless)
8630 Wide strip, organically coated
8640 Wide strip, cold rolled
8650 Wide strip, hot and cold rolled
8660 Wide flat steel
8670 Wide-flange beams
8672 Cellform beams
8680 Electrical sheet and strip
8690 Enameled steel sheet
8700 Thin sheet in further processed special designs
8710 Thin sheet, cold-rolled
8720 Thin sheet, surface finished
8740 Sheet products, laser welded
8750 Sheet products, mash-seam welded
8760 Flat steel
8769 Sectional steel
8770 Shaped steel (incl. pit lining)
8780 Welded sections
8790 Heavy plate
8795 Heavy plate blanks
8800 Heavy plate products, pressed, dimpled, bent, edge-finished
8810 Heavy and medium plate, incl. lining plate
8820 Semi-finished products
8830 Semi-finished products, continuously cast
8831 Semi-finished products, continuously cast, ingot
8840 Semi-finished products for rolling
8850 Semi-finished products for forging
8860 Superstructure material
8870 Clad steel sheet
8880 Rails
8890 Shipbuilding material
8900 Shipbuilding profiles
8910 Forging semi-finished products
8915 Forged bars
8920 Slit strip

8922 Slit strip, surface finished
8930 Cold drawn special steel sections
8940 Special profiles, hot rolled
8950 Special profiles, hot rolled and drawn for lift trucks, vehicle, machine and pipeline construction
8960 Special profiles, hot extruded
8970 Bar steel (quality, case-hardened, quenched and tempered, spring, free-cutting)
8975 Bar steel (angle steel)
8976 Steel bars (stainless steel, all dimensions)
8980 Steel sheet piling sections (box piles and accessories, driven steel piles)
8981 Steel sheet piling sections (box piles and driven steel piles)
8985 Steel sheet pile sections, box piles, steel piles, anchoring and accessories
8990 Continuous cast billets
8992 Trapezoidal profiles - PUR and mineral wool, sandwich elements, acoustic elements, cassettes
9010 Galvanized steel strip
9020 Galvanized profiled steel sheet
9030 Galvanized steel sheet in sheets and rolls, galvanized strip steel
9040 Honeycomb beams, machined beams
9050 Wire rod
9060 Wire rod, flat or round
9070 Wire rod, round
9080 Wire rod in spring steel grades
9090 Wire rod in cold heading grades
9100 Wire rod in welding wire grades
9130 Rolled steel
9140 Hot wide strip
9150 Tinplate and strip, ultra-fine sheet and strip, tin-plated sheet and strip, special chrome-plated ultra-fine sheet and strip (ECCS)
9160 Y-sleepers

15.02. Pipes

9170 Fittings for pipes, stainless
9180 Large-diameter pipes
9190 Large diameter tubes, spiral welded
9200 Boiler tubes
9220 Flanges, stainless
9230 Oilfield tubes
9260 Clad tubes
9270 Precision steel tubes, welded
9280 Precision steel tubes, seamless and welded (round, oval, square, rectangular and as special sections)
9290 Precision steel tubes, seamless and welded, with surface finishing such as electrogalvanizing, chromating, phosphating, etc.
9300 Tubes prematerial (round and square)
9310 Tubes
9320 Tubes made of degussite
9330 Tubes made of cold-tempered steels, weldable fine-grained steels
9332 Tubes, ceramic
9334 Tubes of circular or square cross-section
9335 Tubes, circular or square cross-section, hot-dip galvanized
9340 Stainless steel tubes
9345 Pipe parts and components
9350 Tube products (U-tubes, also with special radii, coil systems, etc.)
9360 Centrifugally cast tubes (also made of stainless steel)
9370 Special section tubes, welded, cold-rolled
9380 Steel drainage pipes, hot-dip galvanized
9390 Steel pipes, machined
9400 Steel pipes, welded
9410 Steel tubes, seamless
9420 Door reinforcement tubes, welded
9430 Door reinforcement tubes, seamless
9440 Cylinder tubes

15.03. Forgings

9450 vessels (flanges, nozzles, etc.)
9460 Products for general engineering (crankshafts, tools, gears, etc.)
9470 Products for power engineering (generator parts, turbine parts, etc.)
9480 Products for aircraft engine construction (e.g. compressor blades, disks)
9490 Products for shipbuilding
9500 Open die forgings, general
9510 Die forgings, general
9520 Seamless rolled rings
9530 Forgings, general
9532 Non-ferrous forgings (copper and copper alloys, aluminum alloys)

15.04. Railroad rolling stock

9540 Axles
9550 Wheel tires

15.05. Steel in the following delivery forms

9560 Structural steels, general
9570 engineering steels, case-hardening steels, quenched and tempered steels, surface-hardening steels, low-temperature steels, cold-heading steels, fine-grained steels, steels resistant to compressed hydrogen
9580 Stainless steel special remnants (Ia and IIa quality)
9590 Stainless steels
9600 Case hardening steels, foreign standard steels, wear resistant steels
9610 Case-hardened steels, nitriding steels, spring steels, foreign standard steels, wear-resistant steels
9618 ESU remelted steels
9620 Spring steel wire, stainless
9625 Thin sheets
9630 High temperature steels and alloys
9635 Perforated plates
9638 Cold rolled sections
9640 Stainless bars and tubes
9641 Stainless bars
9642 Special sections, hot rolled, hot extruded or drawn
9650 Stainless, acid and heat resistant steels
9655 Stainless, acid and heat resistant steels and alloys
9660 Stainless, acid- and heat-resistant steels and alloys, also heating conductor and resistance alloys
9670 High-speed steels
9680 Special structural steels, alloyed, weldable
9685 Engineering steels, alloyed, weldable
9690 Steels with special physical properties
9696 Chromium-plated steels
9700 Pre-machined steels in bars and plates, rough milled, fine milled, ground
9710 Rolling bearing steels
9714 Mild unalloyed steels
9718 Tool steels, hardened
9720 Tool steels, alloyed and unalloyed

15.06. Drawing and cold rolling mill products

9730 Bright steel (including free-cutting bright steel, bright steel shafts, bright special sections)
9740 Spring steel strip
9750 Cold rolled strip
9751 Hardened strip steel
9755 Cold rolled strip, coated
9760 Cold rolled strip with bright surface
9770 Cold rolled strip with refined surface
9780 Cold rolled clad strip
9790 Cold rolled profiles from hot rolled or cold rolled strip
9800 Cold rolled profiles with refined surface
9810 Body parts
9814 Sheet metal formed parts
9817 Precision strip steel
9820 Pressed, stamped and drawn parts
9830 Steel strip for packaging purposes
9838 Tailored beams
9840 Tailored blanks (sheet blanks)
9850 Formed tube and sheet components for the automotive industry
9860 Drawing and cold rolling mill products
9870 Cylinder tubes for hydraulics and pneumatics

15.07. Wire and wire products

9880 Anchor steel, screwable
9885 Structural steel mesh
9890 Reinforcing wire, reinforcing mats, pit mats
9900 Reinforcing meshes for reinforced concrete
9920 Wire meshes
9930 Wire mesh
9932 Wire mesh
9950 Wire ropes and strands
9960 Wire and wire products
9970 Iron, free-cutting, cold extrusion and cold heading wires
9980 Iron fine and superfine wires
9990 Iron and steel wire, drawn
10000 Spring steel wire, oil hardened
10010 Spring steel wire, unalloyed
10015 Profile wire
10020 Flat and shaped wires
10025 Threaded steel
10030 Other wire products
10035 Prestressing steel
10040 Prestressing steel, prestressed concrete strands
10050 Galvanized and PVC coated iron wire

15.08. Steel construction

10058 Car lifts, mobile
10060 Automatic reinforcement station
10070 Sheet metal structures

10080 Bridge construction
10090 Hall construction
10100 Masts
10110 Steel construction, general
10115 Joining technology in steel construction, general
10120 Steel construction, general
10130 Assembly hall construction

15.09. Services
10140 Deep hole drilling, contract
10141 Deep hole drilling, horizontal
10145 Forming and smoothing
10146 Cutting tool steel

16 Furnace and energy technology

10150 Engineering and technical assistance
10152 Waste gas systems behind electric arc furnaces
10154 Waste heat systems behind walking beam furnaces and pusher furnaces
10160 Complete heating systems
10170 Furnace optimization (conversion to low NOx combustion)
10180 Process control systems for industrial furnaces and energy plants
10190 Rational use of energy

16.01. Rolling mill furnaces
10200 Deep annealing furnaces
10210 Rolling mill furnaces, induction
10220 Rolling mill furnaces

16.02. Forging furnaces
10230 Forging furnaces
10240 Forging furnaces, gas fired
10250 Forging furnaces, induction

16.03. Roller Hearth Continuous Furnaces
10260 Roller Hearth Continuous Furnaces
10270 Roller hearth and walking beam furnaces

16.04. Continuous furnaces for wide strip
10280 Strip heating, inductive
10290 Strip edge heating, inductive
10300 Continuous furnaces for wide strip

16.05. Top-hat furnaces
10310 Top-hat furnaces
10320 Top and pot annealing furnaces

16.06. Vacuum furnaces
10330 Vacuum annealing furnaces
10340 Vacuum hardening furnaces
10341 Vacuum pumps, dry running, for vacuum furnaces

16.07. Hardening and tempering equipment
10350 Quenching baths
10355 Carburizing furnaces
10360 Hardening furnaces
10370 Hardening plants, general
10375 Hardening and tempering plants, electrically heated
10380 Hardening and tempering plants, gas heated
10390 Hardening and tempering plants, with inductive heating
10400 Hardening and tempering plants, with resistance heating
10401 Laser hardening systems
10403 Nitriding furnaces

16.08. Heating furnaces and heat treatment plants
10408 Continuous furnaces
10410 Co-step furnaces
10420 Hardening furnaces
10430 Bogie hearth furnaces
10440 Induction heating plants
10450 Industrial furnaces, used
10460 Chamber furnaces
10470 Conductive heating plants
10480 Furnaces with mechanically driven hearth
10490 Patenting plants for wire
10500 Plasma nitriding plants
10505 Radiators
10510 Roller hearth and walking beam furnaces
10520 Pit furnaces
10530 plug furnaces
10540 Pusher-type, roller and rotary hearth furnaces
10545 Tempering and drying plants
10550 Vertical and horizontal strip furnaces for heat treatments
10560 Heat treatment plants
10562 Heat treatment furnaces (continuous and discontinuous)
10570 Heat treatment furnaces for batch operation, open heated

16.09. Bath furnaces
10580 Aluminum melting furnaces
10582 Aluminum melting and holding furnaces
10590 Furnaces and plants for lead coating, galvanizing and tinning
10600 Salt and metal bath furnaces

16.10. Industrial furnaces for special purposes
10610 Furnaces for the ceramic industry
10615 Lime kilns
10620 Inert gas, vacuum furnaces
10630 Tempering furnaces
10640 Drying furnaces for casting cores, molds and mold covers
10650 Drying furnaces for stopper rods
10652 Microwave ovens / dryers
10660 Accessories for industrial furnaces

16.11. Protective gas plants
10670 Protective gas plants

16.12. Insulations
10680 Block insulation
10690 Firing pads
10700 Calcium silicate
10710 Insulation materials
10720 Vibration protection
10730 Backing insulation
10732 Electrical insulation systems for arc furnaces and transformer houses
10735 Heat protection and insulation products
10740 Insulating and sealing boards, asbestos-free
10744 Insulating fabrics up to 1260 °C
10746 Insulating cords, tapes, packings and hoses up to 1260 °C
10748 Support arm insulations, asbestos-free
10750 Insulating bricks
10760 Cooling pipe insulations
10770 Furnace components
10780 Sound insulation
10790 Vibration insulation
10800 Thermal insulation
10803 Wool felt for bright annealing furnaces

16.13. Components
10805 Exhaust technology
10810 Bath rollers
10820 Belt coolers, belt dryers
10830 Block pressers
10840 Block and slab pushers for heating furnaces
10850 Burners for gas and oil
10860 Custom-made burners
10870 Feeding and discharging machines
10880 Electric heaters
10890 Natural gas burners
10895 Furnace probes (for the use of video cameras)
10900 Gas burners
10910 Generators for protective and reaction gases
10915 Hardeners
10920 Heating conductors
10930 Hearth rollers
10950 pulverized coal furnaces (also -plants)
10960 Laser light barriers
10970 Oil burners
10990 Furnace riders
11000 Furnace rollers
11005 Plasma generators
11010 Regenerative burners
11020 Recuperative burners
11028 Recuperators
11030 Recuperators, regenerators
11040 Rollers (e.g. from SIC)
11050 Safety devices for EAF oxygen-fuel burners
11060 Jet tubes
11070 Radiant tube burners
11078 Vacuum pumps, dry running, for vacuum furnaces
11080 Heat exchangers
11090 Heat recovery systems
11092 Weighing systems for melting furnaces
11093 Wool felt for bright annealing furnaces

16.14. Operating materials
11110 Hardening agents (also hardening powders and carbon restoration agents)
11120 Hardening oils
11150 Fire-resistant hydraulic fluids

11160 Polymer solutions
11170 Lubricants
11180 Spray cleaners
11190 Heat transfer fluids

16.15. Services
11200 Energy consulting
11210 Energy saving
11215 Commissioning, maintenance and service of heating equipment
11240 Planning and projecting of energy-technical plants

17 Refractory technology

11245 Product know-how for basic refractory bricks and mixes
11248 Monitoring of refractory components

17.01. Raw materials, precursors and binders for refractory materials
11250 Aluminum hydroxide
11260 Alumina, alumina
11263 Reinforcing wires for refractory mixes
11265 Binders for the production of refractory materials
11270 Electrocorundum
11280 Graphite
11290 Adhesive sand
11300 Coke breeze
11310 Coke breeze, dry
11320 Magnesium oxide
11330 Microsilica
11360 Silicon carbide
11366 Titanium dioxide
11370 Clays
11380 Alumina specialties
11390 Zirconia

17.02. Plants for the production of refractory materials
11400 Equipment for the production of refractory materials

17.03. Refractory materials and equipment
11410 Tapping stones for converters and electric arc furnaces
11420 Painting, filling and plastering materials
11430 Basic ramming, gunning and casting mixes
11440 Basic bricks (magnesia, magnesia-chromium, chromium ore, chromite, dolomite, spinel, forsterite and carbon bricks)
11450 Calcium silicate
11460 Dolomite products
11470 Electrode masses
11480 Fiber ceramic moldings, vacuum formed
11481 Fiber ceramic moldings, vacuum formed, up to 1750 °C
11485 Fiber mats and felts up to 1600 °C
11490 Fiber products, ceramic
11500 Prefabricated parts, refractory
11510 Refractory concrete
11512 Refractory concrete, high strength, for industrial floors
11520 Refractory products, general
11530 Refractory ramming mixes
11540 Refractory anchorages
11550 Refractory material
11560 Lightweight refractory bricks
11570 Lightweight refractory and insulating mixes
11580 Lightweight refractory and insulating bricks
11590 Gas purging equipment, refractory
11600 Pouring mixes, self-flowing
11610 hearth masses
11620 High-fire bricks
11630 Blast furnace bricks
11640 Induction furnace mixes
11650 Insulating material, asbestos-free
11660 Isostatically pressed products
11670 Carbon and graphite bricks
11690 Converter bricks
11700 Arc furnace bricks
11710 Perforated bricks
11720 Masses, refractory (general)
11725 MgO-C bricks
11730 Mortars and mastics, refractory
11740 Mux masses
11750 Ladle masses
11752 Torpedo ladle lining
11755 Ladle lining, monolithic
11760 Ladle bricks
11768 Products made of \ 050HTW \ 051 high temperature wool
11790 Gutter and taphole masses
11800 Gutter lining, cooled
11810 Acid resistant bricks
11820 Acid ramming and centrifugal masses
11830 Firebricks
11840 Shadow pipe
11850 Slide gate ceramics
11860 Cast basalt
11865 Protective blankets made of textile fabric, refractory
11870 Silicon carbide bricks
11880 Silica bricks, tondina bricks
11886 Special adhesives up to 1200 °C
11890 gunning and repair compounds
11900 Steel mill wear material
11910 ramming, casting and vibrating masses
11915 ramming, spraying and casting compounds
11920 Stoppers and spouts
11930 Continuous castings, refractory
11940 Immersion tube, monota immersion spout
11950 Technical ceramics
11960 High-alumina bricks (andalusite, bauxite, corundum, mullite, sillimanite bricks)
11970 Torpedo mixer stones
11980 Tundish masses
11985 Pouring compounds, cement-free, for blast furnace tapping troughs
11990 Vermiculite
12000 Thermal insulation materials, asbestos-free
12004 Vacuum formed parts
12005 Vacuum formed parts, without ceramic fibers
12010 Wollastonite
12020 Zircon nozzles
12030 Zircon containing stones
12040 Zircon sand/flour)

17.04. Processing of refractory materials
12050 Processing of used refractory materials
12060 Testing of FF materials

17.05. Machines for refractory construction
12070 break-out hammers, pneumatic and hydraulic, for electric furnaces, converters, ladles and troughs
12071 Excavation robots
12075 Chipper
12080 Converter tap hole repair vehicles
12095 Converter lining devices
12100 Manipulators for FF masses
12110 Ladle spraying machines
12118 Pumping machines for refractory materials
12120 Pumping machines for refractory materials
12130 Centrifugal machines for FF-masses
12140 Spraying machines for FF materials
12150 Tamping plants, autom., for ladles

17.06. Refractory construction
12160 lining of all kinds of furnaces
12170 Firing chambers
12175 Refractory anchors
12180 Refractory construction
12190 Refractory ramming mixes
12200 Suspended ceilings

17.07. Services
12204 Training - Refractory
12205 Refractory maintenance at operating temperature
12206 Refractory systems

18 Machinery and plant engineering

12210 Plant engineering, general
12220 CAD design
12230 Engineering and technical assistance
12240 beams, columns, shafts
12250 Industrial Engineering
12258 Standard parts for cutting and punching tool construction
12260 Cleaning and cleaning materials
12270 Second-hand machines (purchase and sale)
12280 Special constructions
12285 Heat exchangers

18.01. Mining equipment, machines and supplies
12290 Plants and machines for underground mining
12300 Bucket elevators
12309 Conveyor systems
12310 Conveying plants and machines
12330 Mine support profiles

18.02. Chemical plants and accessories
12350 Tank and apparatus construction
12360 Liquid gas - storage stations
12370 Gas tanks
12390 Acid chimneys
12400 Acid and chemical resistant plants and equipment
12410 Nitrogen production plants

18.03. Steam generation plants and equipment
12425 Exhaust gas technology
12430 Waste heat boilers
12440 Steam filters
12450 Steam boilers, general
12460 Pressure boilers
12470 Hydrazine removal
12480 Pulverized coal firing systems

18.04. Foundry equipment, machinery and supplies
12354 Casting ladles
12500 Molding machines
12530 Foundry equipment, machines and supplies
12535 Foundry tools
12540 Foundry consulting and engineering
12542 Foundry software
12550 Core shooters
12560 fettling machines
12570 Robots
12580 Sand mixers
12586 Melting furnaces, inductive
12590 Shaking ladles
12592 Crucible tongs
12605 Vacuum investment casting plants-superalloys
12607 Vacuum investment casting plants with cold crucibles for titanium or titanium alloys

18.05. Power plants and power stations
12610 Power plants and power stations, steam
12620 Power plants and power stations, electric

18.06. Ventilation plants and equipment
12630 Blowers
12635 Industrial fans
12650 Air conditioners, general
12660 Air conditioners for heat plants
12670 Air conditioners for crane lances, crane bridges, etc.
12690 Expansion joints
12700 Ventilation ducts
12710 Ventilation systems and equipment, general
12720 Natural ventilation
12730 Induced draught systems and equipment
12740 Ventilators

18.07. Water treatment plants, equipment and accessories
12750 Chemical water treatment
12760 Pressurized water plants and accumulators
12770 Filtering plants for circulating water
12780 Rubber compensators
12790 Cooling towers
12793 Cooling water / circulating water systems
12796 Magnetic filters
12800 Press water additives
12810 Water treatment systems
12830 Water demineralization, treatment and recycling
12840 Water recooling systems
12846 Water filtration

18.08. Other plants
12848 Chillers
12850 Slag granulation hoses
12860 Slag recycling plants (also slag granulation plants)
12862 Slag granulation plants
12870 Lube oil plants

18.09. Maintenance
12880 Spare parts and consumables
12890 Maintenance, general
12892 Maintenance organization
12894 Maintenance systems
12896 Repair, overhaul and modernization of machine tools
12900 Maintenance of large gear units
12920 Maintenance of continuous casting plants for ingots and slabs
12930 Maintenance of continuous casters for ingots and billets
12950 Repair of ingot molds
12960 Repair of ingot molds
12964 Cooling system cleaning
12970 Ladle repair, FF
12980 Repairs, spare parts
12983 Software for maintenance
12990 Preventive maintenance
13000 Heat exchanger cleaning
13010 Condition based machine maintenance

18.10. Power and work machines
13020 Steam turbines
13021 Gas turbines
13030 Rotary compressors
13040 Compressed air equipment
13050 Natural gas, gas transmission compressor stations
13060 Natural gas HP storage
13070 Piston pumps
13080 Piston compressors
13083 Corrosion resistant pumps
13090 Centrifugal pumps
13100 Mixing units for all fuel gases
13120 Lubrication pumps
13130 Screw compressors
13150 Turbo compressors
13160 Vacuum pumps

18.11. Gearboxes and drive elements
13168 Drive elements
13170 Drive engineering
13174 Valve gearboxes
13180 Brakes
13190 Brake disc mounting
13195 Torque limiter
13200 Flange couplings
13210 Cardan joints
13220 Cardan shafts
13230 Gear rollers
13240 Gearboxes and drive elements
13250 Large gearboxes
13255 Chain drives and sprockets
13260 Hirth serration
13261 Hirth spur gearing
13270 Couplings
13285 Couplings, flexible, elastic
13290 Couplings, mechanical and hydrodynamic
13300 Planetary gearboxes
13308 Slew drives
13310 Safety couplings
13318 Spindles
13320 Special constructions
13350 Shaft-hub couplings (backlash-free)
13360 Shaft couplings (rigid)
13370 Winding shafts
13380 Gear drives
13390 Gear wheels
13395 Gearbox repairs

18.12. Bearings
13400 Slewing rings
13404 Elastomeric bearings
13406 Spherical plain bearings / rod ends
13410 Plain bearings
13420 Ceramic-metal compact plain bearings
13430 Ball bearings
13440 Cam rollers
13460 Linear systems
13470 Roller bearings
13480 Yoke type track rollers
13484 Thermal separation
13485 Support and guide rollers
13490 Rolling bearings
13492 High-temperature rolling bearings
13500 Roller bearings

18.13. Oil hydraulic systems, equipment and accessories
13508 Rotary distributors
13510 Rotary feeders
13520 Pressure measuring, switching and writing devices
13530 Pressure switch
13540 High pressure flange connectors
13550 Hydraulic systems
13560 Hydraulic and shaft seals
13570 Hydro gears
13580 Hydro motors
13590 Hydro pumps
13595 Hydraulic accumulators
13600 Hydro valves
13610 Hydraulic cylinders
13620 Oil hydraulic systems, devices and accessories
13630 Vibration dampers
13640 Servo valves
13645 Continuous valves
13660 Complete plants, oil hydraulic
13670 Water hydraulic

18.14. Control systems and components
13680 Shut-off valves

13690 Automatic inflow control with distribution gate valves
13695 Torque limiters
13710 Electro-hydraulic actuators
13718 Electro-servo cylinders
13720 Multipoint single and multi-purpose regulators
13730 Control systems, complete
13740 Control valves
13760 Actuators
13780 Continuous single and multi-purpose regulators

18.15. Piping and accessories
13786 Exhaust gas technology
13790 Butterfly valves
13800 Asbestos-free fabric expansion joints
13810 Fittings
13820 Flanges
13840 Rubber expansion joints
13850 High pressure pipe technology
13859 Safety valves
13860 Expansion joints
13890 Pipe break safety valves
13900 Pipe swivels
13910 Piping and accessories
13920 Pipeline construction
13930 Piping accessories
13940 Check valves
13945 Hoses
13947 Flexible hoses with ceramic wear protection
13950 Plug-in disc gate valves

18.16. Stranding machines
13955 Stranding machines
13958 Rope making machines

18.17. Tool and model making
13956 Mold frames, mold assemblies
13960 Materials for model and prototype construction
13970 Model and prototype making

18.18. Machine tools
13980 Cutting-off machines
13990 External thread cutting machines
14000 Band sawing machines
14010 Bending and straightening machines
14015 Slab sawing machines
14020 Wire working and processing machines
14030 Flow-forming machines
14040 Milling machines
14060 Spark erosion machines
14070 honing and lapping machines
14080 Cable sheathing presses
14081 Cable sheathing presses (lead and aluminum)
14088 Sharpening machines
14090 Cold circular saws
14095 Hot circular saws
14100 Mould processing machines
14120 profile and flat shears
14130 Shears (standing, flying) for metallurgical operations
14140 Shears (standing, flying) for sheet metal working
14150 Shearing centers
14160 Grinding and polishing machines (also internal)
14170 Special machines for chip forming
14180 Special machines for chipless forming
14190 Special machines for special tasks
14195 Concrete sawing machines
14200 Stone cutting saws
14210 Plate shears
14220 Cut-off machines

18.19. Tools
14230 Press brake tools
14240 Drills
14242 Taphole drilling tools
14250 Diamond tools
14260 Pneumatic tools
14280 Carbide (also metal carbide)
14290 Tungsten carbide inserts and molded parts
14300 Carbide tools
14302 HM tipped saw blades
14304 HP grinding wheels
14306 Saw bands and blades for metallic and non-metallic materials
14310 Saw blades for metal
14318 Cutters
14320 Shear blades
14323 Splitting knives and accessories for splitting lines
14330 Abrasives and grinding wheels
14334 Special tools for die casting industry
14336 Cutting wheels
14337 Roll grinding wheels
14338 Cutting and special tools

18.20. Clamping technology
14380 Clamping hydraulics
14400 Clamping elements
14401 Clamping tools, screws

18.21. Components
14410 Seals
14412 Seals with high chemical and thermal resistance
14420 Rotary seals for feeding gases or liquid media
14430 Cooling water circulation units for continuous casting-rolling lines
14440 Nozzles (also blow-off and descaling nozzles)
14450 Pistons
14460 Metal hoses
14470 Buffers (rubber and cellular buffers)
14480 Stuffing box packings
14490 Wear plates

18.22. Operating fluids
14500 Solid lubricants
14510 Industrial oils
14520 Cooling lubricants

18.23. Tribology
14522 Dosing and monitoring equipment for lubricants
14523 Oil circulation systems for bearing and gear lubrication
14524 Two-line grease lubrication systems for metallurgical plants and rolling mills
14525 Special lubricants
14526 Central lubrication systems
14527 Machines for degreasing and lubrication

18.24. Services
14528 Service for compressors and turbines
14529 Mechanical processing of hydraulic parts

19 Transport and storage technique

14530 Engineering and technical assistance
14535 Hot material conveyors
14540 Transport and logistics for industrial residues
14545 Hot material conveyors
14548 Transport
14550 Transport technology

19.01. Metallurgical plant vehicles
14560 Slab, bloom and billet transporters, rubber tires
14570 Coil transport systems
14580 Coil transporters
14590 Steel mill vehicles, general
14600 Metallurgical plant vehicles, track-bound
14605 Air cushion vehicles-FTS
14610 Slag ladle transporters
14620 Slag transporter
14630 Scrap transport trailers with weighing equipment
14640 Steel mill vehicles

19.02. Rail vehicles
14650 Diesel locomotives
14660 Railroad wagons
14670 Self-propelled wagons

19.03. Track technology
14680 Turntables and transfer cars
14684 Track technology
14690 Shunting systems

19.04. Trackless vehicles
14700 Trailers
14705 Trucks and trailers
14720 Electric industrial trucks
14730 Electric trucks
14734 Electric four-way sideloaders
14740 Driverless transport systems
14742 Driverless transport systems for steel and aluminum coils
14750 Forklifts and cross stackers
14760 Rubber-tired heavy-duty transport vehicles
14810 Heavy-duty tractors
14820 Telescopic excavators
14822 Transport systems for coils

19.05. Continuous conveyors
14830 Conveyors (general)

14840 Pneumatic conveyors
14850 Vibratory conveyors
14860 Vertical conveyors
14880 Steep conveyors
14890 Continuous conveyors for bulk material
14900 Continuous conveyors for piece goods
14910 Conveyor belts and screws
14920 Trough chain conveyors

19.06. Cranes

14930 Slewing cranes
14940 Casting cranes
14945 Crane systems, automatic
14946 High capacity automatic cranes
14950 Cranes, hoists and accessories, general
14955 Crane service
14960 Overhead travelling cranes
14970 Gantry cranes
14980 Bracket cranes
14990 Buffers
14992 Vacuum lifting devices for heavy industry
14993 Automatic stacking devices (vacuum lifting devices)

19.07. Scales

14997 Bundle and coil scales
15000 Batching and blending scales
15010 Track and truck scales
15020 Crane scales
15030 Roller table scales
15040 Scales for continuous weighing
15041 Scales for alloying elements
15042 Scales for pig iron
15043 Scales for scrap
15044 Scales for static weighing
15045 Scales for stationary weighing
15050 Weighing systems for ladle turrets and ladle cars
15060 Load cells
15080 Weighing systems for silos

19.08. Storage and retrieval systems

15090 Bund high-bay warehouse
15100 Container staging systems
15110 Labeling systems
15120 Lattice girder storage systems
15130 Manual overhead conveyors
15134 Aerial work platforms
15140 Storage technology and automation systems for sheet metal, long goods and stacking boxes
15141 Storage technology and automation systems for sheet metal, long goods and stacking boxes
15150 Storage and retrieval systems
15155 Storage systems for coils
15160 Storage and racking systems
15164 Long goods order pickers, high rack stackers
15170 Marking systems
15180 Pallets and cassettes
15188 Vertical elevators (paternosters)
15190 Stacker cranes
15193 Traversers and turning devices
15195 Honeycomb racking systems

19.09. Warehouse organization

15198 Labels
15200 Identification
15208 Warehouse logistics
15210 warehouse organization)

19.10. Components

15220 Slinging equipment
15230 Loading and unloading equipment
15240 Sheet metal package tongs
15250 block pushers, extractors
15270 Bunker discharge aid
15280 Bunker and silo equipment
15290 Coil and sheet metal packaging
15300 Coil tongs
15310 Permanent magnets
15320 Electrical equipment for cranes etc.
15330 Electric hoists
15333 Distance measuring devices for cranes
15335 Labels
15340 Conveyor belt cover
15350 Conveyor belt scraper
15360 Conveyor devices and equipment
15370 Conveyor belt splices
15380 Conveyor belt vulcanizing equipment and material
15390 Grippers and tongs
15400 Handling machines
15410 Lifting clamps, safety lifting clamps
15420 Industrial robots, metallurgical, sensor controlled
15430 Chains
15431 Sprockets
15440 Tipping eyes, tipping shackles
15450 Crane wheels
15455 Crane ropes
15460 Storage yard equipment
15470 Laser distance measuring devices for cranes
15480 Load lifting belts
15490 Lifting magnets and equipment
15500 Magnetic brakes
15510 Magnets, magnet systems
15511 EGIS safety device for electric lifting magnets
15520 Wheels
15530 Corrosion, friction and wear protection
15540 Bulk containers
15550 Pulleys
15555 Safety device for electric load lifting magnets
15560 Separation magnets
15570 Silos for FF-masses
15580 Silos for bulk materials
15590 Handling plants for bulk materials
15600 Deflection rollers
15610 Packaging technology
15620 Wear protection coatings with aluminum oxide ceramics
15630 Wear protection coatings with rubber
15632 Wear protection technology
15635 Track-bound tippers
15640 Wagon tipper
15650 Hot transport and cooling hoods for steel ingots
15652 Weighing systems for steel production

19.11. Operating materials

15660 Lubricants

19.12. Packaging technology

15662 Automated packing stations for coils and long goods
15664 Packaging materials

20 Electrical engineering and automation

15670 Electromechanical actuators
15680 Engineering and technical assistance
15690 Technical translations and documentation

20.01. Electrical equipment for metallurgical plants and rolling mills

15700 Workplace design systems
15720 Three-phase motors
15730 Electrical equipment for metallurgical plants and rolling mills
15740 Electrical equipment for rolling mills
15750 Large electrical installations, complete
15760 Power supply systems for mobile consumers
15770 Spring cable reels
15780 Spring hose reels
15785 Radio remote controls
15788 Radio systems
15790 Radio control systems
15800 Gear motors
15810 DC motors
15820 High current cables and lines, water cooled
15830 Cables and wires
15840 Cables, cable reels and accessories
15850 Motorized cable reels
15860 Low voltage switchgears and installations
15870 Switchgears
15880 Slip ring bodies
15890 Fuse systems
15900 Heavy current capacitors
15910 Plugs and socket-outlets
15920 Power converters (frequency converters)
15930 Power supply systems (movable and also busbars)
15940 transformers (also for industrial furnaces)
15960 AC and intercom systems
15962 High voltage feeders and contacts

20.02. Control and automation systems

15967 Electrical, instrumentation and control engineering, general
15968 Installations for anisotropic control technology
15970 Automation, general
15980 Automation plants for ore and fine ore
15990 Automation plants for blast furnaces
16000 Automation plants for industrial furnaces, general
16010 Automation plants for cold rolling mills
16020 Automation plants for coking plants
16030 Automation systems for steel mills
16035 Automation systems for blast furnaces

16040 Automation systems for hot rolling mills and tube mills
16041 Automation systems for hot rolling mills
16050 Automation plants and process control systems in metallurgical plants and rolling mills
16055 Automation of strip processing lines
16060 Automatic detection systems
16063 Strip guiding systems
16070 Data transmission equipment and systems
16080 Industrial television technology
16090 Information and communication systems
16100 Identification
16110 Customized complete systems
16120 Guidance systems (inductive) for vehicles
16130 Control systems (by image processing) for vehicles
16140 Control and automation systems, general
16150 Positioning systems for cranes
16160 Process automation
16162 Process automation for strip processing lines
16170 Process automation for continuous steel casting plants
16180 Process automation for metallurgical plants
16190 Process control systems
16192 Process control with infrared detectors
16200 Process optimization
16202 Process optimization with weighing systems
16205 Shopfloor systems
16210 Control systems, complete
16220 Control stations for metallurgical and rolling mill plants
16230 Control systems, electrical
16240 Control systems, electronic
16250 Control systems for press water tanks
16260 Control systems, hydraulic
16270 Control systems, infrared
16280 Power supplies for automation and control
16290 Networking
16293 Video technology
16295 Weighing systems for process automation in steelworks

20.03. Data processing

16300 Analog devices and accessories
16305 Archiving
16310 Production and machine data acquisition BDE / MDE
16320 Data acquisition devices and systems
16330 Data processing
16338 Digital image processing
16340 Digital devices and accessories
16350 Expert systems
16355 Manufacturing Execution System (MES)
16360 Turnkey system solutions, hardware \ 057software
16380 X-Window Terminal

20.04. Software

16390 Simulation software
16393 Software for archiving, document management and workflow
16395 Software for order processing, warehouse and test certificate management
16400 Application software
16410 Software for slitting lines
16415 Enterprise resource planning system for metal and steel trade
16420 Software for production planning and control
16430 Software for statistical process control and quality assurance
16440 Technical calculation programs

20.05. Maintenance

16450 Machine diagnostics
16460 Maintenance and inspection

21 Measuring and testing technique

16470 Gas measuring instruments for degreasing plants
16472 Gas measuring devices for metal degreasing plants
16480 Gas measuring devices for metal cleaning plants
16488 Multichannel measuring systems

21.01. Measuring and testing technology, general

16490 Automation and metrology, color measurement
16500 Pressure transducers
16508 Corrosion testers
16510 Metrology
16511 Measuring magnetism
16520 Measuring and testing systems, general
16530 Measuring and testing systems, general
16540 Measurement value acquisition
16550 Measured value processing
16552 Measuring and test equipment identification labels
16553 Measuring equipment and test status identification labels
16560 Radioactivity warning systems
16564 Recorder systems, paperless
16566 Pre-warning of melt breakthroughs and residual wall thickness measurement on refractory linings
16568 Roll gauges

21.02. Measurement of physical properties

16570 Distance measuring system
16580 Distance sensors for positioning and length measurement (laser, ultrasonic, optical, inductive and capacitive)
16581 Distance sensors for positioning and length measurement (magnetostrictive)
16590 Bath mirror measurement in converter
16600 Bath mirror control
16608 Strip thickness control (AGC)
16610 Strip sag measuring device
16612 Strip flatness measurement
16613 Strip flatness control
16615 Strip guiding system
16620 Tape tension measuring systems
16625 Tension measuring system for driven S-rolls
16630 Width measuring devices
16640 Strain gauges and measuring strips
16645 Strain measuring systems
16650 Strain and mass flow measuring systems
16652 Dressing degree and mass flow measuring systems
16660 Thickness measuring systems and devices
16670 Thickness gauges
16680 Distance switches and measuring devices (optical, acoustic and inductive)
16690 Torque measuring devices for S-rollers
16700 Torque measuring device
16710 Speed measuring devices
16720 Flow meters
16721 Flow measuring devices, capacitive, e.g. for coal injection
16730 Flow monitoring
16740 Diameter measurement
16750 Electrical measurement of mechanical quantities
16755 Electronic measuring system for hydraulic and lubricating oils
16770 Form measurement
16780 Level measuring devices
16790 Level control
16800 Level control
16810 Gas measuring instruments
16815 Oxygen sensors for waste gas
16820 Equipment and chemicals for waste water control
16830 Speed measuring devices
16850 Infrared switch
16860 Infrared radiation pyrometer
16861 Infrared radiation thermometer with scanner
16870 Infrared radiation pyrometer with scanner
16871 Infrared Radiation Thermometer
16875 Infrared thermography
16877 IR camera - infrared based slag detection
16878 Cameras, furnace cameras
16879 Cast iron temperature measurement
16880 Insulating capillary
16890 Force measuring devices for tension and compression
16891 Force measurement and weighing systems
16892 Force measuring systems
16900 Cooling water monitoring
16910 Length measuring devices for tubes
16920 Linear encoders
16930 Linear encoders (also for ways and distances)
16940 Linear encoders, ultrasonic (also for ways and distances)
16950 Length and speed measuring systems (optical)
16960 Laser speed and length measuring systems
16970 Conductivity and pH meters
16980 Mass flow meters
17000 Measurement of refractory linings (in operating condition)
17010 Measuring devices for electrical quantities
17020 Measuring machines

17030 Measurement printers
17033 Microstructure / roughness measurement
17035 Surface crack detection
17040 Opto-electronic measuring instruments
17050 Flatness measuring devices
17057 Profile measuring devices
17060 Profile measuring systems (non-contact)
17080 Pyrometer
17090 Pyrometer tubes
17100 Ratio pyrometer
17105 Inline concentration measurement of liquids
17110 Probes for liquid pig iron
17120 Tube measuring equipment
17130 Coating thickness gauges
17133 Coating thickness control
17135 Layer thickness control
17138 Slag detection with infrared
17140 Slag detectors
17160 Forging measurement
17180 Vibration measuring devices
17190 Rope testing equipment for round and flat steel ropes (rope belt conveyors)
17200 Dust measuring equipment
17210 Equipment for radiation measurements
17220 Systems for nuclear radiation measurement (input control)
17230 Immersion thermocouples
17250 Temperature measurement equipment
17255 Temperature profile measuring systems
17260 Thermocouples
17270 Thermocouple protection tubes
17274 Thermographic measurement
17280 Thermal conductivity measuring systems
17290 Rolling mill force measuring systems
17300 Rolling mill measuring systems
17310 Resistance thermometers
17320 Line scan cameras
17322 Non-destructive thickness measurement of refractory linings (during furnace shutdown)
17325 2-color pyrometer with fiber optics

21.03. Quality management

17340 3-D profile measurement of rails and other profiles
17341 3-D profile measurement of weld seams
17345 Pickling bath monitoring
17350 Breakdown early detection
17352 Breakdown early detection and monitoring
17360 Breakdown monitoring
17365 Chrome bath monitoring
17368 Roller emulsion control
17370 In-line surface inspection, optical
17380 Measuring instruments for quality management
17384 Mold control
17390 Length, speed and profile measuring systems
17400 Hole detection
17408 Surface inspection
17409 Surface inspection systems
17410 Surface inspection
17415 Surface inspection of strip steel
17426 On-line measurement of oils and waxes
17430 On-line surface inspection, optical
17432 On-line surface quality inspection, optical
17440 On-line roughness measurement
17445 Systems for quality data acquisition and processing

21.04. Quality control

17446 Strip edge inspection
17447 Strip steel surface inspection, automatic and complete
17448 Strip steel surface inspection, automatic and complete
17450 Quality control, visual
17460 Testing services

21.05. Services

17470 Metrology services

22 Materials testing

17473 Destructive and non-destructive materials testing

22.01. Non-destructive materials testing

17480 Consulting, execution, equipment
17490 Image processing, barcode readers
17500 Demagnetization equipment
17510 Internal pressure testing equipment
17520 Corrosion testing
17530 Measuring and testing machines
17536 Training and certification for NDT
17540 Ultrasonic testing equipment / machines
17560 Non-destructive testing of round and flat steel cables
17570 Non-destructive pipe testing equipment
17580 Non-destructive material testing equipment, general
17589 Non-destructive material testing equipment, acoustic
17590 Non-destructive material testing equipment, electromagnetic
17620 Non-destructive material testing equipment, optical
17630 Non-destructive materials testing with X-rays
17640 Non-destructive materials testing with acoustic emission analysis
17650 Non-destructive materials testing equipment with ultrasound
17660 Non-destructive materials testing
17664 Non-destructive materials testing with fluorescent and red / white penetrant methods
17665 Non-destructive material testing with fluorescent and red / white test method
17670 Non-destructive materials testing with coupling agent-free ultrasonic excitation
17680 Non-destructive materials testing, optoelectronic
17690 Non-destructive materials testing (service)

22.02. Strength testing, endurance testing

17698 Fixtures for tensile testing
17700 Stress analyses and reliability tests on machines and components
17710 Consulting, execution, equipment
17720 Fatigue testing machines
17730 Hardness testers
17740 Hardness testing equipment
17750 Machines for tensile test preparation
17760 Friction and wear testing machines
17770 Crack testing machines
17780 Pipe testing presses
17790 Torsion testing machines
17800 Universal testing machines for tension, compression, bending and tensile tests

22.03. Technological testing methods, testing service

17810 Chemical analyses
17820 Grain size analysis
17830 Mechanical-technological testing
17840 Metallographic testing
17850 Technological testing
17852 Technological testing, microscope image analysis
17860 Deep drawing testing machines for sheets and strips
17870 Conversion of conventional universal testing machines to electronic measurement with data processing
17880 Roll testing (concentricity, eccentricity)

22.04. Destructive material testing

17888 Corrosion testing
17890 Machines for the production of notched bar impact specimens

22.05. Fatigue testing

17896 Testing of safety valves in operating condition

22.06. Damage analysis

17898 Damage analysis

23 Analysis and laboratory equipment

17900 Engineering and technical assistance

23.01. Sampling and sample preparation

17910 Gas probes, gas sampling probes
17915 Sampling
17920 Sampling equipment
17940 Sample punching
17950 Sample transport
17960 Sample preparation
17970 Sample preparation for X-ray fluorescence analysis
17980 Sample preparation for OES and XRF (X-ray testing)
17990 Sample preparation machines
18000 Spectrometer sample preparation with remelting equipment
18010 Punching tools for samples

23.02. Analytical equipment

18020 Analytical instruments
18022 Devices for inline concentration measurement of liquids
18025 Analyzers for oxygen measurement

18027 Automated analyzers for process control and wastewater management
18030 Automation equipment for analysis and laboratory
18040 Gas analyzers
18048 Laser induced fluorescence
18050 Laser plasma spectrometer
18059 Mass spectrometers
18060 Conductivity and pH measuring instruments
18070 Oil-in-water monitoring in the laboratory and in industry
18080 Optical emission spectrometers
18090 O2 analyzers
18100 Plasma spectrometers
18105 X-ray diffractometers
18110 X-ray fluorescence spectrometer
18120 X-ray fluorescence spectrometers, portable
18130 Oxygen probes
18138 Heavy metal analysis in water, laboratory, field, process and online
18140 Nitrogen analyzer system for direct determination
18150 Nitrogen probes
18160 Hydrogen analysis system for direct determination
18170 Hydrogen probes
18180 Accessories for analytical technology

23.03. Laboratory equipment, general

18190 Analytical standards
18200 Analytical reference material
18202 Equipment for sample preparation for OES and XRF (X-ray testing)
18210 Calibration samples
18220 Annealing boxes
18230 Laboratory furnaces
18240 Laboratory equipment
18250 Laboratory automation
18260 Shuttles
18264 Shuttles and HF crucibles for C+S determination
18270 Spectral samples
18280 Crucibles

23.04. Metallography

18290 Services
18300 Metallography equipment
18310 Metallographic laboratories
18320 Metallographic testing

24 Environmental protection and disposal

18330 Consulting and measurement
18340 Engineering and technical assistance

24.01. Dedusting and gas cleaning

18342 Exhaust gas technology
18348 Oxygen sensors for exhaust gas
18350 Exhaust systems
18360 Exhaust gas cooling systems
18362 Exhaust gas cooling with heat recovery
18370 Exhaust gas cleaning systems
18375 Secondary exhaust gas cleaning systems
18376 Sintered exhaust gas cleaning systems
18377 Desulfurization of sinter flue gases
18378 Exhaust gas cleaning for pellet plants
18380 Waste heat boiler
18390 Aerosol separation
18400 Treatment of dusts from steel mills and foundries
18410 Electrostatic precipitator
18420 Dedusting and gas cleaning
18430 Dedusting plants and accessories, general
18440 Dedusting filters and plants (cassette, cartridge, round, bag, pocket filters, etc.)
18450 Denitrification plants
18460 Denitrification catalysts (DENOX)
18470 Fine dust removal for sinter plants
18480 Filter media
18490 Gas recovery plants
18500 Fabric filters
18510 Casting shop dedusting
18515 Blast furnace exhaust gas cleaning
18520 Hot gas filtration
18530 Industrial vacuum cleaners
18535 Catalytic plants
18536 Catalyst service
18540 Compact air cleaner
18550 Laser Clean Box
18560 Air filters (also in-line filters)
18570 Multicyclones and cyclones
18580 Afterburning, catalytic
18590 Afterburning, thermal
18600 Wet dust collectors
18608 Wet dedusting systems
18610 Wet fine dust removal for sinter plants
18615 Wet electrostatic precipitators
18620 Wet cleaning plants
18630 Flue gas desulfurization for boiler and sinter plants
18640 Flue gas cleaning plants for waste and hazardous waste incinerators
18650 Dust collectors
18660 Dust measuring devices
18670 Dust recovery plants
18690 Thermal exhaust air purification
18693 Dry exhaust gas cleaning plants
18700 Dry dedusting plants (also rotary flow dedusters)
18710 Dry cleaning plants
18720 Venturi dust collectors
18728 Central exhaust systems
18730 Central dust extraction plants

24.02. Waste water treatment

18740 Waste water plants, grease separators, chemical pumps
18750 Waste water treatment
18755 Waste water treatment, thermal
18756 Wastewater treatment for wastewater containing oil and grease
18760 Wastewater treatment plants
18770 Chemical water treatment
18774 Evaporation plants
18790 Wastewater treatment plants
18800 Recirculation systems
18802 Recirculating water treatment
18810 Solvent recovery plants
18820 Neutralization and detoxification plants
18830 Sludge dewatering, mobile
18840 Sludge dewatering, stationary
18842 Water management

24.03. Regeneration plants

18870 Regeneration plants for pickling solutions
18880 Acid resistant collection cups and wall coatings with DIBt test mark
18890 Sand regeneration plants

24.04. Recycling and waste disposal

18900 Exhaust air purification
18910 Remediation of contaminated sites
18920 Plants for the recycling of raw materials (dusts)
18921 Plants for the recycling of residual materials
18922 Car recycling plants
18923 Electric arc dust recycling
18925 Biological exhaust air treatment
18930 Soil and groundwater remediation
18940 Flaring plants, thermal afterburning
18970 Injection plants for filter dust
18975 Injection plants for alloy and residual materials using oxygen burners
18980 Storage of substances hazardous to water
18990 Oil and grease removers
18997 Radioactive substances
19000 Residue-free vibratory grinding
19005 Slag processing (slag transport and recycling)
19009 Chimney construction
19010 Chimneys (also sheet metal chimneys)
19020 Separation of non-ferrous metals
19045 Plants for preparation and recycling of metallurgical residues
19050 Other disposal plants
19060 Recycling of residual materials (ashes, slags, dusts, sands)
19070 Rolling mill slag de-zincification
19072 Dezincification of metallurgical dusts
19080 Recovery of recyclable materials
19090 Fluidized-bed drying of steel mill sludges

24.05. Components

19110 Separators (gasoline, benzene, oil, water)
19114 Aerators and agitators
19120 Emulsion splitting plants
19130 Injection plants for processed, oil-containing mill scale sludges
19140 Injection plants for Carbo Fer
19150 Injection plants for PE granules
19160 Heat exchangers

24.06. Operating materials

19170 Activated carbon
19180 Lignite coke
19190 Oil binder
19200 Lubricants

24.07. Services

19210 Exhaust gas measurements
19220 Chemical and mineralogical analysis
19230 Emission measurements
19232 Simulation software for exhaust gas measurement with design and optimization of exhaust systems

25 Occupational safety and ergonomics

25.01. Occupational safety

19240 Occupational safety clothing
19260 Respiratory protection masks
19263 Fire blankets for welding work made of textile fabric
19266 Fire blankets and containers
19270 Gas detectors
19280 Heat protective clothing
19285 High temperature resistant and fireproof textile products
19289 Protective glass
19290 Industrial protective glass
19300 Light curtains for accident prevention and other applications
19305 Soldering protection mats made of textile fabric
19310 Furnace sight glass Neotherm®
19320 Safety edges
19330 Safety mats
19340 Welding protection glass Athermal®
19350 Welding accessories
19360 Dust measuring devices

25.02. Noise protection devices

19368 Hearing protection
19370 Noise reduction
19380 Industrial noise protection
19390 Noise protection devices
19400 Noise monitoring
19410 Level recorder
19420 Sound insulation
19430 Sound level meter
19432 Sound insulation

26 Other products

19440 Aluminium and zinc slug production

26.01. Foundry products

19450 Stainless steel mold casting
19460 Stainless steel shell mold casting
19470 Stainless steel centrifugal casting
19490 Investment casting by the lost wax process
19500 Cast iron with spheroidal graphite (ductile iron)
19510 Cast iron with lamellar graphite (gray cast iron)
19520 Cast iron shape casting
19530 Continuous cast iron
19540 Chilled cast iron
19550 Heat resistant cast iron
19560 Gravity die casting
19570 Copper and copper alloy castings
19580 Light metal castings
19590 Machine mold casting
19610 Acid resistant castings
19630 Centrifugal casting
19640 Heavy metal casting
19660 Steel casting
19670 Wear-resistant casting

27 Consulting, planning and services

19695 Hot tapping under pressure
19700 Fittings service
19710 Training and further education of welding personnel
19715 Consulting, planning and services
19720 Consulting services
19721 Consulting for optimization of weighing systems
19730 Consulting service
19731 Procurement, eProcurement
19734 blended learning
19740 Services, quality assurance
19750 Emission measurements
19760 Energy consulting
19770 Energy saving
19780 Energy service (optimization, recovery, supply)
19790 Decoating
19792 Spare parts for commissioning
19794 Commissioning
19810 Engineering services (also commissioning of metallurgical plants as well as conveyor and drive technology plants)
19815 Engineering problem solving
19820 Maintenance organization
19822 Cooling and boiler water treatment
19824 Lean management
19825 Leak sealing under operating pressure
19830 Logistics consulting
19832 Logistics services, steel logistics
19840 Contract annealing
19850 Contract annealing (own mobile annealing facilities)
19860 Management consulting
19875 On-site machining (milling, drilling, turning, grinding, etc.)
19880 Assembly and maintenance
19890 Marketing services
19892 Offline Maintenance
19893 Online Maintenance
19895 Quality management consulting
19900 Experts
19910 Cutting and welding consulting
19920 Welding research and education
19930 Simulation studies and software
19935 Software for metalworking
19940 Supplier of spare parts, equipment and accessories for the steel industry, general
19950 Radiation
19952 Radiation protection
19955 supply chain management
19960 Digitalization consulting
19970 Software solutions for digitalization
19980 Digitization analysis
19990 Technical translations and documentation
20000 Training and commissioning of metallurgical plants
20005 Management consulting
20010 Leasing of electronic measuring equipment, data technology and computers
20015 Continuing education
20016 Continuing education - refractory
20020 Certifications

28 Steel in civil engineering

28.01. Software for building and construction

20050 Cad software

28.02. Steel in building construction

20058 Structural steel
20070 Hall gates
20086 Pipelines

28.03. Steel in civil engineering

20100 Offshore technology
20106 Tubes
20108 Micropiles
20110 Anchorages
20112 Sheet piling

30 Service concerning steel materials

20135 Processing services

30.01. Joining

20178 Soldering

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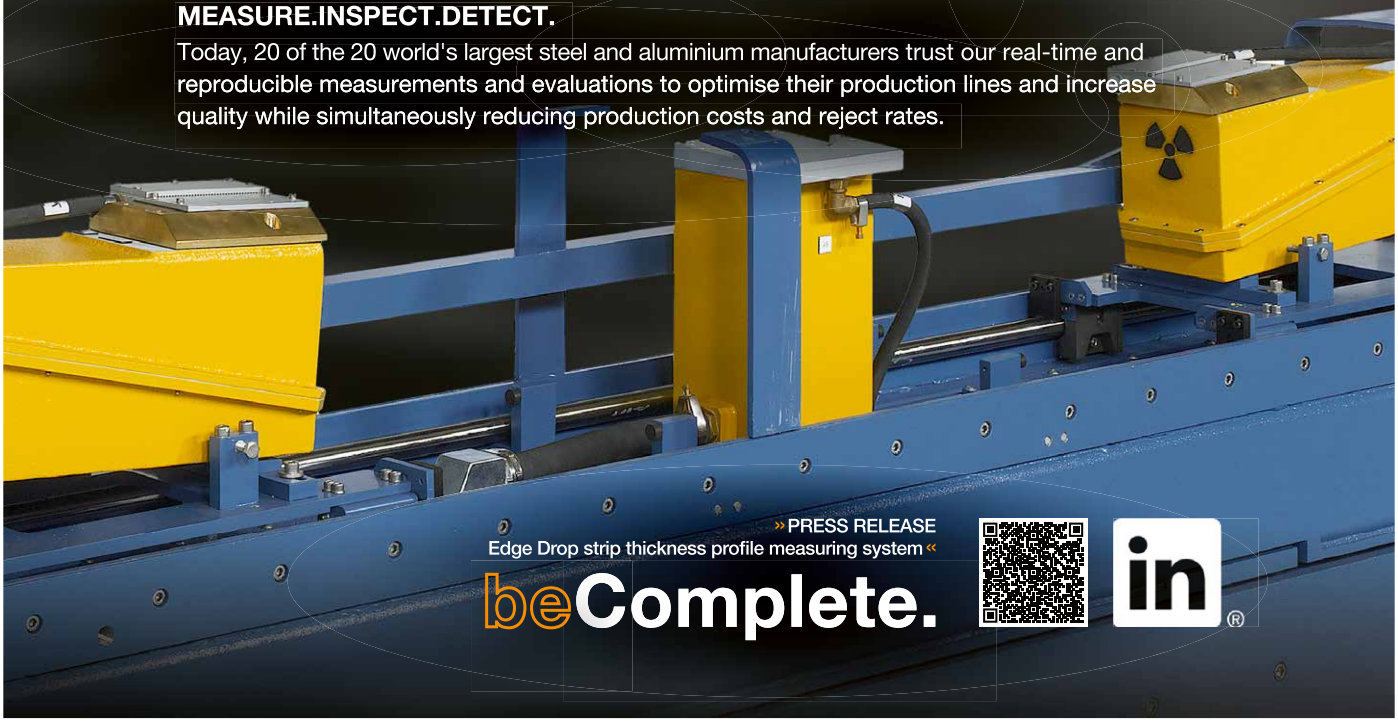
WELCOME TO THE WORLD OF MEASUREMENT

The most important parameter for the end product in cold rolling mills is the strip center thickness. Our Edge Drop strip thickness profile measuring system has three measuring heads, one measures the strip center thickness. Special feature are the outer measuring heads, which move independently of each other for automatic tracking and measurements of the strip edges with high resolution.

- Exact determination of strip edge thickness profile as well as centreline thickness reduces the scrap rate when trimming cold-rolled steels
- At the same time, it is possible to control the rolling mill automatically with the help of the measurement results via a closed loop control, resulting in further optimisation of the production process
- Rolling mills produce cost-efficiently and according to the highest quality standards, delivering a flawless starting product to specification to the processing industry
- The amount of trimmed material can be determined precisely from the measurement reports, which significantly reduces the scrap rate

MEASURE.INSPECT.DETECT.

Today, 20 of the 20 world's largest steel and aluminium manufacturers trust our real-time and reproducible measurements and evaluations to optimise their production lines and increase quality while simultaneously reducing production costs and reject rates.



» PRESS RELEASE
Edge Drop strip thickness profile measuring system «

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GREEN STEEL: WORKING TOGETHER FOR A SUSTAINABLE FUTURE

At GMH Gruppe, we are pioneers in sustainable steel production. Our Green Steel empowers customers to decarbonize their products, reducing carbon footprints and contributing to a cleaner, greener future. Together, let's shape a sustainable tomorrow.

Georgsmarienhütte Holding GmbH
Neue Hüttenstraße 1
49124 Georgsmarienhütte
www.gmh-gruppe.de

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