Issue October 2025

STEEL+ TECHNOLOGY

04/25

THE TECHNICAL MAGAZINE FOR IRON AND STEEL PROFESSIONALS AROUND THE WORLD

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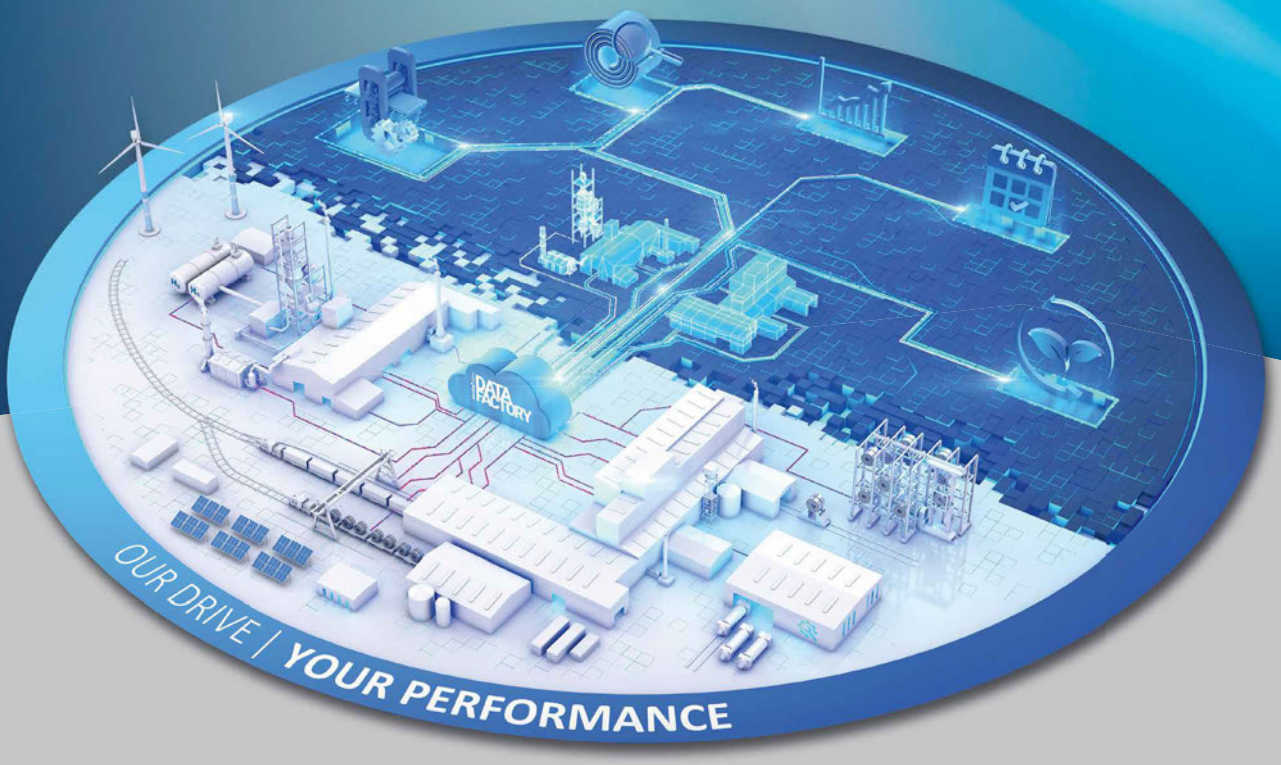
SMS group

Integrated Lifecycle Partnership



To be the leading partner for our customers in this transformation, SMS group bundles all competencies from electrics/automation, digitalization, and technical service. Our goal is to maintain and expand the performance of our customers' plants throughout their entire lifecycle. Together with our customers, we develop integrated solutions specifically geared to the customer's use case. In doing so, we focus on crucial KPIs such as plant availability, product quality, productivity, or delivery reliability but also on increasingly relevant topics such as sustainability and safety.

Innovations for the green transition

Arnt Hannewald,
Dipl.-Ing., Editor

Algoma Steel, a Canadian steel company, is clearly one of the frontrunners in the green transformation. The transition from the traditional BF-BOF route to electric steelmaking was realised faster in Sault Ste. Marie, Ontario, Canada than in other places. In 2021, Algoma Steel announced plans to replace its two coal-fired blast furnaces with electric arc furnaces. Now, four years later, the company has reached a significant milestone in its shift towards electric steelmaking: EAF #1 has successfully produced its first batch of liquid steel (see **page 20**). Combined with Ontario's low-carbon power, Algoma Steel will soon be among the greenest producers of flat-rolled steel in North America. In my estimation, the keys to such rapid progress in the transition are as follows: Firstly, Algoma has focused on liquid steel production and relied on proven, state-of-the-art meltshop technology: just two new EAFs that melt recycled scrap. Secondly, Algoma's meltshop will be fed primarily with scrap or metallics sourced from the market, eliminating the need to set up a DR plant, which would require a supply of natural gas or hydrogen, as well as specific ore requirements.

Advanced iron ore beneficiation technologies are under development for the latter. In particular, the cold agglomeration technology developed by Binding Solutions Ltd in England has been featured several times in STEEL + TECHNOLOGY. These pellets can be used as an alternative to standard induration and sinter materials in blast furnaces and direct reduction (DR) plants. Compared to traditional induration and sinter processes, BSL's cold agglomerated pellets drastically reduce energy usage and CO_2 emissions. This technology has now taken two important steps towards industry implementation. German company Salzgitter AG has chosen to trial such pellets in industrial ironmaking operations (i.e. in blast furnaces and direct reduction plants; see **page 36**). BSL is also considering building a large-scale pellet plant at the Port of Rotterdam in the Netherlands.

Steel industry professionals continue to be innovative and frequently meet at conferences and exhibitions. The German steel industry will meet in Essen on 13 November for their annual national gathering. This event shouldn't be missed out on. Online registration is still open.

21 Nippon Steel and U.S. Steel finalize historic partnership

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61 Mill Steel's new production facility is located at The Port of Houston

Weathering steel is used as construction material for the new Huikku Bridge in Finland 68

STEEL DISTRIBUTION

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SGJT and Yukun are enjoying their QSP-DUE plants operating in coil-to-coil, semi-endless and endless mode, based on HRC market requests.
The Nucor Steel QSP-DUE plant is under construction.

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QSP PLANTS

SMS GROUP MOURNS THE LOSS OF HEINRICH WEISS

Heinrich Weiss, entrepreneur and long-standing CEO of SMS group, passed away aged 83. Jochen Burg, CEO of SMS group: "Heinrich Weiss was a true role model. An extraordinary entrepreneur, he transformed a mid-sized Siegerland company into a global market leader in machine and plant engineering for the steel industry. Our thoughts are with his family, and he will be greatly missed."

Heinrich Weiss remained closely involved in the company's development until recently. For more than five decades, he led the family business as its fourth-generation head. The company's origins trace back to his great-grandfather, Carl Eberhard Weiss, who opened a forge in Siegerland in 1871 that eventually became Siemag (Siegener Maschinenbau) AG. After completing engineering studies in Munich, Heinrich Weiss joined the company in 1968 and was appointed Chairman of the Managing Board in 1971. Under his leadership, the company entered a period of strong growth and global expansion. 1973 marked the company's merger with Schloemann, based in Düsseldorf. The company's further development was shaped by major acquisitions, notably Mannesmann Demag in 1999 and Luxembourg-based Paul Wurth in 2021.

Heinrich Weiss had been the driving force and the face of SMS Group for decades (Picture: SMS group)

Until 2024, Heinrich Weiss served as the sole chairman of the Family Foundation and carefully prepared the generational transition. Beyond his dedication to the company, Heinrich Weiss also served for decades on economic policy bodies, leading the China Working Group of the Asia-Pacific Committee of German Business from 1982 to 1997, acting as Federal Chairman of the CDU Economic Council from 1983 to 1988, and presiding over the Federation of German Industries (BDI) from 1991 to 1992. Among other appointments, he served on the supervisory boards of Deutsche Bahn, Commerzbank and Bertelsmann, and on the Board of Directors of Bombardier.

Johannes Frauendörfer, Chairman of the Weiss Family Foundation Board: "Heinrich Weiss was not only a significant entrepreneur but also a person of clarity, integrity, and passion. His life's work is inextricably linked to SMS. As the Foundation Board, we will carry forward his legacy responsibly, with future generations in mind."

SMS group

NEW CEO AT THYSSENKRUPP ROTHE ERDE

Dr. Lisbeth Jacobs is the new Chief Executive Officer of thyssenkrupp Rothe Erde, succeeding Winfried Schulte who recently retired.

Winfried Schulte began his career in 1992 as a trainee at the then Hoesch Rothe Erde in Dortmund and went on to hold various leadership positions over the years. In 2013, he was appointed chair of the management board of thyssenkrupp Rothe Erde, a leading manufacturer of large-diameter slewing bearings and seamless rolled rings, serving key industries such as energy, mechanical engineering, infrastructure, mobility, and aerospace.

Dr. Lisbeth Jacobs succeeds Winfried Schulte as Chief Executive Officer of thyssenkrupp Rothe Erde (Picture: thyssenkrupp Decarbon Technologies)

His successor, Dr. Lisbeth Jacobs, holds a PhD in materials engineering and brings more than 25 years of international leadership experience across Europe, Asia-Pacific, North and South America, and the Middle East. She has held senior positions in the metals industry, construction and building materials, agricultural technology, as well as in innovation and sustainability management. Holding both Belgian and New Zealand citizenship, Jacobs combines a strong international outlook that has shaped her entire career.

The thyssenkrupp business Rothe Erde belongs to the Decarbon Technologies segment of thyssenkrupp together with the businesses Uhde and Polysius as well as the majority stake in thyssenkrupp nucera.

thyssenkrupp Decarbon Technologies


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PRIMETALS
TECHNOLOGIES

ZEKELMAN INDUSTRIES MAKES LEADERSHIP APPOINTMENTS

Steel pipe and tube manufacturer Zekelman Industries has named Jeff Cole Chief Operating Officer and appointed Chris Hoyt President of Atlas Tube.

Jeff Cole will oversee operations for all pipe and tube divisions, including plant operations and engineering functions. As the operations leader, he will partner closely with business unit presidents to align operational strategies and drive execution of their organizational objectives. Jeff Cole began his career with Atlas Tube as a mill operator and is a 32-year veteran of the company, most recently serving as President of Atlas Tube.

Chris Hoyt succeeds Jeff Cole as President of Atlas Tube. In this role, he will be responsible for the overall success of Atlas Tube with direct oversight of sales, service, and production planning teams. Chris Hoyt joined Zekelman in 2022 as Vice President of Sales, Atlas Tube.

Zekelman

CHAMPION IRON ANNOUNCES DEPARTURE OF CHIEF FINANCIAL OFFICER

Donald Tremblay, Chief Financial Officer of Champion Iron, will be departing the company. A global search is being undertaken for a new CFO. In the interim period prior to the nomination of a new CFO, certain of the company's executives will have direct oversight of the CFO responsibilities. Champion's CEO, David Cataford, said: "As an integral member of our executive team since 2022, Donald participated in the achievement of several milestones for our company, including progression of the Kami iron ore project and the ongoing construction of the direct reduction pellet feed project."

Champion Iron

LESS AISBL APPOINTS NEW SECRETARY GENERAL

Dr. Carmen Ostwald has been appointed as the new Secretary General of LESS aisbl. She succeeds Martin Theuringer, who has played a significant role in the setup of the Low Emission Steel Standard (LESS).

Dr. Carmen Ostwald has extensive experience in the European steel industry. As Secretary General, she will play a pivotal role in shaping and executing the strategic vision of LESS aisbl. Her responsibilities include expanding membership across the steel value chain and fostering collaboration with industry, government, and standardisation bodies. The ultimate aim is to establish LESS as a recognized benchmark in public and private procurement, making it easier for consumers to identify and trust low emission steel based on a transparent and credible standard.

Martin Theuringer is leaving LESS to take up the position of Managing Director at the Federal Association of the German Foundry Industry.

Dr. Carmen Ostwald, the new Secretary General of LESS aisbl (Picture: LESS)

LESS aisbl

UK STEEL APPOINTS NEW CHAIR

Tata Steel UK's chief executive, Rajesh Nair, has been appointed the new Chair of UK Steel, the trade association for the UK steel industry.

A graduate in electrical engineering from the Indian Institute of Technology, Rajesh Nair has held several senior operational and commercial roles across Tata Steel. Since joining Tata Steel UK as Chief Operating Officer in 2021 and becoming CEO in 2023, he has played a central role in reshaping the business and advancing its transition to low-CO_2 steelmaking. Rajesh Nair is a board member of Tata Steel UK and also chairs Surahammars Bruks in Sweden.

Tata Steel

LEADERSHIP CHANGES AT U. S. STEEL

U. S. Steel has appointed Kevin Lewis as Executive Vice President and Chief Financial Officer and Tubular Solutions, and Scot Duncan as Senior Vice President, General Counsel & Secretary.

Kevin Lewis joined U. S. Steel 17 years ago, holding key positions across finance, strategy, investor relations, and financial planning & analysis. Scot Duncan has worked collaboratively across the organization for a decade providing counsel on commercial, corporate, and transactional matters.

U. S. Steel also announced that Jessica Graziano, Senior Vice President and Chief Financial Officer, and Duane Holloway, Senior Vice President, General Counsel & Chief Ethics & Compliance Officer, will be departing the company.

U. S. Steel

BOSNIA AND HERZEGOVINA

ArcelorMittal sells Bosnian operations

ArcelorMittal has signed a sale and purchase agreement to sell its operations in Bosnia and Herzegovina. ArcelorMittal Zenica, an integrated steel plant, and ArcelorMittal Prijedor, an iron ore mining business that supplies the Zenica plant, will be sold to Pavgord Group.

ArcelorMittal has made considerable investments and efforts to keep the Zenica and Prijedor operations within the group. However, after a thorough strategic review, the company concluded that a sale is the best solution for the development of the business and its people.

Under the terms of the transaction, ArcelorMittal's shares in ArcelorMittal Zenica and ArcelorMittal Prijedor will be sold to Pavgord Group, and all employees' jobs are transferred to the new owner. The deal is expected to close before the end of 2025, subject to merger control clearance and the fulfilment of all conditions precedent. Until then, all operations of the company will continue as usual, with the full support of the local management team and the company leadership team.

"ArcelorMittal acknowledges the support of the government of Bosnia and Herzegovina, and the government of the Federation and Republika Srpska, during the 21 years that the company has been operating in the country. We thank all our employees at ArcelorMittal Zenica and ArcelorMittal Prijedor for their hard work and passionate engagement during all these years," commented Sanjay Samaddar, Vice President ArcelorMittal and Chief Executive Officer, ArcelorMittal Europe – Long Products.

ArcelorMittal

FINLAND

Blastr Green Steel announces strategic investment to minimize water usage and discharge

Blastr Green Steel has announced a new strategic investor in its latest round of financing. In addition to investing in the project, Ecolab has commenced the design of, and intends to subsequently build and operate, the water management system at Blastr's 2.5-million t/year steel plant in Inkoo.

Ecolab is a global leader in water, hygiene and infection prevention solutions and services, operating in more than 170 countries. Its Nalco Water business provides sustainable water solutions to steel companies and other customers around the world designed to reduce water usage, maximize production process water reuse and wastewater recycling, and minimize treated effluent discharged.

The parties will work together to minimize seawater intake, seawater discharge, and heat load to the sea with potential reductions estimated at up to 85-90%. Further advances will be explored through innovative stormwater integration and the use of municipality.

Mark Bula, CEO of Blastr Green Steel: "Even though our water treatment plan was deemed acceptable by the Finnish authorities as part of the Environmental Impact Assessment (EIA), we want to do even better. We have listened to our community and to Inkoo's elected leaders." Blastr will shortly launch its Series A investment round through its recently announced financial advisor, the U.S.- and London-based Evercore. globally competitive and low-carbon industry."

Blastr / Ecolab

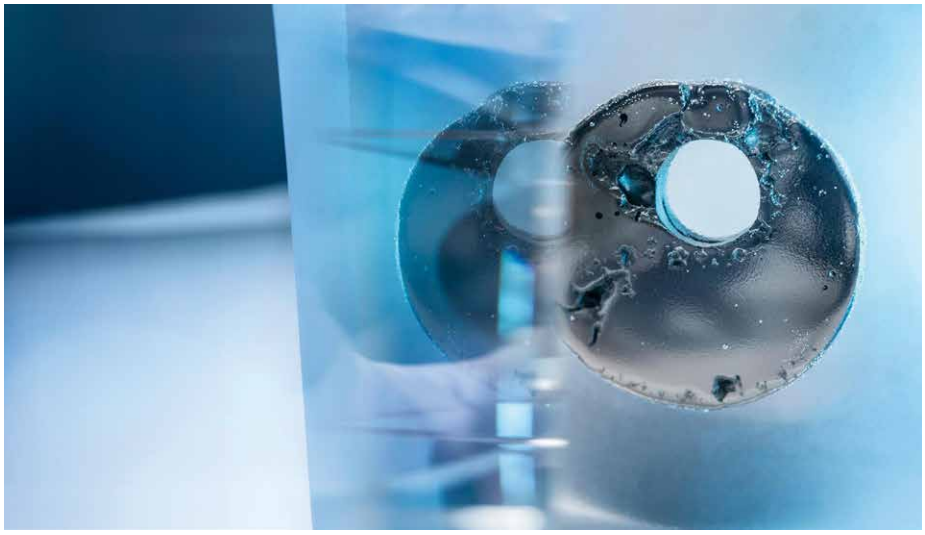
FINLAND

Outokumpu and Boston Metal sign MoU to optimize metals production

Outokumpu has signed a Memorandum of Understanding (MoU) with Boston Metal to enhance the production of critical carbon-free metals vital for industries such as defense and aerospace.

Under the MoU, the companies intend to initiate a joint development project related to the use of Outokumpu's high-quality chromium material in critical components of Boston Metal's proprietary Molten Oxide Electrolysis (MOE) technology and to further improve the efficiency and circularity of Outokumpu's operations.

As part of the agreement, Boston Metal will evaluate and test their MOE technology with the aim of further improving side-stream recycling within Outokumpu's operations and improving Outokumpu's overall circularity approach. Outokumpu will provide chrome-oxide and chromium feedstock which originated from their Kemi mine in Finland to Boston Metal with the aim to help expand and further secure the supply chain for its inert anode, which is an essential component of the technology.



Chromium metal produced in Outokumpu's R&D lab (Photographer: Valokuvaaja)

Boston Metal's technology electrifies metals production, directly eliminating carbon emissions and enabling a zero-carbon pathway when paired with renewable energy. The company is currently commissioning its first commercial plant in Brazil for the production of high-value critical metals, such as niobium and tantalum. In parallel, the modular MOE technology is being scaled for high-volume applications, like iron and steel.

Outokumpu / Boston Metals

FRANCE

Marcegaglia places order for minimill project in Fos-sur-Mer

Marcegaglia and Danieli have signed an agreement to initiate the engineering phase of a flat-product minimill project in Fos-sur-Mer. Danieli will deliver a fully automated minimill that will include all the production equipment for scrap preparation, electric steelmaking, slab casting and hot-strip rolling.

Named the Mistral Project, the new minimill will produce up to 2.1 million t/year of stainless and carbon steel hot-rolled coils to supply the Marcegaglia cold-rolling complex in Ravenna, covering around 30% of the company's overall hot strip demand.

The new electric steel meltshop will feature a Danieli Fastarc Zerobucket furnace, equipped with continuous scrap charging and the Tornado preheating system, and Q-Melt adaptive process control with auto-pilot. Liquid steel will be processed into quality grades by twin-ladle refining stations and twin-tank vacuum degassers, ensuring high energy efficiency and reduced carbon and NO_x emissions. Danieli Automation will provide advanced process control for the mill. Danieli's scope of supplies also includes advanced water- and fume-treatment systems. .

The single-stand caster will produce 200 to 250-mm-thick carbon steel slabs, partly feeding the new hot-strip mill and partly supplying the Marcegaglia plate mill in San Giorgio di Nogaro, Italy.

The minimill, which is expected to start production by mid 2028, will be designed to permit Marcegaglia highly flexible production, thanks to an integrated Steckel mill and hot-strip mill setup within a single configuration. It consists of a roughing stand and a five-stand finishing mill, with the first stand adaptable for Steckel operation. Such arrangement will enable the rolling of stainless-steel slabs from the Marcegaglia Sheffield plant in Steckel mode, and of carbon-steel slabs from the caster in continuous mode through the five-stand finishing mill.

Danieli

GERMANY

SHS Group and Verso Energy sign hydrogen contract

SHS - Stahl-Holding-Saar Group, with its shareholdings Dillinger, Saarstahl and Rogesa, has concluded a long-term contract with energy company Verso Energy for the annual supply and purchase of at least 6,000 t of "green" hydrogen. With the conclusion of this Franco-German contract, Verso Energy and the SHS have thus given the green light to the regional, cross-border hydrogen economy.

Rogesa launched a closed tender process in March 2024 for procurement of regionally produced "green" hydrogen. As a result of this regular tender, Verso Energy and Rogesa have agreed on an annual supply of at least 6,000 t of hydrogen over a period of ten years starting in 2029.

Verso Energy will supply Saarland's steel industry with hydrogen certified as renewable fuels of non-biological origin. This certification guarantees that the hydrogen was produced using renewable electricity. Using these initial quantities of hydrogen, along with steel scrap and a new plant technology consisting of a direct reduction plant and electric arc furnace at the Dillingen site and an electric arc furnace at the Völklingen site, SHS can achieve the targeted reduction of its carbon emissions by up to 55% by the early 2030s, in line with funding requirements.

Verso Energy will produce the hydrogen with the Carling Hydrogen Next Generation project in Carling, France. In a first step, Verso Energy is planning to build an electrolyzer, which will be powered by electricity from renewable sources. The hydrogen produced is fed into the Moselle-Saar hydrogen conversion pipeline network, transported to the Dillingen steel plant, and used there for the production of CO_2-reduced steel. SHS laid crucial groundwork for the strategic expansion of the regional hydrogen economy when it commissioned the pipeline network in April 2024. It is being built by network operators Creos Deutschland Wasserstoff and NaTran Deutschland.

Jonathan Weber, Managing Director of SHS and Member of the Board of Management of Saarstahl and Dillinger, commented on the contract: "We are confident that we have found a strong partner in Verso Energy to make our entry into hydrogen-based steel production for Saarstahl and Dillinger at the Saarland site a success. With this contract, we have secured the first quantities of hydrogen for the SHS Group and have thus achieved another milestone for our Power4Steel decarbonization project."

SHS – Stahl-Holding-Saar / Verso Energy

GERMANY

thyssenkrupp Steel and Smart Steel Technologies launch intelligent scheduling system

thyssenkrupp Steel, in collaboration with Smart Steel Technologies, is taking a major step toward the future of steel production with the launch of an intelligent scheduling system for its extensively modernized production network in Duisburg - Bruckhausen.

The new system ensures highly efficient processes to provide high-quality products to customers. The software solution now automatically schedules one of the most advanced plant networks in the European steel industry. This network includes the new continuous casting line No. 4, the completely modernized hot strip mill No. 4, and the slab storage facility. The system is automated, featuring fast reactive scheduling. This lifts the level of production planning automation at thyssenkrupp Steel to a new level. The future maintenance and further development of the system will be handled by Smart Steel Technologies.

thyssenkrupp Steel / Smart Steel Technologies

SMS group enters into strategic partnership with The Systems Group

SMS group is entering into a strategic partnership with The Systems Group, a US American company offering services specifically for the steel industry. This collaboration marks a major step forward in delivering safer, more sustainable, and lower-maintenance solutions for steelmaking plants operating with electric arc furnaces and secondary metallurgy units.

The strategic partnership between SMS group and Systems drives safety and sustainability in steelmaking (Picture: SMS group)

At the heart of the partnership is the Spray-Cooled® technology, a patented system developed by operators in the 1980s and owned by The Systems Group since 1999. The technology has become a globally trusted standard in cooling systems for steel mills, particularly those using electric arc furnaces. Now, through this agreement, SMS will offer Spray-Cooled® EAF roofs, sidewalls, hoods, and ducts as part of its integrated plant solutions – for new installations and upgrades at steelmaking sites worldwide.

Unlike traditional tubular cooling systems, Spray-Cooled® operates at atmospheric pressure, eliminating the risk of high-pressure water leaks, which are among the most serious safety hazards in melt shops. The technology also offers significant benefits in terms of heat retention, reduced emissions, energy efficiency, and ease of maintenance. Its flexible design adapts to a wide range of furnace geometries, making it ideal for steel producers prioritizing uptime and a long equipment life.

Andrea Lanari, Vice President Metallurgy at SMS, says, "At SMS group, our mission is to deliver the best to our customers – not only in performance and efficiency, but also in workplace safety and sustainability. Partnering with The Systems Group allows us to bring a proven, field-tested technology to our customers that aligns with these values."

SMS group / The Systems Group

GERMANY

Feralpi inaugurates new rolling mill

ESF Elbe-Stahlwerke Feralpi officially inaugurated its new "Walzwerk B" rolling mill in Riesa. The mill, supplied by Danieli, connects directly to an existing conticaster via a 300-m hot-charge roller table.

Guests attending the inauguration ceremony at ESF Elbe-Stahlwerke Feralpi (Picture: Danieli)

The rolling mill is comprised of 16 housingless stands, a six-pass, multidrive finishing block and a spooler line. The K-Spooler produces deformed bars from 8 to 25 mm in diameter and twist-free spooled coils in coils weighing from 2.5 to 8 t.

Traditional gas heating has been replaced by induction heating for zero direct CO_2 emissions.

Endless rolling is enabled by means of efficient billet head-to-tail welding using a Danieli continuous welder of the 6th generation. The Danieli multistage soft quenching process provides improved and more uniform metallurgical characteristics than achievable with the re-coiled process. Big data and artificial intelligence implemented by Danieli Automation ensure real-time connection between the existing caster and the new mill, reducing heating energy consumption and dynamically regulating the thermo-mechanical process for the best final product quality.

Danieli

Buderus Edelstahl to sell two business units to GMH Gruppe

GMH Gruppe is acquiring two business units of Buderus Edelstahl in Wetzlar, a wholly owned subsidiary of Mutares: the hot rolling mill for large, rolled steel dimensions and the machining and heat treatment facilities for highly complex open-die forged parts.

The two operations will become part of GMH Gruppe, while the remaining business units will stay under the ownership of Mutares. The transaction is subject to various closing conditions, which are expected to be fulfilled in the fourth quarter, thus enabling the legal completion of the acquisition.

With the integration of Buderus Edelstahl, GMH Gruppe continues to pursue its strategic growth agenda. "The machining and heat treatment of highly complex open-die forgings, as well as the hot rolling mill for large dimensions, are a perfect fit with our strategic business areas: circular economy, green steel and heavy forging," said Dr. Alexander Becker, CEO of GMH Gruppe.

In addition, Buderus Edelstahl's drop forging division will be sold to the FerrAl United Group, a 100% subsidiary of the Mutares Group. According to current plans, the remaining divisions will cease operations in the fourth quarter of 2025.

Buderus Edelstahl / Mutares / GMH Gruppe

GMH implements new integrated production planning system

As part of a comprehensive digital transformation project, Georgsmarienhütte GmbH (GMH) has successfully implemented a demand and sales planning system from PSImetals at its steel plant.

The integrated production planning system supports end-to-end planning across the company's supply chain and production units. With the PSI software solutions, accurate due date confirmation of sales order entry can now be provided within a few minutes. In addition, the system enables an optimized production mix, as rolling and annealing lines are aligned more effectively with production orders to better fulfill customer demand. A scenario-based sales & operations planning process allows GMH to evaluate and compare multiple forecast and planning scenarios based on KPIs as well as strategic planning. This enhances seamless transition to detailed operational scheduling. The solution is based on a modern architecture using the PSImetals service platform and features real-time integration with SAP via standardized interfaces.

PSI

GERMANY

thyssenkrupp Steel to modernize slab sizing press

thyssenkrupp Steel has awarded Primetals Technologies a contract to modernize the slab sizing press at its hot-strip mill No. 2 in Duisburg. The modernization will ensure increased equipment availability and secure a future-proofed supply of spare parts. Startup is scheduled for the third quarter of 2026.

The upgrade of the slab sizing press will increase machine availability (Picture: Primetals Technologies)

This order follows a successful upgrade by Primetals Technologies at thyssenkrupp Steels' hot-strip mill No. 4. The new project includes a comprehensive upgrade of the electrical and drive systems. Implementation and startup services are also part of the scope.

The drive system of thyssenkrupp Steel's slab sizing press is divided into two groups: a main drive powered by a cycloconverter, and several supporting drives for the pinch rolls, gap adjustment, and roller table. All converter technologies for these drives will be renewed while most existing transformers and motors will be retained, significantly reducing capital expenditure. Primetals Technologies will also design a tailormade cooling solution for the drive room. Based on a closed-loop air-to-water system at the drive cabinets, this setup provides efficient cooling and improves overall energy efficiency. An arc fault protection system will be installed to quickly extinguish arc flashes, enhancing safety for both personnel and equipment.

Primetals Technologies

ITALY

Novastilmec and Danieli to partner in downstream finishing lines

Novastilmec and Danieli have reached a cooperation agreement, under which Danieli is acquiring 30% of the shares of Novastilmec, a company located near the lake of Lecco in northern Italy.

Established in 1978, Novastilmec specializes in high-performance processing lines for steel, aluminium, brass, copper and titanium coil strips. The partnership will allow Novastilmec to expand its business volume, and Danieli to expand the range of its activities in the field of downstream finishing of steel and nonferrous flat products. This cooperation will also enable both companies to expand their business towards downstream service centres worldwide.

Danieli / Novastilmec

Arvedi AST to upgrade continuous annealing and pickling line

Stainless steelmaker Arvedi AST has entrusted Fives with the upgrade of its continuous annealing and pickling line to increase line productivity and eliminate the current limitations of the furnace when transitioning between different products.

To ensure a more balanced flow across the production chain, Fives proposed installing technology, such as Celes EcoTransFlux™, a transverse flux induction heater. This highly compact system is designed for rapid heating at extremely high temperatures, even for non-magnetic steel grades. Adding this rapid heating technology to the annealing section will speed up the process and increase the output of the line. Induction technology is also environmentally friendly, as it significantly reduces NO_x and CO_2 emissions.

Major improvements will also be achieved by means of a digital solution to control the heating section. The Virtuo™-L thermal process solution will be installed to decrease fuel consumption and improve mechanical properties through precise transition management. This industry-proven solution is based on predictive modelling to automatically adjust the heating power and improve the temperature transitions of the strip, resulting in fewer coil rejections and lower gas consumption. In addition, an AI-based cooling model will be introduced to regulate the cooling speed of the strip.

Fives

ITALY

Cogne Acciai Speciali and CVA sign energy release contract

An energy release contract has been signed between renewable energy company CVA and Cogne Acciai Speciali. This contract is part of a broader collaboration between the two companies aimed at supporting the region's green energy transition.

Under the Energy Release scheme, a mechanism introduced by Italy's Ministry of the Environment and Energy Security, Cogne Acciai Speciali will request the advance of 272,075 MWh of electricity from the GSE – Gestore dei Servizi Energetici, which manages incentive mechanisms aimed at promoting the development of energy efficiency and renewable sources. The energy obtained from the GSE will then be repaid over 20 years through the commissioning of new renewable energy plants to be built and managed by CVA.

Through this partnership, CAS and CVA strengthen their leading roles in the energy transition, contributing to the goals of the Regional Energy and Environmental Plan and the European Green Deal. Cogne Acciai Speciali will benefit from enhanced energy performance and a reduced environmental impact of its production, in line with the Memorandum of Understanding signed with CVA in December 2024. CVA will construct four new photovoltaic plants in Sicily, with a total capacity of over 20 MW and an estimated renewable energy output of 593,600 MWh, expected to be fully operational by 2026.

Cogne Acciai Speciali / CVA

SPAIN

Celsa Barcelona issues FAC for upgrade of medium section mill

SMS group has successfully completed the upgrading of Celsa Barcelona's medium-section mill. The entire modernization of the mill's Level 2 automation was executed without interrupting ongoing production.

Celsa Barcelona's medium section mill produces a variety of long rolled products, including beams, angles and channels (Picture: SMS group)

The upgrade involved a crucial overhaul of the automation systems to maintain the mill's competitive edge and improve its operational efficiency. Since its original design and commissioning by SMS group in 2001 and modernization in 2020, the mill, which has an annual capacity of approximately 900,000 t, has played a crucial role in providing high-quality long rolled products such as beams, angles, and channels for the construction industry.

The goal of this modernization was to replace the previous Level 2 automation system, which had become a security risk due to outdated operating systems and development tools. By implementing state-of-the-art automation technologies, Celsa Barcelona aimed to secure long-term operational stability and maintain continuous production efficiency. The new X-Pact® Level 2 system features an open software architecture, ensuring ease of maintenance and extensibility, while allowing for seamless integration of additional functionalities and digitalization with minimal effort. With the tandem mill in particular, the implementation of X-Pact® Vision webHMI plays a crucial role by consolidating information from each section onto a single screen. This significantly streamlines operations compared to the previous setup, which required two to four screens, thereby markedly improving productivity and decision-making processes.

SMS group

SWEDEN

SSAB secures additional green financing for Luleå

Following the successful debt raising at the end of April 2025, SSAB has secured an additional EUR 430 million green financing to support its transformation project in Luleå, which will involve the construction of a state-of-the-art minimill.

The latest financing is backed by the German Export Credit Agency Euler Hermes and complements earlier support from the Swedish National Debt Office (Riksgälden), Italian Export Credit Agency (SACE), and the Nordic Investment Bank. Crédit Agricole CIB structured the transaction.

The loans are structured under the green loan principles, in line with SSAB's green and sustainability-linked finance framework. "Securing this final piece of the financing marks a key milestone in our transformation journey," said Leena Craelius, CFO of SSAB. "With this new green loan, we have now completed the financing package needed to deliver the Luleå transformation. It reflects strong support from our partners". The investment in Luleå will enable SSAB to accelerate the product mix improvement and virtually eliminate all CO_2 emissions from production at Luleå.

The new mill will have a capacity of 2.5 million t/year with two electric arc furnaces, advanced ladle metallurgy and an integrated rolling mill. The investment also includes a cold rolling complex, advanced galvanizing, as well as continuous annealing and is key to re-position SSAB Europe as a maker of premium products. When the new minimill is completed, SSAB will close the current blast furnace-based production system.

SSAB

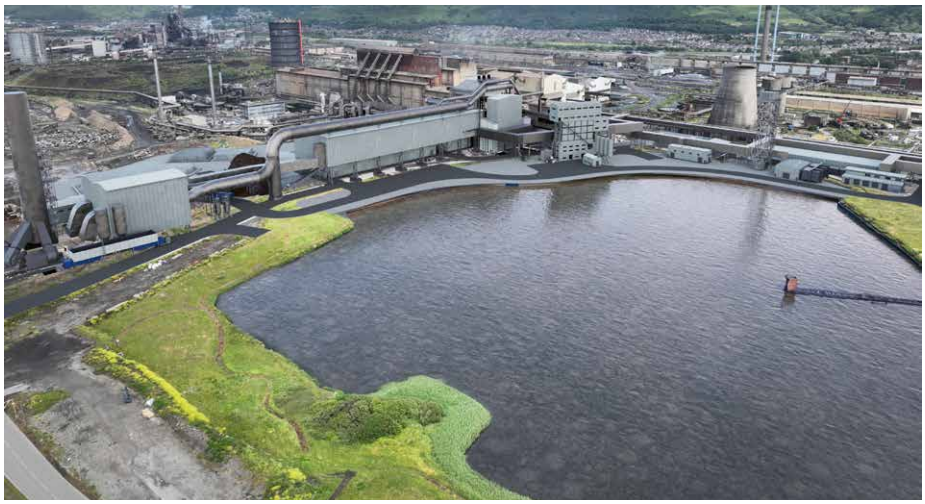
UNITED KINGDOM

Tata Steel places electrification and production technology order for Port Talbot

Tata Steel has appointed ABB to deliver essential electrification and advanced process technologies for the company's low CO_2 steel transformation at its Port Talbot site in Wales.

The contract forms part of Tata Steel's more-than-a-billion investment in sustainable steelmaking, which includes the construction of a new 320-t capacity electric arc furnace to be supplied by Tenova, based on a contract awarded by Tata Steel in October 2024.

ABB will supply high- and low-voltage switchgear, power and distribution transformers, and digital control systems. As part of the deal, ABB will also supply its ArcSave® electro-magnetic stirring system – known as Consteerrer® – under a wider contract with technology partner Tenova. The commissioning of ABB's technologies is scheduled for 2027 to align with full operational startup of the EAF at Port Talbot in 2028.



Computer graphics of the future EAF steel plant to be built at the Port Talbot site
(Picture: Tata Steel UK)

ABB / Tenova

BROWNFIELD TRANSITION PROJECT

Algoma Steel achieves milestone in transformation to EAF steelmaking

Algoma Steel, a leading Canadian producer of hot- and cold-rolled steel sheet and plate products, has successfully produced the first liquid steel from Unit One of its new electric arc furnace (EAF) facility

First heat achieved in Unit One of the Danieli Digimelter facility(Picture: Danieli)

One of two new Danieli Digimelter EAFs at Algoma Steel in Sault Ste. Marie, Ontario, Canada, melted and poured the first liquid steel in August. Moving away from the former BF-BOF technology, Algoma Steel will use recycled scrap metal as the main feedstock for the new EAFs, while retaining the flexibility to incorporate a wide range of other iron inputs. Once completed, Algoma's transformation will represent the first major brownfield project in North America to transition from integrated to electric steelmaking.

Digimelter #1 is part of Algoma's new green steel shop supplied by Danieli. The facility is designed with an annual production capacity of 3.7 million tons of liquid steel, supported by two 250-ton EAFs. Both EAF's will be powered by Q-One digital power systems, each delivering more than 150 MVA. The melt shop will also leverage two existing **ladle furnaces**, along with a new Danieli twin-tank **vacuum degasser**, enabling the production of exceptionally clean steel.

By adopting advanced melt shop and refining technologies, Algoma is expected to reduce carbon emissions by approximately 70%. When powered with Ontario's clean electrical grid the company is well-positioned to become a leading North American green steel producer.

The Danieli-patented Q-One **power feeder** enables continuous frequency variation throughout the melting phases, enhancing energy efficiency and reducing electrode consumption. In addition to minimizing impact on the power grid, Q-One enables direct use of renewable energy resources for electric steelmaking. The process is further optimized through the Danieli Q-Melt **automatic process control suite**, which ensures consistent energy efficiency.

The twin-tank vacuum degasser, equipped with oxygen-blowing, will support the production of advanced steel grades and further improve product quality of coil and plate applications.

The melt shop's design prioritizes **environmental performance**, with engineered enclosures surrounding the two furnaces to reduce noise and emissions. Two new off-gas fume treatment plants, including baghouses and a dedicated recirculating water-treatment plant, will provide industry leading filtration, emission control, and water conservation.

Algoma's transition also includes an automated scrapyard, featuring automated cranes, scrap visual recognition, and automated scrap sorting and charging, enhancing both safety and operational efficiency.

Danieli

THE INTERNATIONAL MERGER IS FINALLY ON THE WAY

Nippon Steel Corporation and U. S. Steel finalize historic partnership

U.S. Steel retains its name and headquarters and continues manufacturing products under the slogan "Be Mined, Melted, and Made in America." The companies are forging ahead together as a global steelmaker.

Employees working at the U. S. Steel Gary Works pig iron caster (Picture from the archives: U.S. Steel)

After U.S. President Trump had approved the partnership of Nippon Steel Corporation and U.S. Steel the companies entered into a National Security Agreement ("NSA") with the U.S. Government. The NSA provides that new investments will be made and includes various commitments (see below). Along with President Trump's Executive Order, the companies had completed the U. S. Department of Justice review process. Finally, all necessary regulatory approvals for the partnership had been received.

Protect and create over 100,000 jobs. In mid-June, the companies announced the finalization of their historic partnership. Together, Nippon Steel and U. S. Steel have become a world-leading steelmaker. This partnership will protect and create more than 100,000 jobs* through massive investments in steelmaking across the United States, including in Pennsylvania, Indiana, Arkansas, Minnesota, and Alabama. The partnership ensures that U. S. Steel will retain its iconic name and headquarters in Pittsburgh, Pennsylvania, and that its products will continue to be mined, melted, and made in America for generations to come. Takahiro Mori, Nippon Steel's Representative Director and Vice Chairman, will serve as Chairman of the Board of U. S. Steel.

The U.S. Government and the companies have agreed to measures to protect U.S. national security, including, among others, the following commitments by the companies:

- Investment: Nippon Steel will make approximately US$11 billion in new investments in U. S. Steel by 2028, which includes an initial investment in a greenfield project that will be completed after 2028;
- U.S. Headquarters: U. S. Steel will remain a U.S.-incorporated entity and will maintain its HQ in Pittsburgh, PA;
- U.S. Board: A majority of the members of U. S. Steel's board of directors will be U.S. citizens;
- U.S. Management: U. S. Steel's key management personnel, including its CEO, will be U.S. citizens;
- U.S. Production: U. S. Steel will maintain capacity to produce and supply steel from its U.S. production locations to meet market demand in the U.S.; and
- Autonomous Trade: Nippon Steel will not prevent, prohibit, or otherwise interfere with U. S. Steel's ability to pursue trade action under U.S. law.

Pursuant to the NSA and through the ownership of the Golden Share, the U.S. Government will have certain rights, including, among others the right to appoint one independent director; and consent rights of the President of the United States, or his designee, on specific matters, including:

- Reductions in the committed capital investments under the NSA;
- Changing U. S. Steel's name and HQ;
- Redomiciling U. S. Steel outside of the United States;
- Transfer of production or jobs outside of the United States;
- Material acquisitions of competing businesses in the United States; and
- Certain decisions on closure or idling of U. S. Steel's existing U.S. manufacturing facilities, trade, labor, and sourcing outside of the United States.

This framework will enable Nippon Steel to secure management flexibility and profitability at U. S. Steel while protecting U.S. national security.

With this partnership, the Nippon Steel Group's annual crude steel production capacity is expected to reach 86 million tons, bringing it closer to Nippon Steel's global strategic goal of 100 million tons of global crude steel production capacity.

** The total jobs figure includes direct, indirect and induced jobs.*

U.S. Steel / Nippon Steel

THE AMERICAS – BRAZIL

Primetals Technologies opens new service workshop

Primetals Technologies has recently inaugurated a new service workshop in Santa Cruz, Rio de Janeiro. The almost 8,000 m² facility is strategically located near several major steel producers.

In addition to its core business of caster roll maintenance and nickel plating, the new workshop introduces innovative coating technologies for flat rolling mills, galvanizing lines, and other critical equipment. It is equipped to handle maintenance work for hot and cold rolling mills, as well as galvanizing line rollers. Advanced technologies such as laser cladding and high-velocity coating systems (HVOF and HVAF) enable precise and durable refurbishments. Additionally, the site includes a state-of-the-art mechatronics and hydraulics test centre.

The workshop also supports the repair of critical components for industries beyond steel, including mining, oil and gas, wind energy, and paper production. It leverages advanced digital tools to automate workflows, enhance traceability, and ensure rigorous quality control. Operational activities are fully tracked and documented, providing customers with reliable, real-time data and complete transparency throughout every step of the repair process.

The newly opened service workshop in Santa Cruz, Rio de Janeiro (Photo: Primetals Technologies)

Primetals Technologies

THE AMERICAS – CANADA

Canadian Steel Producers Association responds to government plan

The Canadian Steel Producers Association (CSPA) has responded to the package of new and future measures announced by the Canadian government to address the steel sector's concerns.

According to a statement released by Catherine Cobden, President and CEO of the Canadian Steel Producers Association (CSPA), Canadian steel producers face a dire situation. The unjustified tariffs by the United States have delivered a significant blow to the Canadian steel industry. The tariffs were initially set at 25% and then adjusted to 50%.

"A newly proposed border measure – a tariff rate quota (TRQ) – has been announced that will continue to allow high levels of foreign steel into our country tariff-free," continues the statement. "The industry had asked repeatedly for significantly lower import levels on unfair traders to regain market share at home. In its current form, the TRQ will do little to support our industry. While our sector applauds the proposal for additional measures to fight global overcapacity with our melted and poured policy, the government's plan to implement these only in the coming weeks is at odds with the extreme urgency we are feeling."

"The government has set a 30-day deadline for a new economic and security relationship with the United States. We appreciate the government's plan to reinstate a strong counter tariff package on the US depending on how those discussions progress. It remains a fact however that significant volumes of US steel continue to enjoy the privilege of entering Canada tariff-free while we face a 50% tariff that has essentially closed the US market to the Canadian industry. It is our sincerest objective to work with the government constructively to find a path forward that supports our country and our industry as quickly as possible."

Canadian Steel Producers Association

THE AMERICAS – MEXICO

Tyasa orders bar drawing technology

Tyasa has ordered a new, patented pinion/rack drawing bench for the production of high-quality steel bars from Danieli Centro Maskin.

The new 60 t bar-to-bar drawing line, which will be installed at Tyasa's Veracruz plant, will process bars having diameters from 18 to 65 mm, at working speeds up to 35 m/min. The supply will include a loading area, a shot blasting unit, a 60 t double-strand drawing bench, a cut-to-length unit, a fully electric chamfering unit, non-destructive testing equipment and an automatic packing and unloading area. New mechanical solutions and process control will contribute to a drastic reduction in noise and optimized power consumption. Integrated into a user-friendly interface, Danieli Automation advanced process control and devices will make operations easier and safer. All the equipment, to be manufactured at Danieli workshops, will be put into operation by mid 2026.

Danieli

THE AMERICAS – USA

ArcelorMittal completes acquisition of Nippon Steel's interest in AM/NS Calvert

In accordance with the definitive equity purchase agreement signed between ArcelorMittal and Nippon Steel Corporation in October 2024, ArcelorMittal has completed the acquisition of Nippon Steel Corporation's 50% equity stake in AM/NS Calvert. The facility, now renamed ArcelorMittal Calvert, was originally acquired by ArcelorMittal and NSC in 2014 from ThyssenKrupp.

The operation originally commenced operations in 2010 and has a flat rolled steel capacity of 5.3 million t/year. Its steel finishing facilities include a state-of-the-art hot strip mill designed to roll advanced high strength steels, line pipe and stainless products, a continuous pickling line and a coupled pickle line-tandem cold mill optimized for automotive production, including exposed parts, as well as coating and continuous annealing lines.

Since the acquisition in 2014, significant investments have been made to improve operational efficiency and enhance product offerings to the U.S. automotive and energy markets. Strategic investments include additional slab bays and cranes, a state-of-the-art logistics center to support high-volume pipe production and increased coil size, capability enhancements to the three coating lines and the continuous annealing line, and the new steelmaking facility with the capacity to produce 1.5 million t/year of low CO_2 steel. Commissioning and first heat were completed in June 2025. In addition, a new seven-year domestic slab supply agreement with Nippon Steel has commenced, averaging 750,000 t/year, ensuring a significant portion of the slab requirements are melted and poured in the United States.

In February 2025, ArcelorMittal announced to construct an advanced, non-grain-oriented electrical steel (NOES) manufacturing facility at the same site in Calvert, Alabama. Production is expected to start in 2027.

ArcelorMittal

Atlas completes acquisition of Evraz North America

Atlas Holdings has completed the acquisition of Evraz North America, producer of engineered steel products in the United States and Canada, and announced the formation of Orion Steel.

Orion Steel includes Rocky Mountain Steel Mills in Pueblo, Colorado; Oregon Steel Mills in Portland, Oregon; Interpro Pipe and Steel in Regina, Saskatchewan; and locations across Alberta, Canada. Collectively, the companies operate two electric arc furnace steel facilities, twelve steel product mills and 17 scrap recycling facilities and have a steelmaking capacity of 2.3 million t and finished steel capacity, including tubular products, of 3.5 million t. Orion Steel products regularly contain 98%+ recycled scrap material. Rocky Mountain Steel is solar-powered and the largest rail supplier in North America. Leading the newly created Orion Steel as Chief Executive Officer is former U.S. Steel executive Doug Matthews.

Atlas Holdings / Orion Steel

THE AMERICAS – USA

ArcelorMittal invests in electric heating and thermal energy storage technology

Through its XCarb® innovation fund, ArcelorMittal has made an investment in Electrified Thermal Solutions and signed a MoU with the company to trial electric heating and thermal energy storage technology.

ArcelorMittal's innovation fund, launched in 2021, invests in companies developing disruptive technologies that have the potential to support the decarbonization of steelmaking.

Originating at Massachusetts Institute of Technology and developed over the past decade, Electrified Thermal's patented firebricks sit at the heart of its Joule Hive™ Thermal Battery system, a stack of electrically and thermally conductive firebricks in an insulated steel container. It charges by running renewable electricity directly through the bricks, storing low-cost, carbon-free thermal energy at temperatures proven up to 1,700°C. The thermal energy is then discharged by running air or gas through the brick channels, providing heat to industrial applications, such as hot stoves in a blast furnace, reheating slabs before rolling, and heat treatment in finishing processes such as quenching or annealing. The system therefore holds the potential to be a key enabler for decarbonizing the steelmaking process and reducing reliance on fossil fuels to create thermal energy.

Construction is underway on a 1 MW/5 MWh commercial demonstration plant at the Southwest Research Institute in Texas, with commissioning scheduled for the second half of 2025. Alongside the investment, ArcelorMittal and Electrified Thermal have signed a Memorandum of Understanding to explore technology validation tests at ArcelorMittal's GasLab facility in Asturias and pilot deployment pathways within ArcelorMittal operations.

ArcelorMittal / Electrified Thermal Solutions

Cleveland-Cliffs starts up new stainless bright anneal line

Cleveland-Cliffs has commissioned its new state-of-the-art vertical stainless bright anneal line at its Coshocton Works facility in Coshocton, Ohio.

The new annealing line uses a 100% hydrogen atmosphere, replacing the conventional acid-based processing, and includes a hydrogen recovery unit to recycle hydrogen and use a 50/50 mix of new and used hydrogen in the process. Cleveland-Cliffs produces value-added sheet products, particularly for the automotive industry. The company is vertically integrated from the mining of iron ore, production of pellets and direct reduced iron, and processing of ferrous scrap through primary steelmaking and downstream finishing, stamping, tooling, and tubing.

Lourenco Goncalves, Cliffs' Chairman, President and CEO said: "Since acquiring AK Steel in 2020, our stainless steel business has been the most consistent profit generating unit for Cleveland-Cliffs. By using hydrogen and advanced automation, we're dramatically improving the quality and productivity of this critical product that our customers rely upon Cleveland-Cliffs for."

Cleveland-Cliffs

FalconPoint acquires industrial services company

Private equity firm FalconPoint has acquired various operating segments of Scrap Metal Services LLC, a provider of outsourced services to steel mills.

Founded in 2008, Scrap Metal Services is a leading provider of industrial services, including site environmental services and scrap and slag management, to steel mills within the United States, Europe, and South America. The company also provides marine vessel decommissioning services to the United States Maritime Administration along with other commercial maritime companies. The investment underscores FalconPoint's commitment to investing in businesses that provide mission-critical products and services across essential sectors in the United States and globally.

FalconPoint / Scrap Metal Services

THE AMERICAS – USA

Vinton Steel places order for walking hearth furnace

Vinton Steel has signed a contract with Tenova to deliver a state-of-the-art walking hearth reheating furnace, marking a further step in the companies' ongoing technological collaboration.

The new furnace will be engineered to meet the demanding process requirements of high-carbon steel billets used to manufacture large-diameter grinding media. Vinton Steel, the U.S. subsidiary of Kyoei Steel, is a regional leader in this product segment, which is currently experiencing strong demand, particularly from the mining sector.

Designed to operate alongside the new Green CityMill™ Flex – a recently announced project that will increase Vinton Steel's rebar production capacity up to 400,000 t/year – the new reheating furnace will play a key role in supporting the company's growth strategy. "This project is part of the strategic expansion of Kyoei Steel in the vital North American market," said Masahiro Kitada, Board Director & Executive Managing Officer for Kyoei Steel Group and Chairman of Vinton Steel.

The new reheating furnace will be equipped with sophisticated control systems and Tenova's proprietary low-NO_x burners. It will enable Vinton Steel to broaden its grinding media product range while meeting the most stringent environmental regulations. The furnace is scheduled for commissioning in parallel with the Green CityMill™ Flex startup in the first half of 2027.

Tenova

ASIA – CHINA

Baosteel upgrades hot strip mill gearbox

SMS group has successfully completed the gearbox modernization in Baosteel's high-capacity hot strip mill in Shanghai, as planned, during the mill's scheduled annual overhaul.

With the completion of a critical overhaul of the gearboxes in the 2,050-mm hot strip mill at Baoshan Iron & Steel in Shanghai, SMS group has brought a significant maintenance project to a successful conclusion. The service package performed by SMS included the online measurement and adjustment of the gearboxes on both sides of the slab sizing press, disassembly, offline inspection and testing, and the replacement of the bearings on the input and output shafts. Baosteel thanked SMS group's service team for the competent and efficient execution, with no additional downtime required for the upgrade.

Overhaul of the gearboxes in the 2,050-mm hot strip mill at Baoshan Iron & Steel
(Picture: SMS group)

As one of the key projects in Baosteel's maintenance campaign, SMS delivered end-to-end support – from initial technical consultation and meticulous planning to on-site installation guidance and commissioning. The team's highly professional competence ensured accurate disassembly and reassembly, comprehensive inspections of key components, including housing deformation and wear analyses, gear flank testing, and dynamic balance verification of synchronizing shafts. These detailed evaluations enabled a full assessment of the condition of the gearboxes and provided vital data for Baosteel's long-term maintenance strategy.

Baosteel's 2,050-mm hot rolling line was commissioned in 1989 with equipment supplied by SMS. The slab sizing press, also delivered by SMS, was installed in 2013, further enhancing the mill's capabilities. Since its inception, the cumulative output up to 2011 exceeded 100 million t, reflecting its pivotal role in China's industrial landscape.

SMS group

ASIA – CHINA

HBIS Wuyang starts up continuous caster for ultra-thick slabs

Wuyang Iron and Steel and Primetals Technologies have recently achieved a milestone with the production of the first slab on Wuyang's new single-strand continuous caster at the plant in Wugang, Henan Province.

The new caster is engineered to produce ultra-thick slabs up to 460 mm thick, enabling Wuyang to meet the growing demand for advanced steel products in high-end industries like offshore wind power, nuclear power steel, pressure vessels, and engineering machinery. By partially replacing traditional ingot casting with this advanced slab caster, Wuyang Iron and Steel will significantly cut operational costs, even when producing challenging steel grades.

Primetals Technologies' Single Roll DynaGap segments make it possible to dynamically adjust each roll gap as production parameters change, such as steel grade, cooling rate, and casting speed. These segments deliver an impressive 5,000 kN of force per roll. This strong force helps create advanced internal microstructures in the slabs while maintaining consistently high mechanical properties. The caster will be used to process a wide range of steels, including low-carbon, micro-alloyed, austenitic and martensitic stainless, peritectic and high-strength low-alloyed grades.

The caster also features a new, innovative method from Primetals Technologies for setting up the ideal caster-roll geometry right from the design stage. This approach reduces unsteady bulging, allowing for faster casting speeds and greater productivity. Primetals Technologies' continuous bending and straightening concept works together with a dry-casting machine design that uses Eco-Star rolls to greatly improve slab surface quality. These rolls have an advanced internal cooling system, designed to handle the high temperatures needed to reduce surface defects during dry casting.

The new one-strand slab caster is designed for an annual capacity of 1 million t and slab sizes of 370 to 460 mm x 1,600 to 2,500 mm. It operates with a 12-m radius and a metallurgical length of 41.65 m

Wuyang Iron and Steel's new continuous caster is engineered to produce ultra-thick slabs up to 460 mm in thickness (Picture: Primetals Technologies)

Primetals Technologies

ArcelorMittal Jinxi orders tandem mill project

ArcelorMittal Jinxi New Materials has awarded Danieli the order for a six-stand cold strip mill. The mill, to be installed in Changzhou, Jiangsu Province, will process high-grade non-oriented silicon steel for electric vehicle applications.

To meet stringent requirements for ultra-thin gauges, high precision, and specialized temperature control for silicon steel production, the mill will consist of six 6-high stands and include features such as a proprietary small workroll diameter plus a large-stroke shifting system. These features ensure mill rigidity while precisely controlling edge drop and strip shape, reducing roll change frequency as a result. A dynamic roll and strip oil-lubrication system will guarantee stable, warm rolling while minimizing strip breaks. The DanJoint drive shaft system paired with an automatic thin oil-lubrication unit will lower crown gear wear and extend service life. Precision strip cleaning will efficiently remove residual oil at high speeds, while a smart self-inspecting selective cooling system will facilitate rapid nozzle status checks.

Soft magnetic materials for new energy applications are primarily used in motors, generators, and transformers, with NEV motors being a major application. ArcelorMittal Jinxi New Materials, a joint venture between ArcelorMittal and China Oriental Group, will produce high-grade non-oriented silicon steel strip as part of the New Energy Magnetic Material project. The new mill is planned to start operation in 24 months.

Danieli

ASIA – CHINA

Shougang Jingtang places continuous galvanizing line order

Shougang Jingtang has awarded SMS group the contract for a new continuous galvanizing line to be installed at its facility in Caofeidian. With an annual production capacity of 450,000 t, this project marks a significant expansion in Shougang's production capabilities, focusing on high-quality galvanized sheet for the automotive sector.

Teams from Shougang and SMS group gathering for the contract signing ceremony (Picture: SMS group)

The new continuous galvanizing line will be designed for high-speed production, handling strip thicknesses ranging from 0.4 to 2.3 mm and widths from 900 to 1,900 mm, with a process speed of up to 180 m/min. With this setup, Shougang Jingtang will further strengthen its position in the Chinese automotive product market.

SMS will supply the engineering, core equipment as well as the electrics and automation for the line. The scope of supply includes systems to ensure optimal surface quality, such as the FOEN air-knife system, which precisely controls coating thicknesses to meet the highest standards for automotive sheet. Additionally, a DUMA-Bandzink electrostatic oiling machine will complete the surface treatment process, guaranteeing exceptional quality results every time.

To achieve operational efficiency and ensure consistent monitoring, SMS is supplying its X-Pact® One Pulpit solution, providing centralized and intelligent operation of the line. This system features large screens and cameras along the line, allowing for integrated monitoring and continuous control of the entire process from a single operator room.

In addition to the full X-Pact® Level 1 and Level 2 automation, the scope of supply includes technological measuring devices, smart sensors, and robotic applications for maximum efficiency and process stability, all aimed at automating operations to a high degree. Tailored to Shougang Jingtang's requirements, a complete drive systems package ensures precise strip handling and consistent product quality at high production speeds. SMS's solution integrates advanced drive hardware with precise tension control and improved elongation accuracy, supporting stable processes and uniform product properties.

SMS group

Shandong Zhongxin to build new coupled pickling line and tandem cold mill

Shandong Zhongxin has ordered a coupled pickling line and tandem cold mill (PLTCM) from Primetals Technologies for its plant located in Lin Yi, Shandong Province. Startup is scheduled for early 2027.

Primetals Technologies will supply the complete PLTCM line, including mechanical and electrical design, site services, equipment supply, and complete Level 1 and 2 automation systems with comprehensive digitalization solutions. The pickling line will feature the energy-saving and highly efficient iBox pickling system, which increases capacity without the circulation pumps required in conventional jet pickling tanks. The line will also include a 5-stand, 6-high universal crown-control mill, ensuring high productivity, enhanced strip flatness and precise gauge control.

State-of-the-art digital solutions will boost productivity and reliability across the line. AI-driven process optimization and sophisticated automation systems will improve strip flatness and thickness control. The central operation cockpit and computer-vision-based digital assistants will allow a single operator to oversee multiple plant sections, reducing manual intervention and improving operational efficiency. The through-process quality control system will collect and store all quality-related data for long-term analysis and continuous improvement. Primetals Technologies' condition monitoring system will support safe, efficient plant operations and help maximize productivity.

The new line will enable Shandong Zhongxin to accelerate the development and production of high-quality, high-value-added products, expanding into the home appliances and automotive steel markets.

Primetals Technologies

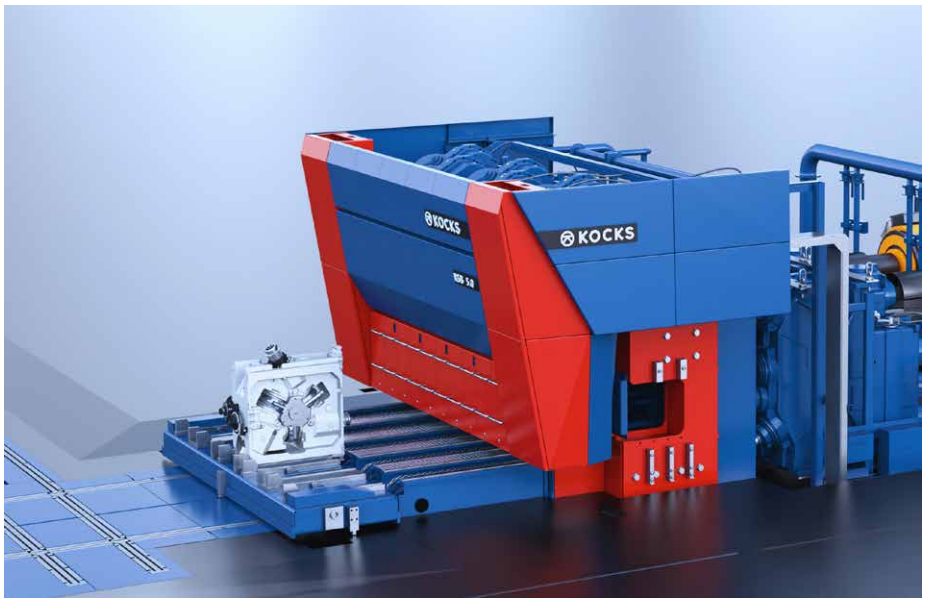
ASIA – CHINA

Lianxin orders reducing & sizing block for new SBQ line

Lianxin Iron & Steel has placed an order with Kocks for a reducing & sizing block 370++/4 of the latest 5.0 design. The order is part of a major investment in a new mill line aimed at enhancing the production portfolio with special bar quality (SBQ) long products.

Private steel producer Lianxin operates three rolling mills with a total annual capacity of 4 million t at its plant in Yancheng, Jiangsu Province. The Kocks RSB® 370++/4 will be part of a new SBQ line at Lianxin and integrated as a finishing block after 24 H/V stands. This allows the Lianxin to roll straight bars with maximum flexibility and highest precision, even with challenging production plans. Finished products include dimensions from 12 to 70 mm in diameter.

The proven 3-roll technology of the Kocks block allows for tight dimensional tolerances and superior surface quality. With fast stand changes and the one-pass family rolling philosophy, the equipment will make a significant contribution to productivity and operational excellence. Kocks' scope of supply includes the advanced remote control for automatic stand and guide adjustments. In the roll shop, the Bamicon Octopus software and hardware supports all setup processes. In addition to installation and commissioning, experts from Kocks will provide on-site training and advisory services for the technological equipment. Commissioning of the equipment is planned for the third quarter of 2026.



A reducing & sizing block of the type to be supplied to special steel producer Lianxin Iron & Steel (Picture: Kocks)

Kocks

New electric arc furnace at Zhejiang Yuxin Steel

Zhejiang Yuxin signed the final acceptance certificate for the new Danieli electric arc furnace featuring innovative continuous scrap charging.

The Zerobucket EAF incorporates the Danieli-patented, Tornado preheating system. The continuous scrap-charge system includes a variable-geometry preheating zone to automatically adjust and adapt the free cross-section of the conveyor in order to create optimal conditions for fume speed, temperature and process control. The use of the dynamic, variable cross-section allows Zhejiang Yuxin to exploit the best pre-heating results with different scrap types available on the market, providing maximum purchase flexibility.

Electric arc furnace at Zhejiang Yuxin incorporating latest continuous scrap charging equipment (Picture: Danieli)

Danieli

ASIA – CHINA

Xinyu signs FAC for reducing & sizing block

Xinyu Iron & Steel has confirmed the successful completion of its Kocks RSB® 370++/4 project with the signing of the final acceptance certificate. This milestone marks the transition to full operation at the company's state-of-the-art SBQ bar mill in Xinyu City, Jiangxi Province.

Designed specifically for Xinyu Iron & Steel's requirements, the block is a key asset of the company's 560,000 t/year new greenfield SBQ mill. The RSB® 370++/4, installed after 22 H/V stands, produces straight bars in a finished diameter range from 20 to 90 mm with tight dimensional tolerances, excellent surface quality, and maximum production flexibility.

The signing of the FAC reflects the close and effective cooperation between Xinyu and Kocks during installation, commissioning, and ramp-up. With the reducing & sizing block now fully integrated into the rolling line, Xinyu is well positioned to expand its capabilities in SBQ production and strengthen its role as a premium supplier in the special steel market.

The FAC for the new reducing & sizing block marks the transition to full operation of Xinyu's SBQ mill. (Picture: Kocks)

The Kocks' scope of supply also included roll shop equipment, automation and software solutions, as well as the remote control for automatic stand and guide adjustment. The Bamicon Octopus software and hardware ensures smooth workflows and efficient setup procedures in the roll shop.

Kocks

ASIA – INDIA

Jeevaka Industries orders billet caster and high-speed rebar outlet

Steel producer Jeevaka Industries has commissioned Primetals Technologies with the implementation of a 3-strand billet caster and a high-speed rebar outlet at its new steel mill in Hyderabad, Telangana. Startup is scheduled for the first half of 2026.

The billet caster, supplied by Concast India, a wholly owned subsidiary of Primetals Technologies, will produce 100 to 200-mm square sections. The mechanical scope of supply also encompasses a dummy bar system, a ladle sequencing car and a hydraulic hot billet shear. Featuring a high-speed cutting mechanism, the billet shear ensures faster processing of billets while minimizing waste and operational costs.

The new single strand rebar outlet will be able to roll 350,000 t/year of 8 to 40 mm rebar at a speed of 45 m/s. The supply includes an 8-stand eDrive Morgan No-Twist Mill, shearing systems, a Morgan water box with trough, delivery pipes, two bar-braking pinch rolls, and a rotary entry system, all of which incorporating Level 1 automation for the full mill. Utilizing individually driven stands, eDrive provides infinite processing flexibility per stand, reducing both capital and operational expenditures for bar, rebar, and wire rod mills.

Primetals Technologies

ASIA – INDIA

JSW Steel Salem to receive advanced process automation

JSW Steel Salem has awarded Primetals Technologies a contract to implement advanced process optimization solutions at the Salem plant in the state of Tamil Nadu. The digitalization project includes the installation of comprehensive process automation systems at the meltshop and casting areas.

The complete meltshop of JSW Steel Salem will be equipped with advance process automation systems (Picture: Primetals Technologies)

Primetals Technologies' scope of supply covers advanced process automation systems for the entire meltshop, including four ladle furnaces, two vacuum degassers, two energy optimization furnaces, and two 3-strand bloom casters.

The new systems will enable autonomous operation, minimizing manual operator input and stabilizing the production process through powerful metallurgical models and dynamic process control systems.

The intuitive user interface and well-balanced operator guidance will ensure consistent, reproducible results. The operator guidance feature is based on standardized production processes and meticulous calculations of all process steps, including cyclic online calculation of key process parameters like steel grade, slag composition, and temperature. The upgrades will increase JSW Steel Salem's production consistency, improve product quality, enhance operational efficiency, and reduce production-related costs.

Primetals Technologies

SAIL orders additional hot-blast stove for Rourkela steel plant

Steel Authority of India Limited (SAIL) has awarded Primetals Technologies the order to supply an additional hot-blast stove for blast furnace No. 5 at the Rourkela steel plant.

Internal-combustion stoves of the type now ordered by SAIL (Picture: Primetals Technologies)

The new internal-combustion-chamber stove will be supplied as a turnkey project, with Primetals Technologies being responsible for design, detailed engineering, equipment supply, construction, and full commissioning. The scope of supply includes the stove shell, refractories, electrical and automation equipment including field instruments, and an upgrade to the Level 1 automation system.

The internal combustion technology will feature an enhanced dome shape and construction, designed to manage expansion and high temperatures more efficiently.

In addition, the new unit will feature Primetals Technologies' burner design, which ensures a more stable flame. The additional stove will allow the Rourkela steel plant to carry out sequential repairs on existing stoves while maintaining production levels. Commissioning is planned for mid-2026.

Primetals Technologies

ASIA – INDIA

SAIL Bhilai Steel to upgrade plate mill

Steel Authority of India Limited (SAIL) is upgrading its plate mill in Bhilaihas with an accelerated cooling system from Danieli. This project will enhance the operational efficiency of the mill and expand the range of the grades produced.

The new, patented Danieli accelerated cooling system, Exstream II, consists of medium-pressure water headers dynamically controlled by a Danieli Automation cooling model. It is engineered to significantly optimize the cooling process for steel products, leading to improved metallurgical properties, reduced alloy use, and enhanced energy efficiency.

The use of the system makes it possible to attain superior mechanical properties and finer microstructure. Improved energy efficiency is achieved by avoiding additional off-line thermal treatment processes that require re-heating after the rolling process. Moreover, a more sustainable steel production process is accomplished through an optimized utilization of resources, meaning use of less additives. The new cooling system is scheduled to be in full operation by the end of 2026.

Danieli

Jindal Steel to modernize plate mill

Jindal Steel has tasked Primetals Technologies with supplying and implementing a comprehensive Level 1 and 2 automation system upgrade at its plate mill in Angul, Odisha Province.

The plate mill has a capacity of 1.2 million t/year and produces plates ranging from 5 to 350 mm in thickness and 900 to 4,800 mm in width. The upgrade will improve system availability and ensure a stable supply of spare parts.

Primetals Technologies will supply new hardware and migrate the existing application software for the mill's main rolling area. The upgrade includes the advanced Simatic S7-1500 control system and the latest WinCC software, both part of the totally integrated automation portal. The project also includes full virtualization of all servers, making lifecycle management of the automation infrastructure smoother and more efficient.

Key automation functions, including the human-machine interface, will be retained during the migration. As a result, operators and maintenance personnel will be familiar with the system from day one, allowing for a shorter ramp-up period and accelerating the return to full production.

Primetals Technologies

Jindal Steel's plate mill in Angul will be upgraded with a state-of-the-art automation platform (Picture: Primetals Technologies)

ASIA – INDIA

Mukand Sumi Special Steel to install new SBQ blooming mill

Mukand Sumi Special Steel has placed an order with Danieli for the supply of a new blooming mill to be installed at the Hospet plant in Karnataka, in the southwest of India.

The new SBQ blooming mill will integrate an existing mill and have a capacity of 300,000 t/year, rolling blooms measuring up to 380 mm by 420 mm. The rolled stock will be 160 to 180-mm square billets and 100 to 200-mm-dia finished round products. The investment will allow Mukand Sumi to expand its production capacity and optimize its product mix across sectors, such as automotive, engineering, bearings, oil and gas, energy and infrastructure, while improving yield and surface quality.

Danieli will provide the mechanical equipment, process control and electrics, medium-voltage motors, advisory and commissioning services, as well as on-site training. A disk saw for cutting the rolled billets and bars is also part of the supply. Most of the equipment will be manufactured and preassembled for easy installation at the Danieli India workshops in Andhra Pradesh. The new mill is scheduled to be operational by the end of 2026.

Danieli

Posco and JSW Steel sign HoA on new steel plant

Posco, South Korea, and India's steelmaker JSW Steel have signed a non-binding Heads of Agreement (HoA) to jointly explore setting up a 6 million t/year integrated steel plant in India.

This agreement builds on the memorandum of understanding signed by both parties in October 2024 and outlines the broad framework for the proposed 50:50 joint venture. As part of the next steps, Posco and JSW will undertake a detailed feasibility study to finalize the plant's location, investment terms, resource availability, and other critical factors. Given its natural resource base and logistical advantages, Odisha is among the key locations being considered.

Mr. Lee Ju-tae, Representative Director and President, Posco Holdings, said, "India is central to the future of global steel demand. Our collaboration with JSW is based on mutual trust and a shared long-term vision. This initiative represents our commitment to supporting India's industrial growth while creating long-term value for both organizations."

Mr. Jayant Acharya, Joint Managing Director & CEO, JSW Steel, said, "This partnership brings together Posco's technological leadership in steelmaking and JSW's proven execution capabilities and strong domestic footprint. The proposed venture will help create a globally competitive manufacturing hub to serve both domestic and export markets."

Posco

ASIA – JAPAN

JFE Steel awards contract for new meltshop

JFE Steel has selected Danieli as technology partner for its green transformation and greenhouse gas emission reduction plan. Danieli will supply a new, digitally controlled EAF and secondary refining stations to be installed at the JFE Steel West Japan works in Kurashiki.

The new meltshop will include a Digimelter®; Zerobucket EAF and a Digirefiner, both equipped with an advanced power supply system, to produce high-quality molten steel. The Q-One power feeder improves the efficiency of the operations by reducing power and electrode consumption, minimizing negative impacts on the power network, and increasing operational flexibility through a redundant architecture. It allows precise control of current, voltage and frequency in the electric arc furnace operation. Technology packages, including an automatic self-cleaning slag door, will reduce power-off time and improve safety around the EAF area. A primary fume-suction line will provide effective dedusting for the electric furnace. The new meltshop for JFE Steel is scheduled to be operational in the first quarter of 2028.

Danieli

ASIA – JAPAN

Tokyo Steel to upgrade hot-dip galvanizing line

Tokyo Steel is going to modify an existing hot-dip galvanizing line at its Okayama works into a continuous annealing and galvanizing line (CAGL). The project will be performed by Primetals Technologies, in collaboration with thermal technology provider Chugai Ro and electrification provider Hitachi.

Panoramic view of Tokyo Steel's Okayama works (Picture: Primetals Technologies)

The project will utilize annealing equipment already in place at the Okayama site. Key improvements include the installation of induction heating technology in the front section to boost heating capacity, along with enhanced cooling capacity in the latter section. These updates will convert the line into a versatile production facility capable of manufacturing both cold-rolled and hot-dip galvanized coil.

Primetals Technologies is responsible for engineering and equipment supply for terminal equipment and skin pass mill modifications. Together with its partners Chugai Ro and Hitachi, the company will also handle engineering and supply of the annealing furnace equipment, along with supervision services for installation and commissioning. The revamped line is scheduled to begin operations in the first quarter of 2027.

Primetals Technologies

ASIA – VIETNAM

Ton Dong orders cold-strip mill for new rolling complex

Ton Dong A has awarded Danieli the order for a new cold rolling mill, as part of a new cold rolling complex erected in Phu My, in southern Vietnam.

The twin-stand 4-high reversing cold-strip mill will be designed to process 400,000 t/year of low carbon, hot-rolled strip, raising Ton Dong A's cold-strip capacity to 1.2 million t/year. The new mill will produce construction grades and material for home appliances starting from the end of 2026. Ton Dong A has been operating two cold-rolling mills from Danieli for more than ten years.

Danieli

ASIA – VIETNAM

Vietnam-Italy Steel inaugurates new rolling mill

Vietnam-Italy Steel, part of Japan-based Kyoei Steel Group, has put into operation the new high-speed rebar rolling mill supplied by Danieli as a greenfield project.

The mill, which is located in Hai Phong, in the north of Vietnam, will be used to produce 500,000 t/year of rebar from 10 to 51 mm dia. It allows Vietnam-Italy Steel to supply the local market with added-value rebar in bundles. The line uses quenching and self-tempering hot-rolling technology and a six-pass multidrive, high-speed, twist-free finishing block and Sund Birsta automatic wire-binding machines.

Linked to the existing caster, and upgraded by Danieli, the mill is rolling in billet-to-billet direct charge mode with billet temperature equalized by Danieli Q-Heat induction heaters for minimum direct carbon emissions and green operation.

Danieli

ASIA – MALAYSIA

Maegma Minerals to build HBI plant

Maegma Minerals, a member of the Melewar Group, has signed a Memorandum of Understanding (MoU) with Primetals Technologies to establish a Midrex Flex plant with a capacity of 2.0 million t/year of HBI in Lumut, Perak. The new plant, provided in collaboration with Midrex Technologies, is scheduled to begin operations in 2029.

The agreement for the new Midrex HBI plant was signed by Friedemann Plaul, Senior Vice President Iron- and Steelmaking; Andreas Viehboeck, Executive Vice President and Head of Global Business Unit Upstream, both with Primetals Technologies; and YM Tunku Dato Yacoob Khyra, Executive Group Chairman, and Uwe Ahrens, CTO, both with Khyra-Melewar Group (Picture: Primetals Technologies)

The Midrex Flex technology used for Maegma Minerals' new HBI plant is designed to operate at different ratios of natural gas and hydrogen, including up to 100% hydrogen. Initially, the plant will operate with a mix of natural gas and hydrogen, allowing for a carbon footprint reduction of more than 50% compared to traditional blast furnace-based ironmaking. It will feature hydrogen-ready equipment and piping, such as three stages of process gas compressors.

Key components include a Midrex shaft furnace with a 7.15-m diameter and a 19-bay Midrex reformer with 280-mm reformer tubes. Notable innovations include a conveyor system that reuses fine-ore residues from the briquetting process. Primetals Technologies will also supply a complete basic automation system (Level 1) and an advanced process optimization system (Level 2).

"The industry is increasingly transitioning to hydrogen, but energy prices remain a challenge," said Andreas Viehboeck, Executive Vice President and Head of Global Business Unit Upstream at Primetals Technologies. "The Midrex Flex plant allows Maegma to scale up hydrogen usage based on market conditions while significantly reducing carbon emissions compared to conventional methods."

The plant will be powered by locally-sourced natural gas provided through the public grid and by green hydrogen produced from off-grid renewable energy and a planned solar park. Additionally, the pellet feed will be sourced from a global mining company with operations near the Maegma site, significantly reducing transportation costs.

Primetals Technologies

AUSTRALIA

PGS selects preferred electrolyzer supplier for green iron project

Progressive Green Solutions has selected thyssenkrupp nucera as its preferred supplier of electrolyzers with a total installed capacity of 1.4 GW for the production of green hydrogen for the Mid-West Green Iron project.

This project aims to annually produce 7 million t of green iron pellets, converting half of this to make 2.5 million t of green hot briquetted iron (HBI) in Western Australia's Mid West region near the regional city of Geraldton. The plant will be powered by renewable energy, consuming green hydrogen whilst utilizing local magnetite iron ore. This will help to significantly reduce CO_2 emissions, compared to traditional steel production.

The project will transform the region into a global center for green iron production with first export anticipated in 2029. The project has an integrated supply chain from mine to port, utilizing already established key infrastructure. PGS's long-term goal is to produce and export up to 30 million t/year of DR-grade green pellets, plus 10 million t/year of green HBI as it scales up its plant.

PGS is relying on thyssenkrupp nucera's state-of-the-art, scalable and highly efficient alkaline water electrolysis technology with its modularized 20 MW scalum® units to produce the required green hydrogen. Dr. Johann Rinnhofer, CEO of thyssenkrupp nucera Australia stated: "The collaboration between PGS and thyssenkrupp nucera is an exciting step toward pioneering the green iron opportunity in Australia, whilst reducing the carbon footprint of steelmaking globally." thyssenkrupp nucera will continue to develop the project, which is currently still in an early planning phase, together with PGS and work toward signing an Engineering, Procurement and Fabrication contract. The realization of the project is subject to a final investment decision.

thyssenkrupp nucera

AUSTRALIA

NeoSmelt places key orders for ironmaking pilot plant

The consortium leading NeoSmelt, an initative aimed at developing a groundbreaking lower-emissions ironmaking pilot facility, has placed two orders for key components of the project: Tenova has been selected as preferred technology supplier carrying out the FEED study for a DRI pilot plant, while Hatch will be desinging the ironmaking electric smelting furnace for the project.

NeoSmelt is by a consortium of BlueScope, BHP, Rio Tinto, Woodside Energy, and Mitsui Iron Ore Development. The plant is to demonstrate that Pilbara iron ores can be used in a DRI-electric smelting furnace ironmaking route, providing the main advantage of lower emissions in steelmaking, compared to the CO_2 emissions of the conventional blast furnace-basic oxygen furnace process.

The contract with Tenova concerns the feasibility phase of the project. The Kwinana Industrial Area, south of Perth, has been chosen by the consortium as the preferred location for the pilot facility, with a final investment decision expected in 2026. If approved, the operations at the facility will start in 2028.

The DRI plant will adopt Energiron DRI technology, jointly developed by Tenova and Danieli. Designed to produce up to 50,000 t/year of DRI, the equipment will feature dual operational flexibility, capable of using either natural gas or hydrogen as reducing agent. This versatility will enable the project to potentially test multiple decarbonization pathways and adapt to evolving lower-emissions energy availability and infrastructure. In addition to its reductant flexibility, the DRI plant will also be capable of processing medium-grade iron ore, adding strategic value, and will be equipped with an integrated carbon capture system, in line with potential long-term decarbonization strategies.

Hatch has been commissioned by the consortium to provide electric smelting furnace technology for the NeoSmelt project. The company will be responsible for project management and controls for the pilot feasibility study and engineering services for the electric smelting furnace, based on Hatch's CRISP+ technology. The company will also provide the balance of plant infrastructure supporting the pilot. Hatch has been working collaboratively with the NeoSmelt consortium since the initial pilot furnace design was completed in 2023.

Tenova / Hatch

RAW MATERIALS

Salzgitter to test greener pellets to decarbonize ironmaking operations

Salzgitter AG and Binding Solutions Ltd will conduct trials of cold agglomerated pellets in Salzgitter's ironmaking operations, i.e. blast furnace and direct reduction plant

German Salzgitter Group and Binding Solutions Ltd (BSL) have entered into an Memorandum of Understanding to undertake trials of BSL's cold agglomerated pellets for blast furnace and direct reduction applications. The process technology of BSL could, if the trials have positive results, complement Salzgitter's on site ore processing within the SALCOS-Salzgitter Low CO_2 Steelmaking programme.

The tests will be conducted on multiple ore types at a number of Salzgitter's production facilities, including direct reduction testing at the 2500 kg/d µDRAL innovation project, the world's first direct reduction plant flexibly operated with hydrogen and natural gas in an integrated steel mill. Blast furnace tests will be carried out at other Salzgitter Group facilities.

The goal of the trials is to demonstrate the value of BSL's cold agglomerated pellets in blast furnaces and prove the benefits of BSL's technology through a world recognised test facility.

The cold agglomerated pellets will be produced from various ore types at BSL's world leading technology centre on Teesside, UK before being shipped to Germany.

The cold agglomerated pellets will be produced from various ore types at BSL's world leading technology centre on Teesside, UK before being shipped to Germany (Picture: Binding Solutions Ltd)

BSL's patented and proprietary cold agglomerated pellets can be used to replace standard induration and sinter materials in blast furnaces and DR plants. In comparison to traditional induration and sinter processes, BSL's cold agglomerated pellets cut energy usage and CO_2 emissions by up to 80% and 70% respectively, while also delivering substantial economic and operational benefits.

> The trials with Salzgitter are a significant opportunity for us to rapidly advance the development of our DR cold agglomerated pellets with one of Europe's largest steel producers, recognised globally for their technical capabilities.
>
> *Jon Stewart, CEO of Binding Solutions Ltd*

Salzgitter's Timo Naleschinski, Head of Purchasing Raw Materials, said: "Through our SALCOS program we are working with leading technical and research partners to achieve our mission of producing virtually climate-neutral steel. BSL's innovative technology has the potential to ensure a secure and diverse supply of high quality, low carbon iron ore pellets for our steel production process helping us to achieve our ambitious climate goals."

Jon Stewart, CEO of Binding Solutions Ltd, said: "The trials with Salzgitter are a significant opportunity for us to rapidly advance the development of our DR cold agglomerated pellets with one of Europe's largest steel producers, recognised globally for their technical capabilities. Partnering with Salzgitter will enable us to benefit from their significant expertise and access to their unique µDRAL plant, allowing us to rapidly increase the technology readiness level of our DR cold agglomerated pellets. We believe that our cold agglomeration technology for pellets has the potential to deliver a stable, long-term supply of high-quality low-emissions pellets for the European green steel industry."

Salzgitter AG / Binding Solutions Ltd

About Binding Solutions

Binding Solutions has developed a patented process for significantly reducing carbon emissions from steel production. The CAP technology can also cut capital requirements and reduce process complexity, delivering commercial benefits to iron ore miners, pellet producers and steel makers. Binding Soultion Ltd is based in Middlesbrough, Teesside, in Northern England, UK.

It operates an advanced technology centre where it provides full life cycle testing from laboratory scale to furnace trial. In May 2025, BSL announced that it had signed a Memorandum of Understanding to assess the potential for a cutting-edge iron ore CAP plant on an industrial scale at HES International's HBTR terminal in Rotterdam, the largest dry bulk terminal in Europe.

References

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[2] Cold-bonded iron ore pellets. In: STEEL + TECHNOLOGY, 2023-3, pp. 36-37

DIGITALIZATION

Kardemir to optimize processes at the sinter plants

New process automation systems will enable closed-loop operation of all three sinter plants. The Level 2 systems will be integrated with the existing SAP infrastructure.

Sinter process optimization systems will digitalize the production processes at Kardemir's three sinter plants in Karabük (Picture: Kardemir)

Primetals Technologies has received an order from Turkish steel company Kardemir (Karabük Demir Celik Sanayi ve Ticaret A.S.) to upgrade and implement process optimization systems at its sinter plants in Karabük, Türkiye. The project covers an upgrade of the existing Level 2 systems at sinter plants No. 1 and 2 and the installation of a new Sinter Optimizer system at sinter plant No. 3. This advanced solution will digitalize Kardemir's sinter production through real-time data collection, automated production data analysis, and AI-driven automated process control.

Enhancing operational efficiency

The new process automation systems will enable closed-loop operation of all three sinter plants using a digital knowledge base built on operational best practices. This will stabilize production, improve efficiency, reduce error rates, and give operators greater transparency.

"We are excited to upgrade our existing sinter Level 2 expert system and introduce a next-generation solution in partnership with Primetals Technologies. This project represents a key milestone in Kardemir's digital master plan and reinforces our commitment to smart manufacturing and operational excellence," said Sefa Çetinkaya, Operational Technologies at Kardemir. "The new Level 2 system, with its robust and secure architecture, will help us achieve seamless data integration and intelligent decision-making. By harnessing advanced technologies like data analytics, the Industrial Internet of Things (IIoT), and artificial intelligence, we will continue to drive innovation and enhance our production capabilities."

Seamless SAP integration

A key feature of this project is the integration of the Level 2 systems with Kardemir's SAP infrastructure. This ensures a smooth flow of data between the Sinter Optimizer and SAP, providing critical production insights for faster, more informed decisions. The integration will optimize steel plant automation, speed up decision-making based on real-time data, and help reduce operational costs.

Continuous process optimization

The Sinter Optimizer features an expert system connected to a digital knowledge base, enabling fast, fact-based decisions and standardized corrective actions. It performs small, frequent control actions based on a standardized control philosophy, ensuring 24/7, shift-independent operation. The system calculates raw material setpoints, crucial for achieving the desired chemical composition of the sinter product, and evaluates the impact of moisture on specific raw material mixes.

State-of-the-art process models predict product quality hours before lab data is available, while multiple Level 2 control loops ensure consistent product quality.

Kardemir is one of Türkiye's leading steel producers, known for its wide range of high-quality steel products. Located in the historic city of Karabük, the company's integrated steel plant is strategically positioned in a narrow valley near Safranbolu. The company plays a vital role in the regional economy and provides innovative steel solutions to meet the diverse needs of its global customer base.

Primetals Technologies

FORGING

Fully integrated and automated line combines open-die and radial forging

The new forging line, which has been installed at Perryman's facility in Pennsylvania, USA, enables the company to produce thick titanium bars and plates for the aerospace industry. This expansion of the product range makes it possible to transition from outsourcing to in-house manufacturing.

SMS group has completed successfully the commissioning of a fully integrated and automated forging line at Perryman Company's site in Pennsylvania, USA. Two new forging machines, a high-speed open-die forging press, and an SMX hydraulic radial forging machine were supplied entirely by SMS. Together with an integrated process and production control system, these machines form an integrated and automated forging line, enhancing production capabilities and meeting growing demand from the aerospace and medical sectors. They also widen the product portfolio from thin titanium bars to include thick bars and plates, which were previously sourced externally, not produced in-house.

The forging machines supplied by SMS to Perryman include a 40/45 MN high-speed open-die forging press in the pull-down design and an SMX 500/15 MN hydraulic radial forging machine with two forging manipulators. The open-die forging press is utilized to forge cast titanium ingots initially to the required size, allowing them to be finish-forged in the radial forging machine. These machines are specifically designed for processing titanium ingots and producing bars of various shapes and in lengths of up to 14 meters.

Visualization of an SMX radial forging machine from SMS group, similar to the one installed at Perryman Company's Pennsylvania site (Picture: SMS group)

Fully integrated process and production control

The two forging machines are complemented by a fully integrated process and production control system that encompasses the entire forging line, enabling a fully automated and integrated forging process. The SMS's MIDIS system manages and coordinates all production sequences, ensuring smooth operations and smart production planning. ForgeBase® and Comforge® technology packages allow for precise configuration of forging strategies by considering material properties and process parameters, with real-time data evaluation and visualization allowing for continuous optimization during forging. SMS-Metrics and Smart Alarm systems monitor machine performance to detect anomalies early, thus minimizing any downtime. The Maintenance Advisor ensures preventive maintenance, improving machine availability and production reliability.

"This project demonstrates SMS's unique capability to implement such complex, integrated systems," emphasizes Klaus Opgen-Rhein, Project Manager at SMS. Dr. Thomas Winterfeldt, Head of Forging Plants at SMS, added: "Our digital solutions are transforming forging technology. The project has shown how true partnership customer and equipment supplier can push technological boundaries."

This comprehensive package is designed to enhance Perryman's production capabilities, enabling the company to manufacture products that were previously sourced externally. It allows Perryman to transition seamlessly from outsourcing to in-house manufacturing with a small core of trained personnel. The automation solutions ensure precise process control, which is essential for meeting the stringent requirements of safety-critical applications demanded by the aerospace and medical sectors.

SMS group

STEELMAKING

Why do arc furnace transformers fail?

Although Badische Stahl Engineering (BSE) is not a transformer design specialist, the company has over 30 years' experience of working with arc furnace transformers worldwide and at German steel company Badische Stahlwerke (BSW). These experiences are used to discuss important operational and technical risks. This can help avoid problems. However, having a spare transformer is absolutely essential.

Arc furnace transformers may fail for several internal and external reasons. We are aware of seven failures since 2024. Here, the focus is on some very important risks that can be mitigated or avoided in order to sustain the operation of the furnace transformer and furnace. Experience shows that transformers do fail after an unknown period of time, regardless of the manufacturer. Therefore, it is absolutely mandatory to have proper spare transformers on site; one spare for each operating transformer is optimal.

If a repair is feasible, the typical repair time for a furnace transformer at the OEM is three to six months. Transformer manufacturers want to utilise their factories fully, so it is always difficult to get a repair slot. 'On-site' repairs are possible under certain damage conditions and if rare repair specialists are available. Repairs at a third-party factory do not necessarily guarantee reliability either. Therefore, even if a spare transformer will never be used, it is worth spending the money for this life insurance.

In fact, some plants do not have a spare transformer at all. This is essentially gambling. Typically, the spare transformer is an older, lower-power model that has been replaced by a more powerful one. In the event of a failure, productivity drops sharply. It is unrealistic to expect another plant to give away an old spare transformer for emergency use (if one does, it's like winning the lottery). There are no transformers on the market for emergency purposes that would fit the installation in terms of supply voltage, frequency, power, weight, dimensions, and high-current side terminals. For example, a 60 Hz transformer can only operate at 50 Hz with 20% less supply voltage due to iron core saturation.

Figure 1. 150 MVA furnace transformer during the factory test (Picture: BSE)

Dirk Riedinger, Badische Stahl-Engineering GmbH (BSE), Kehl, Germany – Contact: dirk.riedinger@bse-kehl.de

There have been some cases of premature failure (within less than two years of the factory test) due to insufficient design or manufacturing, including one at Badische Stahlwerke before 2004. It is generally not possible to state the operating lifetime of a furnace transformer. Twenty years is a reasonable expectation, but the probability of an earlier failure is completely undetermined. However, surprisingly, some much older transformers are still operating (presumably under favourable load conditions).

Figures 2 and 3 show two examples of internal transformer failure, where the windings of one phase were destroyed by arcing at the high-voltage regulating windings inside the high-current windings cylinder shown in the figure. The conductors going to the tap changer at the top and bottom of the coils of one phase are deformed by the large magnetic forces that occur during arcing short-circuit currents. The likely cause of the failure is fatigue of the insulation and/or weakened mechanical sturdiness due to operating age.

The regulating windings are a critical part of EAF transformers as the low-voltage (LV), high-current windings with a large cross-section have to be outside. The connections of regulating winding to the tap changers must be squeezed through the gap between the inner HV and outer LV windings. This manufacturing problem cannot be avoided, and demonstrates the need for specialised manufacturing skills, as well as sturdy windings and/or conductors, in order to withstand the large and varying magnetic forces acting during operation over many years.

The reliability of a spare transformer that has been ‘waiting on stock’ after more than 10 years of operation under full load conditions is already reduced. It is not a secure spare anymore, even if the dissolved gas in oil analysis (DGA) seems to be fine. Experience also shows that, under similar melting conditions, one of two apparently identical transformers may fail substantially earlier than the other. In conclusion, a proper spare transformer concept is mandatory in every steel plant. The most important practical, operational and technical measures for risk reduction are described below.

Operational measures to reduce the risk of failure

BSE knows of many meltshops that overload the furnace transformer on purpose. The largest overload experienced was 20% above the 20% overload range, i.e. 40% in total continuously. This is, of course, a risk for potential failure due to temperature rise of oil and windings (winding hot spot) and related deterioration of paper insulation material (over-proportional lifetime decrease) and due to significantly larger dynamical magnetic forces on the windings. This is an extreme example; more 'normal' overloads are in the 5...10% range. In the past, transformers were not computer optimised as they are today and had a greater 'safety margin' that could withstand a higher load. This is no longer the case for transformers built in the last 10 years or so. Therefore, reliability is related to rated power today.

Everyone needs to be aware of the risks of overload and ensure that a spare transformer is readily available. Overload can also be an insurance issue. It is important that the tap changers, which are a 'weak point', are not overloaded continuously. Typically, there is a margin between the rated current of the tap changer and that of the transformer. The tap changer's rated current should be 5–10% higher. Operating at more than the rated tap changer current continuously is not advisable due to the risk of contact wear and reduced reliability. Badische Stahlwerke significantly increased the reliability of the tap changers of its two transformers and two serial reactors by retrofitting from the MR 'OilTap' to the MR 'VacuTap' type ten years ago, also saving considerable maintenance costs.

In terms of current load, what counts is the average current per voltage tap, not the peaks resulting from fluctuations during melting. Of course, frequent overcurrents have a negative impact on lifetime, but it is impossible to determine exactly how. The overcurrent relay settings should be adjusted so that the furnace breaker switches off too large overcurrents. Definite time overcurrent relays are recommended. This ensures that an overcurrent is always switched off after a defined time. The following settings are useful (Ir is the rated current of the transformer):

$I > (1{,}3...1{,}4) \cdot Ir$ for 3 sec.
$I >> \approx 2 \cdot Ir$ for 1 sec.
$I >>> \approx 3 \cdot Ir$ for 0 sec.

Figure 2. Destroyed HV regulating winding conductors at the top of the coil (Picture: BSE)

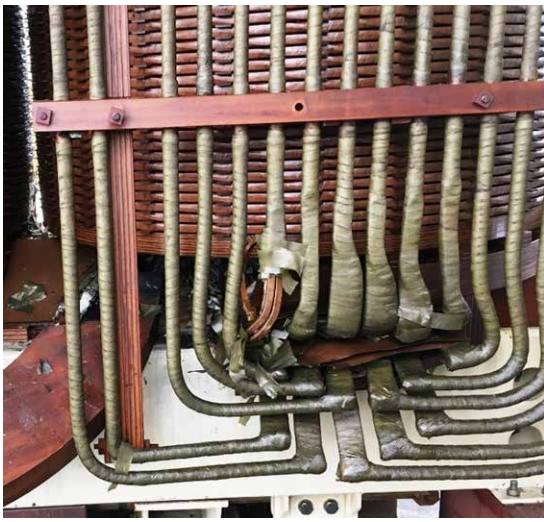

Figure 3. Destroyed HV regulating winding conductors at the bottom of the coil (Picture: BSE)

The settings should be adjusted so that the VCB does not trip too frequently (to avoid switching stress and power-off time), but so that large overcurrents are also avoided (to reduce transformer stress). When the VCB trips, it is recommended to wait 3 seconds before reclosing. Instant reclosure by the operator reduces the VCB's lifetime and may cause failure due to electric stress.

A well performing electrode regulation system controls transformer load effectively. The electrode movements must be dynamical, resulting in more steady melting currents on average. The BSE-Elarc system provides this performance, provided that the hydraulic system also performs well [1].

A VCB tripping due to overcurrent cannot be avoided and is necessary for the protection of the transformer. There is however an important problem with VCB switching on or off when the tap changer is operated at the same time. BSE knows some meltshops where (also recently) the furnace transformer failed due to frequent parallel operation of VCB and tap changer. It is crucial to avoid this parallel operation as a routine.

The power profile changes the transformer voltage tap automatically at the beginning or end of a basket or heat. At the beginning a low voltage tap is set before melting begins to protect the roof delta at bore-in. At the end of the basket or heat, the tap is adjusted again (on- or off-load).

We saw meltshops that routinely operated the tap changer in these critical VCB switching times. This is a worst-case practice and its severe risks seem not to be well known. At switch-on while the tap changer is operating, the inrush current imposes additional load on the tap changer. In 999 cases no problem occurs; however, in the 1000th case the transformer fails. The simple recommendation is to interlock tap changer and VCB operations that are related to routine operations at the start or end of the baskets and the heat. The exception is of course an operational overcurrent. MR Maschinenfabrik Reinhausen, the leading tap changer manufacturer, has also confirmed that this scenario of routine parallel switching must be strictly avoided.

Technical measures to reduce risk of failure

The following are some important measures for supervising a furnace transformer. For a healthy transformer, perform a DGA oil analysis every 3 to 6 months, depending on load conditions. It is important to keep a record of oil analysis results in order to detect rises in gas levels related to hot spots, developing internal faults or excessive moisture in the oil at an early stage. Online gas analysers are standard today. It is recommended that one is installed at each furnace transformer.

Figure 4. RC filters and surge arresters close to transformer HV terminals, copper busbars to VCB switchgear
(Picture: BSE)

The transformer load is determined by the average supply phase-phase voltages and load currents. A continuous voltage over-excitation of 5% is acceptable and standard, however, over-excitation of 10% is critical due to possible iron core saturation. For example, it is not a good idea to continuously overload a transformer in current by 7%, because the on-load voltage is 7% lower on average. When determining the average load currents from, for example, hundreds of RMS current samples, it is important to calculate the average RMS current correctly. Each RMS current sample in the list must be squared, the squares averaged, and then the square root taken. This determines the correct total RMS current. Arithmetic averaging of RMS samples results in a total average that is 2–3% too low, depending on current fluctuations during melting. The greater the fluctuation, the greater the error.

Cleanliness in the transformer vault is important. Dust on the terminals and the transformer tank can cause arcing. The vault should be sealed and properly ventilated with clean air. This is often not the case. Condition-based cleaning during planned downtime needs to be scheduled regularly.

Surge protection is another very important measure. A furnace transformer that is switched with a vacuum circuit breaker (VCB) requires a proper surge protection equipment. This equipment is composed of the RC filter and the surge arresters. For optimal protection, both should be installed close to the transformer HV terminals (**figure 4**). Scheduled checks of this equipment are recommended to ensure it is functioning properly.

VCB have a very 'hard' switching characteristic leading to transient overvoltages caused by possible re-ignitions (virtual current chopping) in the VCB at switch-off. These need to be effectively damped by correctly designed RC filters. The most critical situation in terms of transient overvoltages is to switch off the no-load current of the transformer. Therefore, it makes sense to switch off the VCB with some electrode current at the end of a basket or heat, e.g. 5 kA electrode current. Switching off at larger currents routinely reduces the lifetime of the breaker's contacts. Surge arresters limit voltage peaks that can cause winding insulation failures.

To do the layout of the protection equipment, an expert computer transient simulation of the installation is required (medium voltage supply switchgear to transformer). It is also mandatory that the connection between VCB and transformer is made with copper busbars rather than cables, and the VCB switchgear must be located close to the transformer. A furnace vacuum breaker located 300 metres away from the transformer at the substation is an installation with an unknown risk.

However, short cable distances of around 30 metres should also be avoided. Cables have capacitances that cause undefined conditions that cannot be properly controlled by the protection equipment. A special low inductive grounding system must also be installed to connect the supply cable screens, the protection equipment starpoints and the transformer. BSE knows of some meltshops that have lost transformers due to insufficient surge / transient protection or cables installed between the VCB and the transformer. However, we sometimes find installations with cables between VCB and transformer that have been operating without problems for many years (these are smaller transformer powers below 100 MVA or at ladle furnaces). Nevertheless, this practice is risky due to the poorly defined protective conditions.

Today, VCB technology is available that eliminates the inrush current peak that occurs when a transformer is switched on due to the non-linear characteristics of its iron core [2, 3]. This is a significant development that avoids frequent switch-on stress to the transformer and the entire electrical supply system. Badische Stahlwerke successfully uses this technology.

Another way to reduce the risk of transformer failure is to ensure that the specifications are correct when purchasing a new transformer [4]. As a consultant, BSE has experience of many transformer projects worldwide. Currently, fewer manufacturers can build reliable EAF transformers than in the past. The EAF transformer market is too small and volatile, and experts may have moved to other areas. The situation today is even worse because large manufacturers have been engaged in power transformer projects for the transition to green energy for years. Delivery times of two years have become the norm. In the past, this was less than one year.

It is important to choose a manufacturer that routinely builds EAF transformers. The hands-on manufacturing expertise required at the factory to build reliable EAF transformers is as important as the engineering design expertise (mind figures 2 and 3). It is similar to choosing a doctor for surgery: you want someone who performs operations frequently, not just once a year. It is recommended that a new transformer is installed and operated upon delivery, with the old transformer being used as a spare. Only then can you be sure that the new transformer works properly. No surprises later! The spare transformer also needs care. It should be stored properly (protected against the weather, dehydrating breathers maintained) and kept in good condition (including spare parts such as diverter switches).

In regard to very large power furnace transformers, which are required in Germany for the transformation of the steel industry (CO_2 reduction), BSE has developed a patented 'two transformer' layout using two smaller, simpler, more reliable, parallel furnace transformers instead of one very large, technically very demanding 200 to 300 MVA, 33...35 kV transformer [5]. Only a few of these large EAF transformers have been built to date, as these dimensions present a significant manufacturing challenge. We are aware of failures and hot spot issues in certain installations with a rating greater than 200 MVA. In our opinion, there are too many internal factors that compromise the long-term reliability of such large power aggregates operating on EAFs, not to mention the necessary spare transformer.

Conclusion

Experience shows that furnace transformers do fail over time and unfortunately the time to failure is unknown. This article has described some important measures and prerequisites that can effectively mitigate the risk of production loss and fatal transformer failure caused by adverse operational and/or technical conditions.

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HIGH-GRADE STEEL PRODUCTION

JSW Steel commissions second RH plant at Dolvi Works

With the second RH TOP unit JSW's Dolvi steel complex is doubling the production capacity of vacuum treated steel, i.e. diverse, high-quality steel grades for the automotive and construction sectors. SMS group's RH technology supports JSW Steel's strategy to expand its premium product offerings, grow market share and increase operational efficiency.

RH-TOP plant in operation (Picture: SMS group)

> By producing higher quality steel, we can strengthen our competitive position in both domestic and international markets.
>
> *Subrata Dasgupta, Senior Vice President at JSW Steel*

JSW Steel Ltd., one of India's leading integrated steel manufacturers, has issued the Final Acceptance Certificate (FAC) to SMS group for a second 350-ton RH-TOP plant (Ruhrstahl Heraeus process) at its Dolvi steelmaking shop 2 in Maharashtra. The first 350-ton RH-TOP unit was successfully commissioned in 2023. The new unit further increases JSW's capacity to produce high-purity steels for demanding industries worldwide.

The RH process is a secondary metallurgical process in which liquid steel is decarburized and degassed in a vacuum vessel. The installation of these new RH units provides several key strategic and operational advantages for JSW Steel.

Improved steel quality. The RH process enhances the quality of steel by reducing hydrogen, nitrogen and other impurities. This results in cleaner steel with better mechanical properties, allowing JSW Steel to meet the stringent quality standards of demanding industries like automotive and construction.

Greater production flexibility. The RH units provide greater flexibility in producing a wide variety of steel grades, including high-strength and low-alloy steels. This capability enables JSW Steel to cater to diverse market needs and expand its product portfolio.

Higher operational efficiency. SMS group's sophisticated RH process technology streamlines the refining process at Dolvi Works, reducing treatment times and energy consumption. This not only

improves overall efficiency but also leads to cost savings and increased throughput.

Features for process optimization and reliable plant operation

JSW Steel's RH plant is equipped with a multi-function TOP-Lance that enables the vessel to be preheated directly in the treatment station, increasing flexibility and reducing preparation time. During vacuum treatment, the lance can be used to heat the liquid steel. It is also used after treatment for skull burning, which minimizes maintenance and extends the vessel's lifetime.

In addition, the RH plant at Dolvi steelworks is the first in India to feature a dedicated ferro-silicon (FeSi) bunker at the vacuum lock. This allows JSW Steel to produce non-oriented (NO) and grain-oriented (GO) electrical steel grades.

The ladle rocker design was revised to enhance functional safety and reduce maintenance. The unit can lift ladles containing up to 350 tons of liquid steel, with a total weight of over 500 tons. A counterweight fail-safe mechanism ensures functionality even during power failures or defects in the hydraulic system.

TOP-Lance of the RH plant at JSW Dolvi Works steelmaking shop 2 in Maharashtra, India (Picture: SMS group)

Subrata Dasgupta, Senior Vice President at JSW Steel, emphasized the strategic value of the RH plants: "The RH technology at Dolvi significantly enhances the steel plant's capabilities and aligns perfectly with our goals to improve quality, maximize operational efficiency and expand market reach. SMS group's RH technology is well thought-out with regard to process efficiency, and the RH degassing process is essential for enhancing the mechanical properties of our products. By producing higher quality steel, we can strengthen our competitive position in both domestic and international markets."

SMS and JSW Steel are collaborating on further groundbreaking projects at the Dolvi site, including a major expansion of the steelmaking facility with one of India's largest basic oxygen furnace (BOF) converters, a twin ladle furnace and a primary gas cleaning plant. Additionally, SMS will supply a new state-of-the-art blast furnace as well as the revolutionary CSP® Nexus (Compact Strip Production) for thin slab casting and rolling. JSW's CSP® Nexus is the third of its kind, and expected to be the most productive and powerful in the world. Commissioning is planned for 2026.

SMS group

JSW Steel Dolvi to expand steelmaking facility

Earlier this year, as part of its strategic expansion plans, JSW Steel Dolvi has commissioned SMS to supply a 350-t BOF converter, including a twin ladle furnace, gas cleaning plant, and corresponding level 1 and level 2 automation.

The new BOF converter will feature an advanced oxygen lance system capable of a maximum blowing capacity of 1,250 m³/min, significantly enhancing the production efficiency of the plant. The facility will also be equipped with a cutting-edge automation system, which provides operators with a complete view of the plant without the need to switch between various automation levels.

Additionally, SMS will supply various process optimization models that integrate process control, production strategies, and metallurgical models, thus providing consistent quality and production reliability. The new plant equipment, which will increase the capacity of the existing steel mill by 3.7 million t/year, will go into operation in 2026.

SMS group

LEVELLING THE GLOBAL PLAYING FIELD

New developments in electric motors for the metals industries

Peter-Stefan Tampsi, Global Sales Manager at ABB IEC Low Voltage Motors, explains how new developments in industrial electric motors are improving energy efficiency and boosting productivity across the global metals industry

The metals industry is at a turning point. With global demand for steel, aluminium, and copper accelerating, producers are facing a critical challenge: how to grow profitably and sustainably in an increasingly competitive market.

Metal production is deeply energy-intensive, with energy representing roughly 20% of the manufacturing cost of steel. The International Energy Agency (IEA) estimates the industry currently emits 2.6 gigatonnes of CO_2 annually, accounting for approximately 7% of global emissions. Lower-emission production is a must for regions with high energy prices and strict environmental regulation, contributing to plant closures and job losses. Meanwhile, less expensive metals produced with a higher carbon footprint often gain market share on cost alone.

To level this unbalanced global playing field, technology must step in. Central to the solution are the electric motors and drive systems powering every rotating process in a plant, from steel rolling to scrap handling. Updating legacy motors with high-efficiency alternatives paired with drives from the same manufacturer delivers measurable improvements in productivity, sustainability, and profitability.

Aging DC motors on roller tables can be replaced with new AC motor-drive packages (Picture: ABB)

IEC roller table motors feature vertical cooling fins that prevent dust accumulation and ensure passive cooling (Picture: ABB)

Global shifts: regional trends defining the metals market

The metals industry's performance and priorities vary widely by region.

In Europe, economic pressure and regulatory costs have suppressed output. Steel production in the EU has plummeted almost 30% since 2007, and aluminium smelters in countries like Germany and the Netherlands are operating under severe cost constraints, with up to 50% of capacity idled since 2021. Yet Europe remains a testbed for decarbonization. The transition to clean energy and low-emission materials is real, and metals producers are under pressure to increase productivity while reducing emissions.

IE5 SynRM motors are ideal for rotating equipment like pumps, fans, and compressors distributed throughout the plant
(Picture: ABB)

The situation in the Americas is more dynamic. U.S. investment in onshore manufacturing, including automotive, aerospace, and EV infrastructure, has revived local production of high-value steel and electrical-grade aluminium. At the same time, Chile continues to dominate global copper output, and retrofitting plants to improve energy efficiency has become a key strategy for boosting local value retention.

Asia continues to influence global markets through scale. China alone produces over 50% of the world's steel and continues to invest in upstream capacity. Meanwhile, Indian output is expanding rapidly to meet infrastructure and domestic demand targets. The focus in many Asian markets is now beginning to shift toward energy efficiency, as margins tighten and regulations evolve. Countries like South Korea and Japan are embracing technologies such as variable speed drives (VSDs) to reduce energy losses in metals processing, particularly in electronics and automotive supply chains.

Electric motors: hidden champions of efficiency and resilience

In both greenfield and brownfield projects, smarter motor-driven systems often represent the single greatest untapped efficiency opportunity. At ABB, with over a century of metals industry experience, we offer not just products but complete powertrain solutions that include motors, drives, controllers, condition monitoring, and flexible service agreements.

Roller table motors, for instance, must operate in brutal conditions. Exposure to heat, dust, and mechanical impact is constant. Conventional motors in this application risk overheating and frequent failure. ABB's rugged IEC Roller Table motors, designed for high overload capacity and robust mechanical protection, feature vertical cooling fins that prevent dust accumulation and ensure passive cooling. To ensure optimal performance in varying load conditions and speeds, windings are always selected according to specific – and often very demanding – mechanical and electrical requirements from customers and applications, on a case-by-case basis. With these optimizations, they thrive where others can't, helping reduce unplanned downtime and contributing to higher yield.

The lifting and handling of heavy metal parts such as ingots and coils requires high dynamic performance (HDP) motors that are designed to accelerate loads rapidly, handle shock forces, and maintain positional accuracy. The compact square-frame build of ABB's HDP motors is ideally suited to cranes, hoists, and coilers alike. They offer high torque density with minimal inertia, providing excellent motion control with fewer mechanical stresses.

When it comes to sustainable performance, ABB's line of synchronous reluctance motors (SynRM) raises the bar. With no rare-earth magnets and ultra-low energy losses, IE5 SynRM motors paired with ABB's ACS880 industrial drives can cut energy bills by up to 25% compared to legacy IE3 motors. Because they run cooler, SynRM motors also extend lubrication and winding life, reducing both maintenance and temperature-related wear. These characteristics make them ideal for rotating equipment like pumps, fans, and compressors distributed throughout the plant.

A broader portfolio, a bigger impact

ABB's offerings encompass a wide range of motor and drive technologies tailored for virtually every metals application. From blast furnace blowers to mill stands and laminar cooling systems, each motor is matched with a purpose-built drive for optimized control, efficiency, and safety. For example:

- ABB's ACS880 drives feature built-in functional safety options like Safe Torque Off and Safe Direction, meeting PL e/SIL 3 safety standards, which are crucial for applications like shears and mill stands.

- For roller tables and coilers, our drive systems offer torque from zero speed and precision control without the need for external encoders, reducing cost and complexity.
- Regenerative drives recover braking energy in processes such as reversing mills and coilers, feeding that energy back into the grid to minimize losses and operating expenses.

Through ABB Ability™ digital services, plants can unlock additional efficiency gains. Devices can be connected to cloud platforms for real-time monitoring, predictive maintenance, and data analytics using tools such as ABB Ability™ Condition Monitoring. When paired with remote service capabilities and innovations like Crealizer™ (an embedded drive software platform), motors and drives become enablers of digitalization, not just mechanical workhorses.

Global case studies

Multiple real-world examples highlight how integrating high-efficiency motor solutions into metals facilities pays off quickly, both in sustainability and financial terms.

Take Aurubis, Bulgaria, part of Europe's largest copper producer. The company implemented a plant-wide upgrade at its Pirdop facility, replacing inefficient induction motors with IE4 Process Performance motors and IE5 SynRM models, many of them integrated with ABB's ACS880 drives. The result? Annual energy savings of 25 GWh and a 12,000-ton reduction in CO_2 emissions with a payback period of just 3.5 years – an investment that future-proofs operations while aligning with EU Green Deal goals.

Meanwhile, on the other side of the Pacific, South Korean steel giant POSCO modernized a hot strip mill by replacing aging DC motors on roller tables with more than 70 new AC motor-drive packages from ABB. The maintenance advantages alone were substantial. Frequent replacement of carbon brushes and commutators, a recurring issue with DC motors, was eliminated altogether. ABB's AC Roller Table motors also reduced heat buildup and mechanical wear, resulting in lower lifecycle costs and improved uptime.

The strategic edge in a fragmented world

In uncertain economic times, the certainty of reliable, energy-efficient motor and drive systems provides a tangible edge. Whether you produce specialty alloys in North America or structural steel in Asia, the fundamentals are the same: lower costs, increase uptime, and meet tightening environmental expectations.

As the global market tilts and realigns, levelling the playing field between high-cost, low-emission regions and those with cheap but carbon-heavy production methods will rely more than ever on the right technological choices. Efficient motors are now essential infrastructure for metals producers aiming to regain competitiveness and retain long-term viability.

With ABB's full scope of electric motors, variable speed drives, digital tools, and global support services, metals plants worldwide can turn efficiency into advantage, and sustainability into strategy.

Metals will continue to shape our cities, technologies, and global economies – and it takes high efficiency motors to produce them at competitive prices with the lowest possible carbon footprint.

From blast furnace blowers to mill stands and laminar cooling systems, each motor is matched with a purpose-built drive for optimized control, efficiency, and safety
(Picture: ABB)

Peter-Stefan Tampsi, ABB

ArcelorMittal Poland is delivering premium head-hardened long rails according to the latest European and American standards
(Picture: Danieli)

HEAT TREATMENT

Rail head-hardening system improves the overall product quality

The novel technology, commissioned at ArcelorMittal Dąbrowa Górnicza in Poland, has enhanced the fatigue and wear resistance of the rails produced, owing to the increased hardness of the rail head.

Leading European high-speed rail producer ArcelorMittal Poland is producing premium-quality rails with homogeneous mechanical properties along the whole length using Danieli RH2 rail-hardening technology, in Dąbrowa Górnicza. There, rail lengths up to 128 m (120 m commercial length), with linear weight between 45 and 68 kg/m and hardness levels greater than 400 HB, are processed at a productivity rate of 22.5 rails/hour.

RH2 technology is the result of the intensive research and development activity carried out at the Danieli Research Center, in Buttrio, Italy where the interaction between the head treatment and foot cooling on the rail was thoroughly investigated on a full-scale model of a portion of the machine, and now is implemented and fully commissioned in the new plant in Poland.

The Danieli RH2 system is energy saving since no air blowers are used for quenching (45% lower production cost) and no additional heating devices are required for head/tail temperature equalization (35% lower power consumption compared to running through systems), leading to a lower OpEx compared to other rail head-hardening technologies.

A Danieli Automation control system, with dedicated PLC and HMI, guarantees automatic process settings and control of the system.

By operating RH2, ArcelorMittal Poland is delivering premium head-hardened long rails according to the latest European and American standards, in an efficient and environmentally friendly way, at the lowest carbon-emission levels and making use of clean quenching solutions. With this installation, RH2 has become the new benchmark rail-hardening technology.

Danieli

NON-DESTRUCTIVE TESTING

Inspection of rotary products using eddy current and ultrasonic rotating heads

Controle Mesure Systemes (CMS) has been designing and developing innovative Non-Destructive Testing (NDT) systems using eddy current and ultrasonic methods since 1988. Recognized worldwide, CMS markets its solutions globally through a robust network of agents, for a wide range of industries including the aeronautics, automotive, nuclear, metal and steel industries.

Solutions from CMS are fully customized and tailored to the diameters, dimensions, and characteristics of the products being inspected, as well as to the production line speed. The objective is to deliver high-quality inspections by detecting surface and subsurface defects with eddy current equipment, identifying internal and external defects with ultrasonic equipment, and providing dimensional measurements with exceptional precision.

For each project, CMS develops a unique NDT application to meet diverse customer needs in terms of quality, performance, and reliability. Both the mechanical and electronic components of these systems are designed and manufactured in-house by engineers proficient in the latest technologies.

Leveraging its expertise and a team of highly trained engineers, CMS has developed its own rotating head systems for circular products inspection (tubes, bars and wires): the RotoUTscan for ultrasonic testing (UT) and the RotoETscan for eddy current testing (ET). Special attention was paid to the design of these rotating heads, manufactured to be integrated directly on customer production lines or in off-line inspection station in order to perform high-speed inspection.

The eddy current rotating head, RotoETscan, detects surface longitudinal defects at high speeds, with multiple versions available for diameters ranging from 4 mm to 220 mm (0.15" to 8.7"). A specialized version, the TRVC rotating head, is available for smaller diameters ranging from 0.8 mm to 10 mm (1/32" to 3/8"). Two or four eddy current probes (depending on the version) are installed inside the head, which rotates around the product as it moves linearly through the rotating head.

(From left to right:) Combined testing bench including rotating head RotoUTscan and rotating head RotoETscan (Picture: CMS)

Inspection is performed with a helical pitch, and results are displayed in real-time on the instrument screen using Zet@Setting software. The production software from CMS generates comprehensive inspection reports at the end of the process, detailing the exact locations of defects and ensuring perfect traceability.

While the ultrasonic rotating head, RotoUTscan, detects internal and external defects of any orientation and delivers precise dimensional measurements. Multiple versions are available for diameters ranging from 4 mm to 250 mm (0.156" to 9.84"). Ultrasonic transducers rotate at very high speeds in an immersion environment around the inspected product, which moves linearly through the RotoUTscan. The combination of transducer rotation and product translation enables inspection with a helical pitch. The transducers are adjustable in height and can be precisely rotated around three axes for optimal positioning. Results are displayed in real-time on the instrument screen using the Probus Supervision software from CMS.

Both systems can be combined and installed on the same inspection bench to enable a full-body inspection of the product. A wide range of accessories is available to further optimize the inspection process, including a triple guide, marking system, input/output automated conveyors, and alarms.

All NDT systems from CMS comply with international standards, including ASTM, API, DIN, SEP, BS, ISO, ASME, and SAE—ensuring the highest quality.

Controle Mesure Systemes

MODERNIZATION

Acciaierie d'Italia has increased the reliability of the cold strip production

Proactive servicing minimised the mill's risk of downtime. However, significant wear on the rotary mandrel was detected after 15 years of operation. Following the successful on-site repair of the rotary mandrel, the efficiency of the cold rolling mill improved.

In a remarkable on-site operation, SMS group has successfully modernized the rotary mandrel in the tandem cold rolling mill at Acciaierie d'Italia (ADI) in Genova, Italy. The cold rolling mill plant is sole in Italy for its ability to produce approximately 1.5 million tons of tinplate and electrolytic chrome-coated strip annually, which is largely used in the food processing industry. After 15 years of continuous production, the project aimed at addressing significant wear, particularly focusing on the spherical plain bearings, which necessitated comprehensive repairs. To maintain the performance and reliability of the plant, other key components such as hollow shafts, spur gears, bearing shafts, and support rollers were replaced.

24-hour operation during the repair work

This proactive service approach, combined with the strategic decision to perform on-site repairs, resulted in significant savings for ADI, while at the same time minimizing the risk of unplanned downtimes. Both initiatives collectively bolstered the long-term production reliability of the cold rolling mill, sustainably enhancing the plant's efficiency and stability. The 24-hour operation during the repair work enabled a swift resumption of production.

Since 2019, SMS has regularly conducted site inspections to closely monitor the condition of the rotary mandrel. This allowed SMS experts to identify maintenance needs in advance. In 2022, critical wear on the spherical plain bearings was detected and maintenance measures were immediately initiated. ADI was able to organize all necessary spare parts in advance and make optimal preparations for the repair, thanks to SMS's timely reporting.

With a diameter of four meters and a weight of 55 tons, the rotor replacement was a significant challenge. Yet, through meticulous planning, the rotor was safely lifted for repairs. State-of-the-art technologies such as induction heating devices and hydraulic tightening systems up to a metric size of M80 were employed to install the spherical plain bearing, which has an outer diameter of 900 millimeters, thus ensuring reliable, high-precision plant functionality.

Acciaierie d'Italia expressed its satisfaction with the collaboration, stating, "The partnership with SMS group has proven invaluable for the maintenance and optimization of our plant. Thanks to precise planning, innovative technologies, and seamless coordination, we efficiently implemented the repair of our rotary mandrel, saving valuable time and costs while improving the plant's reliability and performance."

Christian Werner, Solutions Flat Products at SMS, commented, "This project underscores the importance of close collaboration with our customers. Our proactive diagnosis and precise planning not only restored operational safety but significantly reduced downtime and costs for Acciaierie d'Italia. We are proud to support ADI in sustainably optimizing their plants."

The service project involved removing the rotor, which has a diameter of four meters and weighs 55 tons (Picture: SMS group)

SMS group

Ultrasonic inspection system for strip (Picture: Sofratest)

WELDED TUBES AND PIPES

Ultrasonic inspection of strips for welded pipes to detect lamination defects

Sofratest is consistently innovating and providing comprehensive solutions for ultrasonic inspection of welded pipes (ERW or SAW). These systems feature robust mechanics and cutting-edge software, enabling them to identify various defects across the strip, the pipe body, its ends, and the weld.

A complete customized ultrasonic system was developed for inspecting the strip prior to its transformation into a submerged-arc welded pipe at the initial stages of manufacturing. This system was meticulously crafted and built to meet the specific requirements and limitations of the customer. The objective is to guarantee comprehensive production quality by providing early-stage inspection to identify various defects, including lamination defects, and coupling losses, occurring in both the body and edges of the strip.

Comprising 34 ultrasonic probes, this system will inspect both the entire body of the strip and the ends for overall control. The number of probes is 100% customized and determined according to the different plate width to be inspected.

Installed inline, the entire system laterally moves off-line on the calibration table for dynamic calibration, matching the speed of the mills. A detailed report is generated for each calibration using specialized software capable of displaying the speed profile of the calibration table (speed profiling).

Several accessories are available for integration with the system, including a paint marking system for indicating the positions of detected defects on the strip, and a water filtration system for the Ultrasonic testing equipment.

With a robust and user-friendly software, all the results of the ultrasonic inspection are displayed in real-time for better monitoring and analysis. Additionally, the production software ensures traceability by generating thorough reports.

Every system from Sofratest is unique and tailored to customer needs. Each system is aligned with the standards outlined in API 5L, 46th edition – 2018.

Sofratest – a company of the Controle Mesure Systemes Group

Full Real-Time Control with EcoScan

The analysis of the scrap stream without time delay ensures maximum efficiency and quality in incoming inspection, process monitoring, and quality assurance.

For steel mills, a demand-oriented and well-defined scrap composition is essential, as only then can the quality of the produced steel be guaranteed. Unclear compositions of the raw material scrap—for example, the content of copper and other unwanted elements—not only risk causing process disruptions but can also endanger the quality of the final product. At the same time, accompanying elements such as chromium or nickel may be desirable, and knowing their exact content enables optimized management of alloying additions. In a special configuration, the EcoScan® Online can also be combined with an upstream, sensor-based detection and separation unit to produce crafted or "designed" scrap tailored to the steel mill's specifications.

This is where SICON's EcoScan® Online comes into play: the compact device delivers precise, continuous data on the chemical composition of scrap throughout the entire operation. This allows steel plant management to respond immediately to deviations in parameters—whether by adjusting the mix with pig iron or DRI/HBI, or by utilizing defined scrap qualities. In doing so, the entire process can be stabilized and made more efficient, with clear benefits for throughput and cost structure.

Fig. EcoScan ® Online

The EcoScan® Online Analyzer performs its task directly within the scrap conveying process.As the scrap stream passes through the scanner, the system applies X-ray fluorescence (XRF)—a non-contact material analysis method for the qualitative and quantitative determination of elemental composition—to examine the input material.

At the same time, the system records both weight and throughput, enabling the creation of an accurate chemical mass balance. The results are transmitted in real time to the process control system and can also be visualized on a display, for example in the form of a line chart. In addition, the EcoScan® Online generates automated daily and batch reports—fully customized to the customer's requirements.

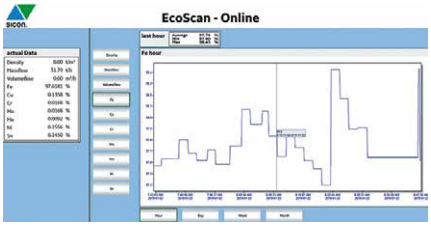


Fig. Line chart with live data

Flexible, economical, reliable

The EcoScan® Online impresses with both its cost-efficiency and flexibility.

The system is ideally suited for the precise analysis of a wide variety of input materials, including shredder scrap, sheared scrap, steel turnings, as well as aluminum and copper scrap. Beyond that, it can also be easily applied for the inspection of other material types. Integration into existing conveyor lines is quick and straightforward, requiring minimal installation effort.The EcoScan® Online gains an even broader range of applications when combined with an optical recognition system. This enables the identification and removal of organic or hard-to-detect impurities from the material stream at an early stage.

As a forward-looking company, SICON is also exploring new fields of application for its innovative solution and is currently preparing the use of the EcoScan® Online for HMS (Heavy Melting Scrap). By expanding the available data base, this will contribute to maximizing scrap utilization in support of the decarbonization of the steel industry.

Fig. EcoScan® Online in use

Conclusion

With its broad analytical spectrum, the EcoScan® Online provides steelmakers with the data they need to perfectly control scrap utilization and significantly increase their scrap input ratio.

Key advantages at a glance:

- Immediate quality control from incoming inspection through to the production process
- Optimized workflows thanks to live data and automated batch reports
- Accurate mass balance even with fluctuating throughput
- Early detection of deviations before problems arise

About SICON

Since 1998, SICON GmbH has stood for pioneering spirit and technological excellence in steel and scrap recycling. With innovative processes—from efficient scrap processing to the recovery of valuable metals—SICON delivers solutions that set new benchmarks. Our mission: conserving resources, boosting efficiency, and ensuring sustainable success for our customers worldwide.

https://sicontechnology.com/

CONTINUOUS STRIP METALLIC COATING UNDER VACUUM

In-line PVD coating of sensitive strip does not alter its crucial material characteristics

For the first time, a vacuum PVD (physical vapor deposition) process is being used continuously on steel strip. At low process temperatures, effective corrosion protection can be applied to thermal-sensitive materials such as ultra-high-strength steels. This article describes the pilot plant's structure and operating principle, contrasts it with conventional processes, and outlines the key advantages of this innovative technology as part of a coherent technical narrative.

Pilot plant for the continuous coating of highly sensitive materials, such as martensitic steel strip (Picture: NEOVAC)

NEOVAC, a joint venture between SMS Group GmbH and SITIZN Group Holding AG, based in Karlstein, Germany, has developed groundbreaking new strip coating technology. For the first time, a continuous vacuum PVD process (physical vapor deposition) is being applied to steel strip at an industrial scale. The plant has been specifically designed for ultra-high-strength and thermally sensitive steel grades.

The new method integrates plasma technology, magnetron sputtering pre-coating, and precisely controlled thermal evaporation into a continuous, fully integrated process chain under vacuum. In addition to providing effective corrosion protection through the efficient application of a precise zinc coating, further targeted functionalization of the strip can be envisaged. Vacuum coating enables the production of additional customized functional layers including tailor-made multi-layer systems, thus providing additional specific properties. The range of these properties includes adhesion promoters, for example to prepare downstream manufacturing processes, wear-reducing features, and optical or electrical properties, among others.

Plant structure and process flow

The pilot plant is configured as a linear process section into which coils are introduced sequentially in batch-by-batch, and which can be adapted to various requirements through its modular design. A coil is first introduced into a vacuum lock chamber with an integrated coiler and is welded to the previously processed strip. The strip is then transferred from the atmospheric into the high vacuum process environment condition.

The actual process chain starts after the evacuation by means of a graduated pump system: In the first stage, plasma pre-treatment is carried out for fine cleaning and activation of the surface, after which a thin magnetron-sputtered pre-coating is applied as an adhesion promoter, followed by thermal evaporation and deposition of the coating material onto the strip. The strip passes continuously through these three treatment stages before the coated coil is recoiled and can be returned to atmosphere afterwards. The mechanical equipment comprises robust uncoiling and recoiling units, active strip guides for precise strip position control, hydraulic snubber rolls for coil handling, and welding devices for changing coils. The vacuum system is composed of

Mathias Hoefler (left), COO NEOVAC and André Herzog, CTO NEOVAC, holding a strip sample that was coated at the pilot plant (Picture: NEOVAC)

turbomolecular pumps, complemented by robust oil diffusion pumps and pre-pumps.

Technical principles of operation

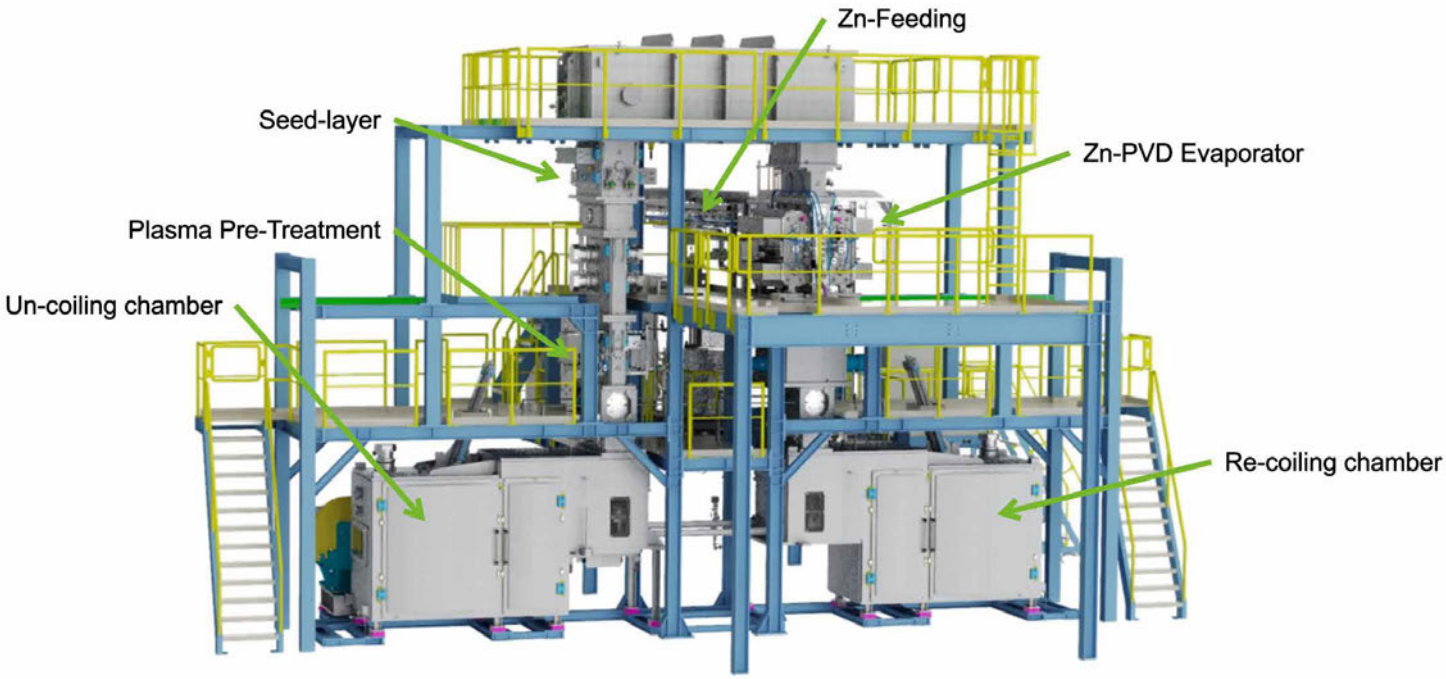
The process is based on fundamental principles of physical vapor deposition, combined with plasma-assisted technology. In the PVD process, the decisive factor for coating temperature-sensitive materials is the thermal separation of the hot evaporation source from the strip. In the evaporation source, the coating material is locally heated to temperatures exceeding its melting point, while the strip surface is kept at around 200–230°C by means of a targeted vapor supply, an optimized cooling system, and swift condensation. This "cold" deposition inhibits thermal diffusion and microstructural changes in the steel. The first process step is plasma pre-treatment to eliminate residual particles and adsorbates from the strip surface while simultaneously activating it; this is followed by a pre-coating step via magnetron sputtering, which deposits a thin, adhesion-promoting layer on the strip. The subsequent thermal evaporation is carried out in a controlled vapor chamber. With the aid of the integrated plasma enhancement, layer density, growth, and adhesion can be precisely adjusted. The described vacuum coating technology results in layers with outstanding adhesion, high density, and fine grain structure, providing distinct advantages over conventional technologies. They also offer substantially improved quality in terms of appearance, look and feel when compared to conventional coating methods such as immersion bath or electrolysis processes.

Distinction from conventional coating methods

From a technical perspective, the innovative vacuum process differs clearly from hot-dip and electrolytic galvanizing. In hot-dip galvanizing, metallurgical reactions occur between iron and zinc at bath temperatures of about 460°C, often leading to the creation of intermetallic iron–zinc phases and, in the worst case, brittle compounds that adversely affect formability. Moreover, the above-mentioned bath temperature restricts the achievable tensile strength of the martensitic steels to be coated, as the short-term temperature elevation causes a loss of tensile strength. Electrolytic processes, on the other hand, employ aqueous baths and involve the risk of hydrogen embrittlement resulting from hydrogen generation during the electrochemical deposition. The vacuum PVD process eliminates both of these limitations: It operates in a thermally gentle manner and without hydrogen involvement. Compared to other PVD formats on the market, the NEOVAC solution is designed specifically for steels with high tensile strengths, industrial strip widths and throughput. The combination of plasma cleaning, sputter pre-treatment and thermal evaporation has been optimized for the processing of ultra-high strength steels with regard to adhesion, formability and layer homogeneity.

Benefits and performance parameters

The key technical added value is the capability to coat ultra-high-strength steels (up to approximately 1,900 MPa tensile strength) with thin, dense zinc or metal alloy layers without compromising their mechanical properties. With adjustable layer thicknesses from about 1 µm to about 30 µm, the plant accommodates



Schematic design of the NEOVAC coating line (Picture: NEOVAC)

material savings as well as specific functional requirements. Through design-related coating control measures, the system achieves a high coating efficiency, with target parameters above 95 percent, thereby reducing material losses and increasing profitability. Another advantage is energy-efficient operation: Depending on the primary energy source, the fully electric plant allows for entirely CO_2-neutral operation, and comparative analyses suggest a potential reduction of energy requirements compared to conventional methods. In addition, the modular design enables the processing of other or additional metals alongside zinc, such as aluminium, copper, or magnesium, with specific evaporators being required for high-melting metals.

Layer properties and function integration

The PVD layers are characterized by a fine-grained microstructure, high density and good adhesive strength. By combining different layers, such as a sputtering-based adhesion-promoting layer followed by a vapor-deposited corrosion layer, layer stacks can be produced that withstand forming processes while providing high-performance corrosion protection. Apart from corrosion protection alone, the vacuum technology is highly suitable for incorporating further functional features. Possible functional layers include copper layers for electrical conductivity, thin-film optical layer systems for optical effects, and structured surfaces to improve paint adhesion. This flexibility turns the plant into a development platform on which steelmakers and OEMs can practically validate new material-layer combinations at coil scale.

Industrial maturity, operating conditions, and scaling

The pilot plant demonstrates industrial maturity on a feasibility scale: It processes coils weighing up to 5 tons, with strip lengths of up to approximately 2,000 metres depending on strip thickness, and widths currently up to 650 mm. In multishift operation, 5 to 6 coils can be processed each day. However, certain challenges still need to be resolved for industrial implementation: These include long-term stability in continuous operation, availability, scaling to larger strip widths, and an economic assessment in comparison with large-scale plants such as hot-dip galvanizing lines. At present, however, the technology is deliberately not targeted at the volume-driven sector of large-scale plants, but rather at differentiated application segments in which material properties and functionality take precedence over volumes.

Application potential and business models

Key application fields for the technology as already implemented include situations in which thermal loads or hydrogen-related risks prevent the use of conventional methods and/or where stringent requirements are placed on the coating's visual appearance: autobody components, high-strength components and structural components in the automotive industry, special sheets for high-strength battery housings. Furthermore, system adaptations allow for extended and more complex applications that, for example, combine small production quantities with high functional requirements. Business models may comprise services as well as joint development projects with steel manufac-

turers, aimed at subsequent investment in modified commercial-scale plants.

Risks and technological limits

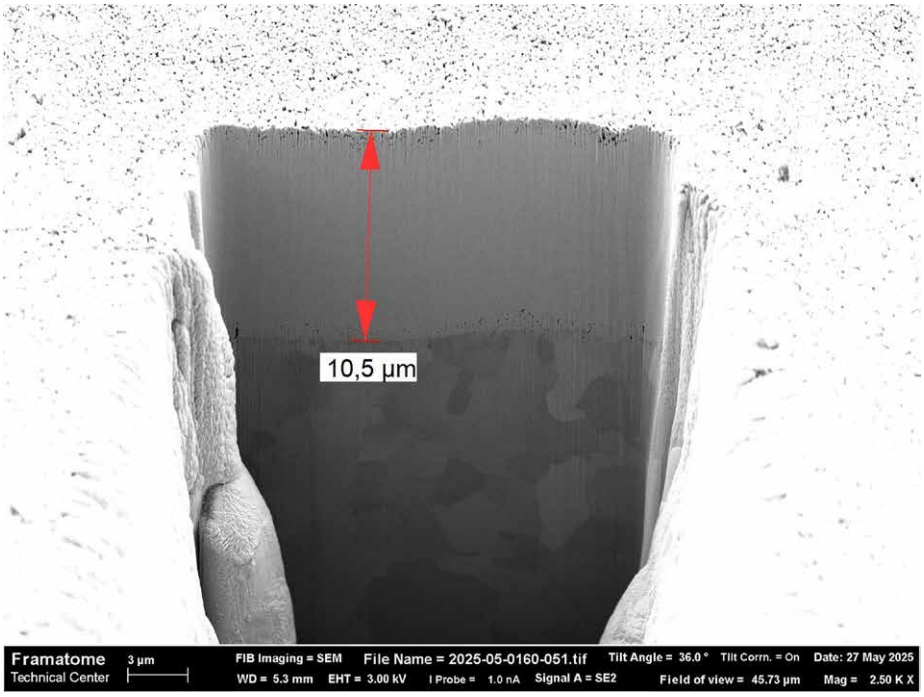
Technical challenges remain, including adaptation for high-melting metals as well as scaling to larger strip widths and, if required, achieving consistently high throughput rates. A vacuum lock system has already been designed and planned to enable the transition from the current batch operation to continuous series production in order to enable continuous inline operation. For its implementation, however, careful engineering with regard to vacuum stability, material feed and maintainability is required.

Final remarks

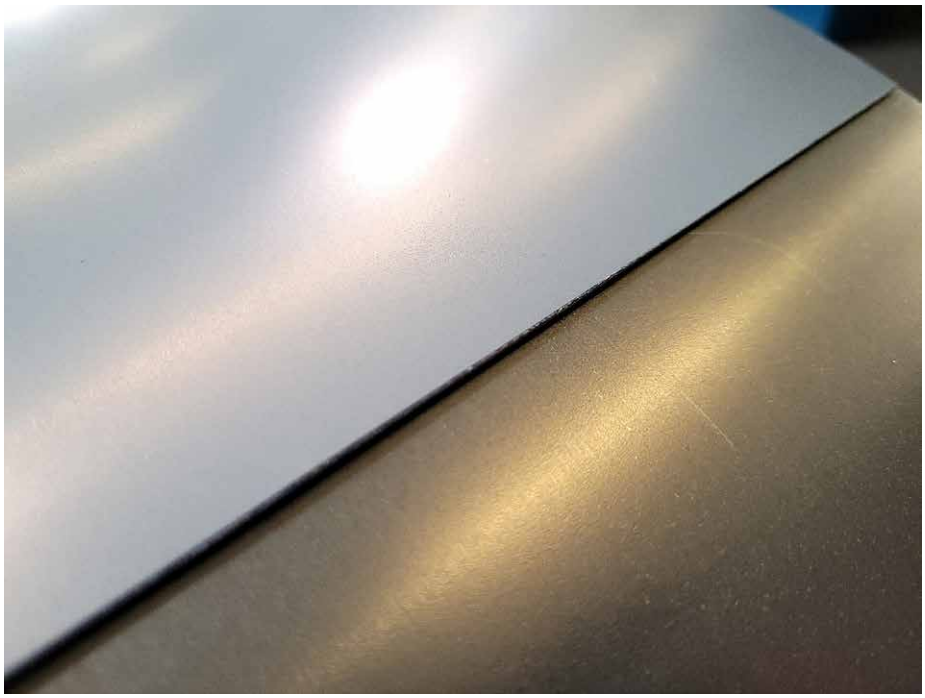
The NEOVAC vacuum PVD plant establishes a new, technology-driven option for adding functional properties to steel strip: precise, thermally gentle, and capable of modular expansion. It bridges a gap previously served by neither hot-dip galvanizing nor electrolysis, and offers a wide spectrum of possibilities ranging from thin, resource-efficient corrosion protection layers to complex functional coatings. Having confirmed feasibility in the pilot phase, the next steps involve pursuing qualification projects, advancing implementation for industrial environments, and scaling of the technology together with industrial partners to bring it into productive industrial use.

NEOVAC is currently actively seeking strategic partners to support this development. Interested partners will be able to set up their own laboratory systems, operate with actual coils, and perform targeted coating tests without investing many years in development. Specifically, the pilot plant offers the possibility to submit sample material and jointly apply defined coatings for subsequent material and product testing. This gives partners the opportunity to assess their requirements and functional profiles at coil scale before deciding on investments in series production or proprietary plants.

NEOVAC



Microscopic image of a 10.5 µm compact zinc layer on steel strip (Picture: NEOVAC)



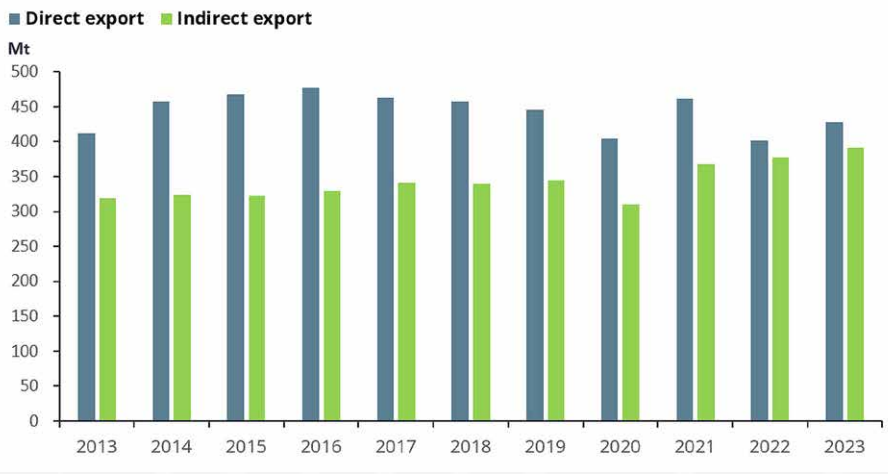
Continuous PVD-coated steel strip (left) produced by NEOVAC using the innovative vacuum process, uncoated strip (right) (Picture: NEOVAC)

Tim Ovelgönne, CEO; André Herzog, CTO; Mathias Hoefler, COO; NEOVAC GmbH, Karlstein am Main, Germany – Contact: info@neovac.eu

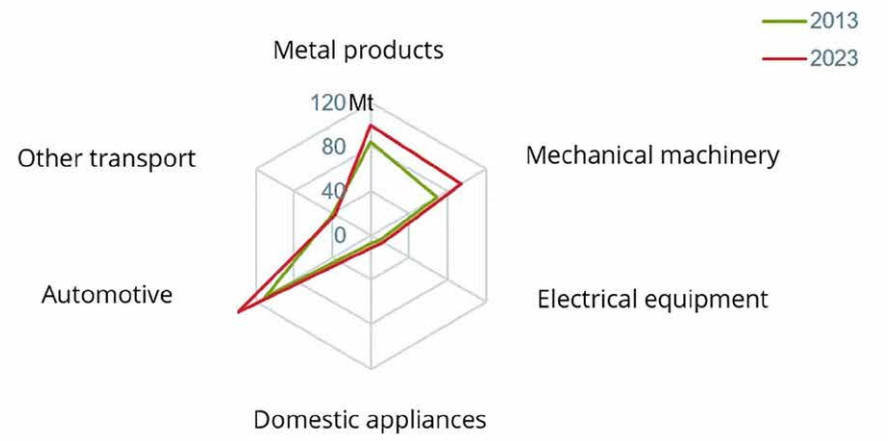
MARKET REPORT

Worldwide indirect trade in steel

The World Steel Association* (worldsteel) has released a report on indirect steel trade between 2013 and 2023. Indirect steel trade takes place through the export and import of goods containing steel.



Indirect exports, imports and net exports of steel, million tonnes (Mt), finished steel equivalent, 2013 – 2023 (Picture: worldsteel)



Indirect exports of steel, by sectors, million tonnes (Mt), finished steel equivalent (Picture: worldsteel)

According to worldsteel, from 2013 – 2023, indirect exports of steel for the 74 countries analysed increased by 23% from 319 million t in 2013 to 392 million t in 2023. The volume of indirect trade in steel was equivalent in volume to 95% of direct exports in 2023. The definitions used and the sources of the data are outlined below.

The trade data of fabricated goods (trade of steel-containing goods) are reported both in value and in volume terms. To process the indirect trade in steel calculations, it is necessary to count how much steel went into producing each manufactured product, namely the steel coefficients of each product, expressed in terms of the weight of the product. In worldsteel's methodology, the steel coefficient is the amount of finished steel products (in tonnes) needed to produce one tonne of a manufactured product.

For product classification, worldsteel's indirect trade study has adopted the Harmonised Commodity Description and Coding System (HS) of the United Nations. HS codes of up to six-digits are used to define traded goods in a detailed way, which involved using approximately 1000 codes in the study.

Trade data and results of computations have been further synthesised in this study and presented for six commodity groups: metal products, mechanical machinery, electrical equipment, domestic appliances, automotive and other transport. These match conventional steel-using sector groupings used by worldsteel in the analysis of steel-weighted industrial production (SWIP).

The source of trade data used in the current indirect trade study is the United Nations Commodity Trade Statistics Database (UN Comtrade).

This publication is available free of charge for worldsteel members and can be accessed here. Non-members can access it via the worldsteel bookshop for €5,900.

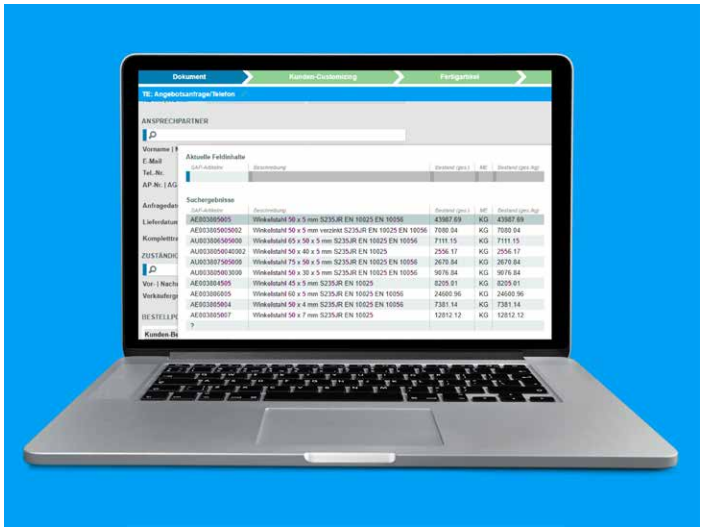
**The World Steel Association (worldsteel) represents steel producers, national and regional steel industry associations, and steel research institutes. Members represent around 85% of global steel production.*

worldsteel

SMART SEARCH FOR A FASTER PRODUCT MATCHING

thyssenkrupp Schulte uses in-house developed AI solution to create quotations

AI-supported software called "smartsearch" analyzes customer inquiries and quickly finds the right products. Language models increase the success rate and offer support in searching for materials



The AI-supported software tool analyzes customer inquiries and quickly finds the right products (Picture: thyssenkrupp Materials Services)

German thyssenkrupp Schulte, which is part of thyssenkrupp Materials Services, uses smartsearch, an in-house software solution that analyzes open-ended customer inquiries with the help of artificial intelligence and compares them with the product catalogue. The aim is to achieve a higher degree of automation in quotations and orders to make processes more efficient for customers and sales. The AI software reads and analyzes customer requests, automatically searches the product catalogue for the required product, and promptly generates a complete quotation.

"The goal of smartsearch is to create a suitable quote for the customers in just a few seconds. This speeds up the purchasing process, reduces our colleagues' workload, and establishes us as a reliable and fast partner. It's another piece of the puzzle in our strategy to promote digital solutions, make materials distribution more efficient, and rethink materials as a service," said Andreas Kellermann, Head of Materials Distribution in the Distribution & Trading unit at thyssenkrupp Materials Services.

> The goal of smartsearch is to create a suitable quote for the customers in just a few seconds
>
> *Andreas Kellermann, Head of Materials Distribution in the Distribution & Trading unit at thyssenkrupp Materials Services*

Faster product searches thanks to intelligent software

Until now, it was common practice in materials distribution to manually enter customer inquiries in SAP. This process was extremely time-consuming, especially with an extensive product portfolio of over 200,000 items. smart ORDER has already enabled partial automation of inquiries, but the solution could not handle open-ended inquiries. smartsearch combines AI, machine learning, and search algorithms to solve this problem. Many small language models work in the background, learning from each inquiry and constantly evolving. The implementation has already shown initial success: Over 50,000 inquiries have been processed, and the success rate of offers has increased significantly.

Smartsearch is already part of the workflow for many colleagues. The next step is to gradually implement the software at other European locations and potentially at thyssenkrupp Plastics. There are further applications for smartsearch that could be implemented in the future. For example, the company plans to use the software to read and evaluate supplier offers. Using the software as a virtual material advisor is also under consideration.

thyssenkrupp Materials Services

100,000TH COMBILIFT IS UP FOR RAFFLE

The company's commemorative multidirectional forklift has been donated to support UNICEF

Irish-based manufacturer Combilift, a global leader in multi-directional and customised handling solutions, has reached yet another remarkable milestone with the production of its 100,000th forklift truck. To celebrate this historic achievement, the company sells raffle tickets offering the chance to win this exclusive forklift through a special competition, with all proceeds donated to UNICEF Ireland's Children's Emergency Fund.

The 100,000th Combilift was debuted at IMHX exhibition in Birmingham, UK in early September, giving attendees the premier opportunity to see this exclusive model up close. With this raffle, Combilift aims to raise in excess of €100,000 to help UNICEF deliver urgent aid to children impacted by conflict and natural disasters – providing life-saving support wherever and whenever it's needed most. UNICEF does not endorse any company, brand, product or service.

Combilift

Combilift co-founders Robert Moffett (left) and Martin McVicar (right) present the commemorative truck at the IMHX expo (Picture: Combilift)

LESS NOW REPRESENTS NEARLY 45% OF EU STEEL PRODUCTION

Low Emission Steel Standard Association (LESS) has significantly broadened its European representation: ArcelorMittal's entities in Belgium, Luxembourg, France and Spain have now joined the LESS aisbl, as well as Swedish Stegra, formerly known as H2 Green Steel. In addition, the German Steel Association (WV Stahl) has joined LESS as an associated member.

The Low Emission Steel Standard provides a structured framework for assessing, classifying, labelling and verifying low-emission steel. It enables public and private buyers to make informed procurement decisions and supports the development of green lead markets across Europe.

ArcelorMittal strongly supports the expansion of LESS. Dr. Frederik Van De Velde, CEO of ArcelorMittal Belgium, has now joined the LESS board of directors, replacing Reiner Blaschek, CEO ArcelorMittal Europe – Flat Products who served as a founding member. Dr. Van De Velde noted: "ArcelorMittal is a leading producer of CO_2-reduced steel products. By bringing more of our European sites into LESS, we are moving further towards an industry-wide adoption of a low-emissions steel standard that provides customers with information they need for their climate strategies. We want to see sustainability criteria integrated as a standard in public procurement rules across the EU member states."

Dr. Frederik Van De Velde, CEO of ArcelorMittal Belgium, recently joined the LESS board of directors. (Picture: ArcelorMittal)

Also Stegra, founded in 2020 as H2 Green Steel , has officially joined LESS. Stegra is in the process of building its first plant for large-scale production of green hydrogen, green iron and green steel in Boden, Northern Sweden.

LESS aisbl was founded in autumn 2024 by 21 founding members. The German Steel Association, which co-initiated LESS, has now joined as an associated member. Kerstin Maria Rippel, Director General of WV Stahl, said: "As one of the initiators of the Low Emission Steel Standard, we remain committed to supporting this now Europe-wide initiative as an associate member. Establishing lead markets for clean steel 'Made in Europe' is essential to ensuring a successful net-zero transition of the steel industry."

LESS aisbl

MILL STEEL EXPANDS ITS HOUSTON OPERATIONS

Mill Steel Co., distributor of flat-rolled carbon steel, stainless steel, aluminium, and metal framing products based in Grand Rapids, Michigan, USA, is relocating its Houston operations to a larger facility strategically located at the Port of Houston.

Mill Steel's new, larger production facility is located at The Port of Houston
(Picture: Mill Steel Co.)

With direct access to the port, Mill Steel will be able to receive up to 60,000 lb. (almost 30 t) coils straight from the water, reducing transit times and improving efficiency. This strategic advantage will allow the company to provide faster lead times on orders. Additionally, the expanded space will support increased productivity and offer greater capacity for future growth.

To further enhance its processing capabilities at the new location, Mill Steel is investing in state-of-the-art equipment, including a new high-speed slitter with precision leveling capabilities that handles 1.8 m wide coils in gauges 0.4 - 6.4 mm.

The new facility will offer Mill Steel's full product line, delivering a comprehensive range of high-quality materials for construction, agriculture, manufacturing, and other industrial applications. Both plants will operate simultaneously during the startup period to ensure seamless supply and on-time delivery.

Mill Steel

STEEL DYNAMICS TO ACQUIRE REMAINING OWNERSHIP INTEREST IN NEW PROCESS STEEL

Steel Dynamics has entered into a definitive agreement to acquire the remaining 55% equity interest in New Process Steel, a metals solutions and distribution supply-chain management company headquartered in Houston, Texas.

New Process has six manufacturing locations, two in Mexico and four in the U.S., two of which are located at Steel Dynamics' Butler and Columbus flat roll steel divisions. New Process is currently Steel Dynamics' single largest flat roll steel customer. "We have enjoyed a strong customer relationship with New Process since our founding," stated Mark D. Millett, chairman and chief executive officer of Steel Dynamics. "This acquisition expands our exposure to value-added manufacturing opportunities, while continuing to serve our other long-standing flat rolled steel customer needs."

Steel Dynamics Inc.

CANADIAN-SWEDISH PARTNERSHIP TO ESTABLISH BALLISTIC-GRADE STEEL PRODUCTION

Canadian manufacturers of advanced armoured vehicles, Roshel, and Swedish steel producer Swebor have signed a strategic partnership agreement to establish Canada's first facility dedicated to the production of ballistic-grade steel.

This project will be the first fully dedicated to ballistic-grade production in Canada. Intellectual property for the new facility will be jointly held by Roshel and Swebor, ensuring shared innovation and long-term collaboration. It will leverage Swedish expertise and Canadian natural resources and production capacity to address a significant production gap in terms of strategic industrial capability, sovereignty, and national defence readiness.

Roshel is actively engaged in several programs within the armoured vehicle industry, including domestic initiatives like the Light Utility Vehicle (LUV) program and Defence Arctic Mobility Enhancement (DAME) program, as well as various international contracts, all of which require substantial volumes of ballistic steel. Hans Bergman, chairman of the board of Swebor, said: "Our partnership with Roshel demonstrates a shared commitment to innovation and self-reliance. This facility will not only meet Canada's strategic needs but also exemplify how allied nations can collaborate to enhance their industrial capabilities."

This agreement will provide Roshel the capability to control the entire production cycle in-house, from the creation of ballistic-grade steel through design and engineering to manufacturing, metal fabrication, final assembly, and delivery. The facility will be constructed as a state-of-the-art ballistic steel production plant, capable of manufacturing a wide variety of steel grades with different thicknesses, hardness levels, and ballistic resistance properties, including quenched and tempered plates, high-hardness armour steel, and specialized alloys for extreme performance. Production will incorporate advanced heat treatment cycles, precise rolling and forming, and rigorous quality assurance testing in accordance with NATO STANAG and other international standards.

Roshel / Swebor

SSAB AND POLMOTORS AGREE ON FOSSIL-FREE STEEL SUPPLIES FOR STRUCTURAL AUTOMOTIVE COMPONENTS

SSAB has entered into an agreement with Polish Tier 1 supplier Polmotors on future supplies of fossil-free steel for their structural automotive components and assemblies.

The collaboration aims to explore the potential of fossil-free materials in demanding automotive applications, combining SSAB's pioneering work in decarbonized steel production with Polmotors' experience in manufacturing components for leading OEMs.

"Polmotors sees the future of fossil-free steel," says CEO Maciej Grabos. "And the potential competitive advantage of being an early adopter, positioning ourselves to meet the anticipated market demand from premium automotive OEMs. We design and manufacture crash management systems for these customers, such as bumpers and rally bars, so choice of materials is crucial. Polmotors looks forward to joint R&D — working with SSAB and the OEMs — for the implementation of new steel grades in our products."

Polmotors / SSAB

After signing of the Letter of Intend on future collaboration in fossil-free steel (Picture: Polmotors)

COGNE ACCIAI SPECIALI UNDERTAKES SUSTAINABILITY CERTIFICATION PROCESS

Cogne Acciai Speciali SpA has embarked on the path to ResponsibleSteel™ certification, a global standard that promotes sustainability across the entire steel production value chain, for its Aosta site.

Stainless steel and nickel alloy producer Cogne Acciai Speciali SpA has chosen to formalize its commitment to the environment, people, and transparency by undertaking the ResponsibleSteel™ certification process. This decision comes in a global context where the steel industry is being called upon to meet environmental and social challenges.

Massimiliano Burelli, CEO of Cogne Acciai Speciali SpA, stated: "ResponsibleSteel™ represents a fundamental step in our journey toward an increasingly responsible and sustainable production process. Sustainability is not a goal for the future – it is a decision we make every single day. With this choice, we are not only investing in the company, but creating lasting value for our employees, customers, and local communities."

Cogne Acciai Speciali

SSAB AND METAL SOLUTIONS START PARTNERSHIP IN FOSSIL-FREE STEEL

SSAB and Metal Solutions, a roofing and cladding fabricator in the UK, have entered into a long-term partnership for the supply of decarbonized steel with virtually zero fossil carbon emissions.

Metals Solutions continues to demonstrate their commitment to providing low-carbon solutions made possible through SSAB's innovative fossil-free technology. This strategic collaboration is expected to play a vital role in helping the roofing and cladding industry reduce its environmental impact. GreenCoat® colour coated steel from SSAB is already among Metal Solution's most popular material choices for metal roofing and cladding. For Metal Solutions this versatile, uncompromising product formed the beginnings of a wider strategy - moving on through low emission recycled steel and eventually on towards a fully fossil-free steel future.

Metal Solutions / SSAB

From left to right: John Flood and Janet Flood, Directors Metal Solutions, and Dave Williams, Managing Director, SSAB Swedish Steel signed the partnership agreement during the Swedish Steel Prize 2025 event in Stockholm (Picture: SSAB)

STEEL FOR MOBILITY APPLICATIONS

Benteler to build new automotive plant in Morocco

The Benteler Group officially launched construction of its new automotive plant in Kenitra, Morocco, with a groundbreaking ceremony on 24 June this year. During the ramp-up phase, the company plans to invest several million euros in the new manufacturing facility.

Official groundbreaking ceremony for Benteler's new manufacturing facility in Kentira, Morocco (Picture: Benteler)

Benteler's new plant in Morocco is scheduled to begin production in 2026. It is expected to generate over 300 direct jobs, with the potential to create many more indirect roles throughout the local ecosystem and value chain. "We can't wait to open our new plant in Kenitra and thereby further expand our global presence. Morocco offers us relevant locational advantages: It's a modern country with a strong automotive industry, plus the country's geography and infrastructure also allow us to optimize logistics," says Matthias Siemer, President of Benteler Automotive Components Europe. "In addition, Morocco has a high proportion of renewable energy sources, which is ideally suited to our ambitions in the area of sustainability."

The groundbreaking ceremony was attended, among others, by Ryad Mezzour, Minister of Industry and Trade of the Kingdom of Morocco. "We welcome Benteler's decision to invest in our country and create hundreds of new jobs in Kenitra. This project further strengthens the momentum of our automotive ecosystem, supported by a skilled workforce and a competitive industrial offering," said Ryad Mezzour. "It confirms the rise of Morocco as a major industrial and technological platform and highlights the kingdom's increasing appeal to leading global industry players."

Over 300 jobs and proven technologies are set to begin

Following the start of production in 2026, Benteler expects to create more than 300 new jobs at its Kenitra site, offering promising career opportunities for motivated individuals. To ensure every employee is well-equipped to contribute to the company's success, Benteler provides comprehensive training programs along with opportunities for continuous development.

At the new facility, Benteler will manufacture front and rear bumpers, twist beam rear axles, crash struts and control arms for a major OEM. The plant will be equipped with state-of-the-art equipment, including a 3,200-ton cold stamping press, various welding systems, a cathodic dip coating system (CDP) and a 3D laser for component production. To drive digital transformation and enhance competitiveness, Benteler will also integrate cutting-edge Industry 4.0 technologies developed through its SMART FACTORIES initiative. These include Big Data analytics, the company's Smart Production Data Platform, and a range of connectivity solutions for intelligent, data-driven operations.

"The Kenitra plant will be a smart facility from day one – it brings together cutting-edge technology and highly trained teams to enhance efficiency and production. By relying on modern, proven technologies, we will deliver the high-quality products our customers expect," emphasizes Nissrine Braimi, Customer Line Director at Benteler Automotive Components.

Strategic location for customer-oriented production

Benteler is establishing its new facility within the Atlantic Free Zone in Kenitra, an ideal location for efficient, customer-oriented manufacturing. The company is constructing a building of around 17,000 square meters on the approximately 50,000 square meter site, which has direct access to the freeway and good connections to the port of Tangier in northern Morocco. "In line with our 'local-for-local' approach, we will be producing as close as possible to our customers to ensure flexible and reliable delivery," explains Matthias Siemer.

Benteler

MARKETS ARE DRIVING THE TRANSFORMATION OF THE STEEL SECTOR

How automotive and other sectors create green steel demand

The global steel industry is navigating a pivotal and capital-intensive transition towards decarbonization. While technological innovation in hydrogen-based and electric ironmaking remains critical, the focus has sharpened on the demand-side dynamics that make this transformation financially viable. Proactive offtakers in key sectors like automotive and construction are moving beyond passive procurement to actively shape the market, providing the bankability required to build the green steel plants of the future.

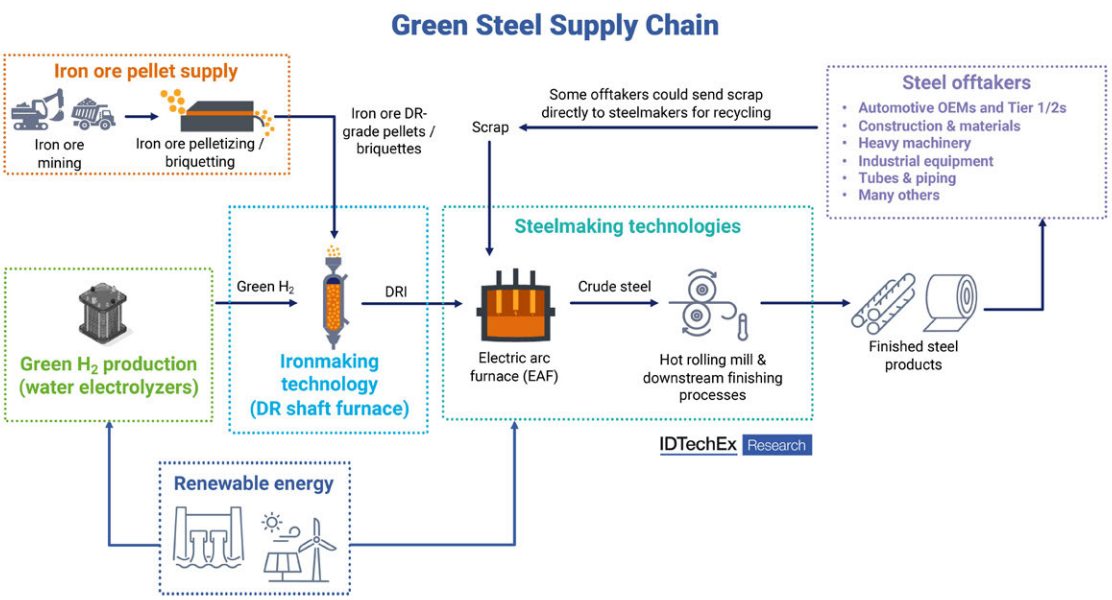
The shift from carbon-intensive blast furnaces to greener alternatives, such as hydrogen-based direct reduced iron (H_2-DRI) coupled with electric arc furnaces (EAFs), requires immense upfront investment, with individual projects often costing billions of dollars. For these projects to move from announcement to reality, producers need to secure long-term revenue certainty.

This is where offtakers play a fundamental role. Through binding, long-term offtake agreements, major steel consumers commit to purchasing future volumes of green steel, often at a premium to conventional steel. These agreements are the financial bedrock of the green steel transition. They significantly de-risk investments for producers and are a critical prerequisite for securing the necessary project financing from private investors and financial institutions. As detailed in IDTechEx's report [1], the success of emerging players like Stegra (formerly: H2 Green Steel), which has raised over €6.5 billion, is directly linked to its ability to pre-sell more than half of its initial capacity through such contracts.

Key drivers: a convergence of policy and corporate strategy

The growing demand for green steel is propelled by the convergence of regulations and ambitious corporate climate strategies. On the policy front, frameworks like the EU's Emissions Trading System (ETS) and the Carbon Border Adjustment Mechanism (CBAM) are increasing the cost of carbon-intensive production, creating an economic case for low-carbon steel. The CBAM is notable as it aims to prevent the offshoring of production to other countries with looser regulations, thus reducing the risk of carbon leakage. Steel producers in China are already aligning to comply with the CBAM. Furthermore, EU regulations like the End-of-Life Vehicles (ELV) Regulation and the ESPR may also stimulate demand for green steel.

In parallel, corporations are facing mounting pressure from investors and consumers to decarbonize their entire value chains, particularly their Scope 3 emissions, which include purchased materials. For an automaker or construction firm, steel constitutes a substantial portion of this embodied carbon. Committing to green steel offtake is one of the most direct and impactful ways for these companies to meet their net-zero targets.



Example of a green steel supply chain
(Image: IDTechEx)

Key player activities: automotive leads, other sectors follow

The automotive sector has emerged as the clear driving force in the offtaker movement. The willingness to absorb a "green premium" is driven by the fact that even a significant per-tonne cost increase for steel translates to a marginal (1-2%) increase in the final vehicle price. This allows automakers to boost their sustainability credentials with minimal consumer-facing cost impact.

European OEMs, as well as Tier 1 and 2 suppliers, are actively procuring green steel. For example, the Swedish startup Stegra (H2 Green Steel) has successfully secured offtake agreements with a roster of automotive leaders including Mercedes-Benz, Porsche, Scania, and ZF. Likewise, SSAB, a pioneer with its HYBRIT fossil-free steel project, has established partnerships with the Volvo Group. Established steelmaking giants are also making significant moves – ArcelorMittal is supplying its XCarb® recycled and renewably produced steel to General Motors, signaling growing momentum for green steel in North America.

While automotive captures the headlines, demand is broadening. In the construction sector, Stegra has secured agreements with building solutions provider Kingspan and ventilation firm Lindab. A compelling circular economy model is also emerging in the energy sector, where utility Vattenfall is set to purchase fossil-free steel from its HYBRIT project partner SSAB for use in its own energy infrastructure. Machinery and industrial equipment manufacturers like JCB, Alfa Laval, and Lindab are also interested in procuring steel for their products. Interestingly, even Amazon Web Services (AWS) has used recycled steel for data center construction in Sweden.

Outlook: a market forged by demand but facing headwinds

The path forward is defined by both immense opportunity and significant challenges. While offtaker demand, government subsidies, and green finance create a powerful ecosystem, the supply side remains fragile. Offtakers must navigate the risks of a nascent market, including potential project delays, price volatility linked to renewable energy costs, and a lack of universally accepted standards for what constitutes "green steel", which creates a risk of greenwashing.

The structure of the industry itself may be set to transform. The concept of "green iron hubs" is gaining traction, where iron is produced using green hydrogen in regions with abundant renewable energy (e.g., Australia, Brazil) and then shipped as hot briquetted iron (HBI) to steelmakers elsewhere. This decoupling of iron and steel production could reshape global supply chains.

Despite these complexities, the trajectory is clear. The demand signal from offtakers has begun the industry's gradual transition. The future of steel depends not only on the furnaces used to make it but also in the long-term contracts signed by forward-looking consumers.

IDTechEx forecasts that hydrogen-based green steel production will reach a significant 46 million tonnes by 2035. While this is still a fraction of the total required to meet 2050 net-zero targets, it represents a definitive start.

IDTechEx

References

[1] Chingis Idrissov and Eve Pope: Green Steel 2025-2035: Technologies, Players, Markets, Forecasts. IDTechEx Ltd., Cambridge, UK; 2025

STEGRA SIGNS AGREEMENTS WITH MICROSOFT, DRIVING DEMAND FOR GREEN STEEL

After investing in Stegra in 2023 through its Climate Innovation Fund, Microsoft is entering into a supply agreement for near-zero emission steel, as well as an agreement for environmental attribute certificates (EACs). These agreements align with Microsoft's focus on building markets for low-carbon construction materials, which in turn supports the company's ambition to become carbon negative by 2030.

The largest part of Microsoft's carbon emissions are what's considered "scope 3" or indirect emissions. The rise in those scope 3 emissions in part comes from the construction of more datacenters and the associated embodied carbon in building materials and technology hardware.

The supply agreement will see Stegra deliver steel with up to 95% lower emissions than conventional steelmaking, from its flagship plant currently under construction in Boden, to be used by Microsoft's datacenter equipment suppliers. Microsoft is not a direct buyer of materials such as steel. It will work with its suppliers to receive the coils from Stegra and process the green steel into components designated for use by Microsoft's datacenter equipment suppliers.

In addition to the agreement that covers physical steel, Stegra and Microsoft have also signed an agreement for environmental attribute certificates. This is a model that Microsoft has worked with in other industries, like aviation fuels and cement but this is the first time it is being implemented in the steel industry.

What Stegra is doing in this innovative environmental attribute certificate agreement is de-coupling the green value from a physical steel product. The physical steel is sold as conventional non-prime steel without a green premium, and to ensure there is no double counting of emission avoidance, the buyer of the physical steel will be obliged to commit to not make any green claims.

The green value is sold separately through the EACs. With these EACs, Microsoft can claim using the corresponding amount of steel with almost no emissions in its operations. The possibility to sell the green value separately via EACs will help drive further demand for sustainably produced products beyond where it today makes sense to deliver the physical product.

Stegra

SUSTAINABLE WATER SOLUTIONS

Decarbonising the global supply chain with green stainless steel

The vast majority of the standard material supplied by Outokumpu to Grundfos will be changed to Outokumpu Circle Green®, a type of stainless steel that has a drastically lower carbon footprint than the global industry average.*

Grundfos aims to respect, protect, and advance the flow of water by providing energy and water efficient systems and solutions for a wide range of applications for water utilities, industries and buildings (Picture: Grundfos)

Grundfos, a Danish company leading in advanced pump and water solutions, is kicking off a new collaboration with Outokumpu on green steel. Already this year, approximately 90% of the stainless steel used in Grundfos' production – used for the company's energy-efficient and water-saving pump solutions – will be from the Circle Green portfolio. The partnership with Outokumpu supports Grundfos' climate targets and contributes to Europe's ambitious goal of becoming decarbonized by 2050.

"Remaining competitive and accelerating the green transition is fundamental to Europe's future. Stainless steel is the most versatile industrial material and heavily needed for applications including clean energy and water solutions, playing a vital part for innovation and technological progress. Europe needs frontrunner companies throughout the value chain to drive the green transition forward. With our long-term customer Grundfos, we share the same ambition and commitment to Science-Based Targets and decarbonization goals, and we are happy to support their next step in sustainability by significantly reducing emissions from the company's entire supply chain and solutions", says Jörg Müller, Head of Sales for Stainless Europe at Outokumpu.

Global water scarcity demands advanced solutions and technologies

Climate change, population growth and urbanization are key contributors to global water scarcity. Grundfos develops advanced pump solutions and water technologies that improve water efficiency and reduce water waste. Energy-efficient pumps minimize water and energy consumption, and wastewater treatment technologies support water recycling and reuse. These solutions need low-emission materials, such as stainless steel, to support the green transition efforts.

"Grundfos actively seeks partners with the same commitment to sustainability and climate resiliency to make an even bigger impact in solving the world's water and climate challenges. Ultimately, our long-term goal is to decarbonize our supply chain. Partnering with Outokumpu and switching to green steel is Grundfos' first tangible effort in our supply chain decarbonization program. It will significantly contribute to lowering our own carbon footprint and helping our customers lower their footprint as well", says Ulrik Gernow, COO and EVP at Grundfos.

Outokumpu Circle Green® was the first innovation of its kind on a global scale with such a low carbon footprint and with a product-specific footprint calculation for every delivery. Today, more than 40 leading companies from various industry sectors in Europe and Asia are using this solution to reduce their carbon footprint.

**Global average carbon footprint of stainless steel (2024): 7 kg CO_2e per kg of stainless steel (Outokumpu's calculation based on data provided by CRU, worldstainless and Kobolde & Partners AB). Outokumpu Circle Green® CO_2 emissions: down to 0.5 kilos of CO_2e per kg of stainless steel.*

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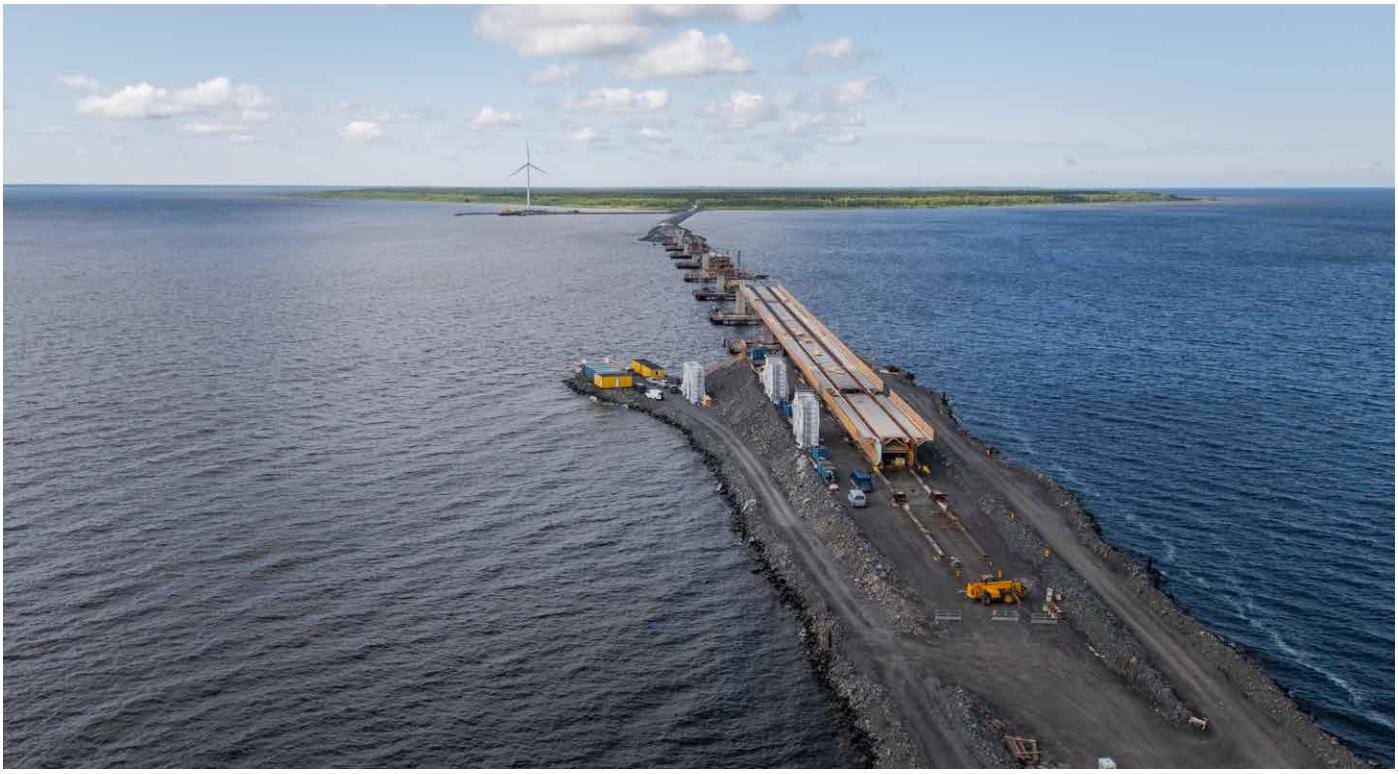
STEEL FOR CONSTRUCTION APPLICATIONS

Weathering steel defies marine conditions of the Nordic region

SSAB Weathering 460ML steel is the main material used in the Huikku Bridge, which is part of a causeway connecting Riutunkari, Oulu, and Huikku in Hailuoto, which is the largest Finnish island in the Bothnian Bay. The 767-metre-long continuous composite girder bridge with a reinforced concrete deck consists of 25 steel sections weighing nearly 100 tonnes each.



Construction site of the 767-metre-long continuous composite girder bridge (Picture: SSAB)

Henrick Kiviniemi laughs. "They are impressive structures, not just matchsticks," he says. Henrik Kiviniemi is Business Director at Steel Group Pohjanmaa Oy, the company which is responsible for the engineering of the bridge steel structures.

SSAB Weathering 460ML steel plates are delivered to Steel Group's workshop as prefabricated products from SSAB Europe's mill in Raahe. "There the shape is cut as required for the flange or groove, and the bevels for welding are partially finished," explains Kiviniemi. At the Steel Group's workshop, the pieces are prefabricated into sections, which are then transferred to the bridge construction site for installation.

"The thermomechanically rolled weathering steel plates have good weldability and do not usually require preheating. The material is easy to work with in every way," says Kiviniemi. He also praises the fact that the materials arrived at the workshop on time and that the schedule has been kept. Long-term cooperation and experience have only increased trust. "We have also been working with SSAB's welding experts, and able to go through the welding parameters and other details, right down to the choice of wire," says Kiviniemi.

The massive bridge sections are over 4 metres high, 6 metres wide, and 26–32 metres long. In addition, SSAB Europe's Pulkkila factory has supplied around 150 tonnes of weather-resistant SSAB Weathering Tube 355WH for the project. The tubes connect the sections together.

Steel suitable for demanding conditions

The Hailuoto Causeway project is being built by the alliance organisation. Tuomo Järvenpää, chief designer of the Huikku Bridge and head of design at AINS Group, says that planning for the project began in

2022. "During the development phase, various options for the Huikku Bridge were explored, including the materials. After comparing the risks and costs, it was decided that a composite girder bridge was the way forward."

In addition to the appearance and overall structure of the bridge, the water permit specified a light blue colour so that the bridge would blend into the landscape rather than stand out. The span-to-rise ratios of the bridge were optimized to achieve a more balanced design in relation to the road plan.

"When selecting materials, weather-resistant steel emerged as a good option for the low-salt marine environment and for a bridge location where maintenance painting and servicing above the water is difficult and expensive. Painting costs are reduced, and the bridge span doesn't need to be painted," says Järvenpää. The number of maintenance breaks affecting bridge use will also be reduced.

During the construction planning phase, 460MPa was selected as the steel strength, which reduced steel consumption and lightened the weight of the girders to be installed without compromising strength.

The bridge sections are huge: stand at over 4 metres in height, span 6 metres in width, and extend 26–32 metres in length (Picture: SSAB)

Maintenance-free patina surface protects against corrosion

Due to its good corrosion resistance and low maintenance requirements, SSAB Weathering steel is a suitable choice for bridge structures on the coast of the Bothnian Bay. It can also withstand northern conditions: weather-resistant steel retains its impact toughness even at temperatures as low as –50 degrees Celsius, says SSAB's Technical Development Manager Erkki Krankkala.

"Weather resistance is achieved through the chemical composition. Over time, it forms an oxygen-impermeable patina layer that protects against corrosion without the need for separate surface treatment," Krankkala continues. "However, if the steel is painted, as was done on the exterior surfaces of the Huikku Bridge sections for aesthetic reasons, the paint will adhere better than on ordinary carbon steel." Krankkala points out that scratches are not a problem for the weather-resistant steel's patina surface. "The patina repairs itself".

SSAB

Huikku Bridge in Hailuoto, Finland

Project: The Hailuoto Causeway
Alliance organisation: The Finnish Transport Infrastructure Agency, GRK Finland Oy, AFRY, and AINS Group
Fabricator: Steel Group Pohjanmaa Oy
SSAB Products used: SSAB Weathering 460ML, SSAB Weathering Tube 355WH

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

STEEL TECHNOLOGY

Harnessing waste heat: a pathway to carbon neutrality for steel producers

The key advantages of waste heat recovery for steel producers, and more broadly for energy intensive industry sectors such as cement production, refineries, and power generation, are lower operating cost and improved efficiency, cost-effective emissions reduction, and robust business case. After implementation of two ECOSTAT heat exchangers at the ArcelorMittal Poland Steelworks in Dąbrowa Górnicza, Poland, the ECOSTAT units capture waste heat from the Cowper gas to preheat the combustion gas and combustion air for the blast furnace. The system not only cuts emissions but also delivers significant cost savings, boosting profitability and competitiveness.

Optimised quality control in the hot rolling mill at SDI Butler

By integrating a new surface inspection system, American steel manufacturer SDI Butler has succeeded in reducing customer complaints while achieving greater process efficiency. In an interview, Butler's quality expert Robert Beck explains the initial expectations for the system, describes his practical experiences as the person responsible, and gives specific examples of the added value that the solution offers in everyday production.

Stahl Gerlafingen improved production performance after wire rod mill upgrade

Stahl Gerlafingen's previous laying head caused multiple issues, including excessive vibration, unplanned shutdowns, poor front-end orientation, and uneven coil packages. To address these challenges, Stahl Gerlafingen substituted the laying head and the pinch roll. The new solution effectively eliminated vibrations, significantly reduced unplanned mill stops, and increased production.

STEEL PROCESSING

Accelerating digital manufacturing and integrating artificial intelligence

Siemens and TRUMPF are partnering to combine Siemens' digital expertise and Xcelerator portfolio with TRUMPF's manufacturing and software excellence. The collaboration will solve critical challenges in system integration in modern manufacturing through open and interoperable interfaces. Virtual development and standardised interfaces enable faster time to market, resulting in significant efficiency gains for customers.

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For currently valid prices see Price List No. 2, effective January 1st 2023.

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Printing
D + L Printpartner GmbH
Schlavenhorst 10
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STEEL + TECHNOLOGY is printed with the highest environmental standards.

Terms of Delivery
STEEL + TECHNOLOGY is published four times a year and is available on subscription. The price for a one-year subscription for print and e-paper is 75.00 € incl. shipment (VAT not included). Subscriptions will be renewed for the next 12 months, unless DVS Media GmbH receives a written cancellation 6 weeks prior expiration. VAT calculated in accordance with EC legislation.

Single copy: 35.00 € excl. shipment

ISSN (Print) 2628-3859
ISSN (Online) 2628-3867

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04 Steelmaking

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04.04 Electric steel plant

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2110 Secondary metallurgical plants

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10.01 Cold rolling mills

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11 Surface treatment

11.04 Surface treatment plants

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14 Sheet metal processing

14.03 Welding technology

8120 Strip welding machines

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☎ +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
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47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
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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
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E-Mail: ws@flox.com
Internet: www.flox.com

16.02 Forging furnaces

10230 Forging furnaces

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🖷 +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

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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

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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

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🖷 +49 203 80398-901
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Internet: www.loi.tenova.com

16.08 Heating furnaces and heat treatment plants

10408 Continuous furnaces

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47059 Duisburg, Germany
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10410 Co-step furnaces

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47059 Duisburg, Germany
☎ +49 203 80398-900
🖷 +49 203 80398-901
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10430 Bogie hearth furnaces

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Internet: www.loi.tenova.com

10460 Chamber furnaces

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Internet: www.loi.tenova.com

16.08 Heating furnaces and heat treatment plants

10510 Roller hearth and walking beam furnaces

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☎ +49 203 80398-900
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Internet: www.loi.tenova.com

10540 Pusher-type, roller and rotary hearth furnaces

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🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

10560 Heat treatment plants

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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)

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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

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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

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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

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☎ +49 203 80398-900
🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

18.06 Ventilation plants and equipment

12660 Air conditioners for heat plants

FrigorTec GmbH
Hummelau 1
88279 Amtzell, Germany
☎ +49 7520 914820
E-Mail: info@frigortec.com
Internet: www.frigortec.com

12670 Air conditioners for crane lances, crane bridges, etc.

FrigorTec GmbH
Hummelau 1
88279 Amtzell, Germany
☎ +49 7520 914820
E-Mail: info@frigortec.com
Internet: www.frigortec.com

18.10 Power and work machines

13070 Piston pumps

HYDROWATT AG
Freistrasse 2
8200 Schaffhausen, Switzerland
☎ +41 52 624 53 22
E-Mail: info@hydrowatt.com
Internet: www.hydrowatt.com

18.10 Power and work machines

13160 Vacuum pumps

LOI Thermprocess GmbH
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🖷 +49 203 80398-901
E-Mail: loi@tenova.com
Internet: www.loi.tenova.com

21 Measuring and testing technique

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

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

21.02 Measurement of physical properties

16830 Speed measuring devices

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☎ +49 7243 604-0
🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.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
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🖷 +49 7243 69944
E-Mail: info@polytec.de
Internet: www.polytec.de

24 Environmental protection and disposal

24.01 Dedusting and gas cleaning

18360 Exhaust gas cooling systems

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47059 Duisburg, Germany
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🖷 +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

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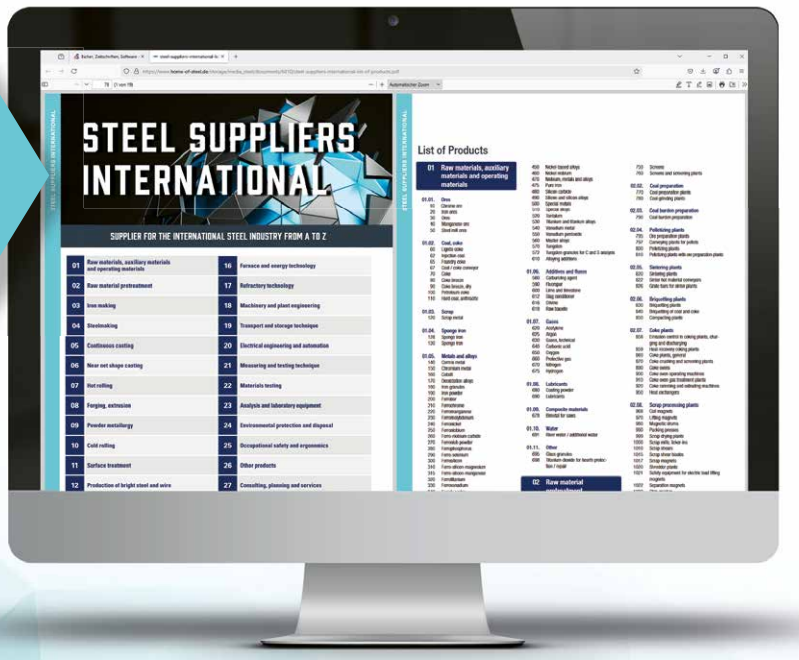

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