INTECO

INTECO NEWS 2024

Industrial-scale H_2 production

Methane pyrolysis is revolutionizing hydrogen production with its cleaner, more efficient process. Discover more about INTECO's zero-emission hydrogen initiatives.

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Big, bigger – secondary metallurgy

Saarstahl AG and INTECO concluded a contract for the installation of a secondary metallurgy facility featuring a 200t twin LF, a 200t RH degasser and a material handling system.

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Spin to win with rotational casting

Explore more about INTECO‘s initiatives on advanced solidification control in vertically cast ingots, promising a market-changing casting technology.

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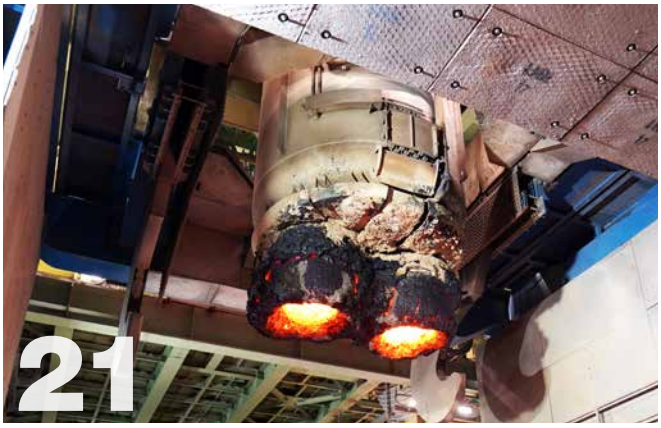
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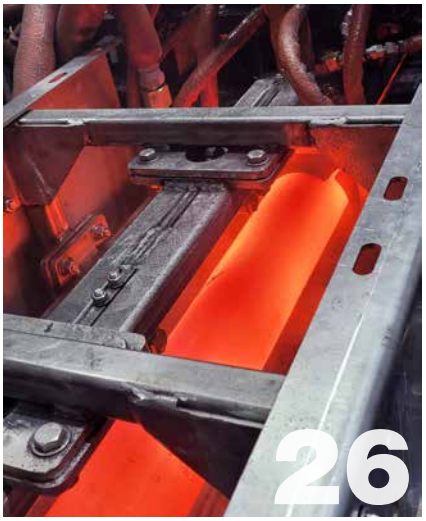
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INTERVIEW

INTECO‘s management reflects on a year of successful projects, challenges overcome, and ongoing innovations, while looking forward to a promising 2025 filled with new ventures and growth opportunities.

Now it’s the end of October, which means that most of the fiscal year is already behind us, how do you feel the year has gone so far?

ROLAND KRISTL: From my point of view, the 2024 fiscal year has been quite successful so far. This applies to both ongoing projects and to new orders we have secured to date. In addition to the plant projects, I am personally very proud of the numerous consultancy services and engineering studies we were able to conduct for our customers. I think we have done more this year than ever before.

HARALD HOLZGRUBER: I am very curious to see if we will exceed last year‘s figures because we sold numerous studies and pure engineering projects last year as well. From my point of view, the way the „new“ management team of Mr Kristl and Mr Mild has handled this year has been absolutely gratifying. I believe that we are much better positioned and organised in many fields today because we have all learned a great deal as part of this organisation over the past ten years. A very good example of this is that everyone now acknowledges that also projects smaller in its scope such as studies are essential for our business success and must not be overlooked. Although individual engineering projects are typically small, once completed to the client’s satisfaction, they can lead to the award of larger projects and are therefore to some extend the core of INTECO‘s acquisition strategy.

Another improvement – not only during this year but already over the past couple of years – is that the INTECO management starts preparing the annual financial statement during the summer to identify and resolve any potential issues well ahead of time.

Is there one key factor behind this very positive review?

ROLAND KRISTL: The most important factor in our success is and remains our long-standing and well-positioned team, which has been ‘welded together’ for many years. Many of our employees have been with INTECO for a long time and play a key role in our achievements. Moreover, our partnerships with local schools and universities help us to continue to attract new and young talent, bringing fresh ideas and new perspectives to our company.

HARALD HOLZGRUBER: I totally agree. The worst thing would be to claim that we have a fantastic team and leave

from left to right:
Dr. Harald Holzgruber (CEO INTECO Holding)
Patrick Mild (Managing Director INTECO)
Roland Kristl (Managing Director INTECO)

it at that. We need to keep our company dynamic and to withstand the temptation of not investing in the development of our employees, just because things are going well. In fact, continual change and evolution are the keys to our success.

ROLAND KRISTL: I firmly believe that new employees will introduce fresh ideas that will result in changes, enhancements, and ongoing development at INTECO. Fifteen years from now, INTECO will be a very different organisation than it is today, and we have no idea how it will look like. And that‘s a good thing.

Which orders have been confirmed in the last few months?

ROLAND KRISTL: Leading the way is the Saarstahl project. But even without this flagship project, we have successfully secured numerous small and medium-sized projects from around the world – in total, very similar to that of previous years. And, of course, as mentioned earlier, we are also very pleased with the number of engineering services and consultancy studies we were able to sell. Additionally, it is highly rewarding to receive positive customer feedback regarding both the execution and implementation of these studies and services. I believe that these studies lay a solid foundation for further activities with our customers and therefore play an important role in the future of our business. Finally, we were also able to acquire a large number of small-scale modernisation projects that make a positive contribution to our company‘s overall success. This combination allows us to approach the 2024 financial statements with great optimism.

Were there any particular challenges that had to be overcome in project execution? And if so, what successes were achieved in this regard?

ROLAND KRISTL: Of course, the steel industry is not immune to the threats we face today. Recently, one of our customers was hit by a severe ransomware attack that stopped their entire production and impacted the plants we supplied. The customer reached out on a Sunday, and our employees were there on Monday and stayed on-site for three weeks to restore operations. Our swift response was remarkable. It impressed our customer as it demonstrated our close business relationship and dedication.

PATRICK MILD: Our customers aren’t the only ones dealing with uncertainties. We repeatedly face supply bottlenecks, too. However, thanks to consistent controlling, we have improved the handling of these ‘sourcing problems’ over the past few years. We can mitigate externally caused problems in supply chains through backups and safety margins. This allows us to deliver nearly all projects on schedule. I am also very happy by how quickly we commission projects now. We already thought we had achieved peak performance, but the recent VAR projects show there is still room for improvement. It took just under three and a half months from assembly to handover. That‘s absolutely fantastic and a truly outstanding achievement – something we can be justifiably proud of. Nevertheless, we are already working on reducing this time in future projects, and I am sure we will succeed.

Which R&D activities is INTECO currently engaged in?

HARALD HOLZGRUBER: Our collaboration with the Montanuniversität Leoben on methane pyrolysis – a technology for producing hydrogen from natural gas – is worth mentioning. A new research centre in Leoben has recently opened. I am confident that as their partner for upscaling and for industrial implementation, we can really make a difference in the course of this exciting project.

ROLAND KRISTL: And, of course, we are always working on further developing our existing products. Whether it‘s the electrode controller or the Mould Level Master, we are constantly striving to stay up to date with current technology and improve them as much as possible to attract additional new customers. In many areas, we are only just beginning and, with that, we can definitely increase our brand awareness.

Finally, I would like to know: What are you looking forward to in 2025?

HARALD HOLZGRUBER:As mentioned earlier, I am very much looking forward to the results in the methane pyrolysis project. Additionally, I am excited about the upcoming trials with a rotating block in Breitenfeld (see page XX). For this, we are also working closely with the Montanuniversität Leoben, which is responsible for simulations in this project. Initial evaluations are consistent with the results of the laboratory tests which we have already conducted. Now, we are looking forward to applying these results on a larger scale, which is of course both exciting and promising.

ROLAND KRISTL: For me, next year looks to be very exciting, too. There are many new projects about to start, and none will be like the other. This exactly is what makes our work so interesting. Furthermore, I hope to see again close teamwork and ‘unity’ in our external presence. Internally, there should – no, in fact, there must be – discussions about different approaches and opinions. However, a unified external presence is essential.

PATRICK MILD: Personally, I am eager to see the ongoing progress and start of assembly of our largest project for Saarstahl to date in the coming year. It‘s always challenging to maintain momentum with such long-running projects. This also applies to the two pressure ESR plants in China and Germany along with many other ongoing projects. From my perspective, 2025 will again bring many new and exciting tasks. I am very much looking forward to that.

HARALD HOLZGRUBER: Finally, I would like to mention that from today‘s perspective, 2025 promises an expansion for the INTECO Group. In recent years, we have focused on adapting and consolidating the individual companies in the INTECO Group, and I believe it’s time to grow again. For this reason, we are currently evaluating two potential companies that we may acquire. This will bring new challenges, but I am confident that we will handle them well and achieve growth and added value for the INTECO Group, like in the past.

Throwback to past events.

The Liquid Metal Processing & Casting Conference

The Liquid Metal Processing & Casting Conference took place in September in Leoben, Austria, and we at INTECO were proud to participate as a gold sponsor. This prestigious event provided an excellent opportunity for us to showcase our advancements in casting and titanium production technologies to an esteemed international audience of industry experts.

Our team presented two papers during the conference which showcased our cutting-edge research and developments. INTECO's R&D team was particularly proud to have one of their papers selected as one of the best at the conference, in collaboration with Ampere Scientific. This underscores our commitment to excellence and innovation in the industry.

Impressions of the LMPC
in Leoben, Austria
Photo credits: LMPC

Impressions of the
Titanium USA conference
in Austin, TX

TITANIUM USA 2024

In October, our team of titanium experts participated in the Titanium USA convention held in Austin, Texas. This event provided the perfect opportunity for us to connect with industry professionals and enthusiasts from around the globe. We were delighted to welcome an international audience to our INTECO booth, where we showcased our cutting-edge technologies and solutions. During the convention, we engaged in insightful discussions that highlighted the benefits and advancements of our innovative Titanium VAR production process. Attendees were particularly interested in how our approach enhances efficiency and quality in titanium manufacturing. The exchange of ideas and feedback from industry leaders was invaluable, and we are grateful for the opportunity to share our expertise and learn from others in the field of titanium.

Best managed companies 2024

INTECO has been recognized as one of Austria‘s Best Managed Companies by Deloitte! This award highlights INTECO’s exemplary performance in key areas such as strategy, innovation, governance, finance, culture, and commitment, as well as its approach to handling cyber risk and its focus on Environmental, Social, and Governance (ESG) principles.

Deloitte Austria, in collaboration with Raiffeisenlandesbank Niederösterreich-Wien, evaluated INTECO as part of their internationally established “Best Managed Companies” program. This marks the fourth consecutive year that exceptional Austrian companies have been honored. Receiving this award reflects the hard work and dedication of the INTECO team, under the leadership of Dr. Harald Holzgruber, alongside managing directors Mr. Roland Kristl and Mr. Patrick Mild.

Dr. Holzgruber expressed immense pride, stating that the award not only celebrates the company‘s commitment to excellence in corporate governance but also highlights the passion and drive of the entire INTECO team. This recognition establishes INTECO as a leader in the melting and casting technologies sector, and a benchmark of operational excellence in Austria.

Impressions of the ECCC2024 (top two pictures) and the ESF (bottom picture)

Essen,
Germany

2024 steel hotspot.

ECCC 2024

In October, our casting team took center stage at the European Continuous Casting Conference (ECCC)! We proudly presented our advanced combi-caster, designed for flexible production, and demonstrated its innovative capabilities and the impact it can have on the steel industry. As a silver sponsor of this event, we were thrilled to support this important gathering of professionals. Our presence at the conference allowed us to engage with industry leaders and share insights on the latest advancements in casting technology. The discussions fostered collaboration and inspired new ideas, reinforcing our commitment to driving innovation in the field.

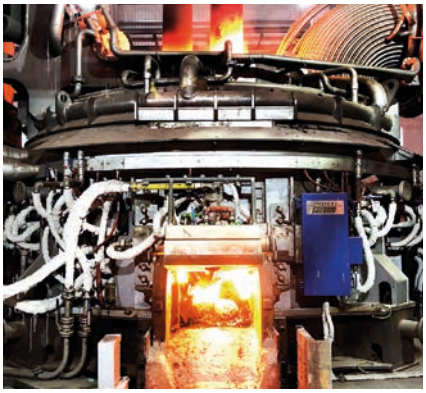
European Steel Forum 2024

After hosting the European Steel Forum by the American Iron and Steel Association (AIST) in 2023 in Leoben Austria, we were happy to have the opportunity to also be a part of this year's event in Essen.
Dr. Harald Holzgruber represented our company on an industry leader's panel about innovative plant technology, introducing our research and development activities on hydrogen production by methane pyrolysis to an international crowd of experts.

INTECO PTI: Chemical energy systems for EAF

INTECO PTI has supplied chemical energy systems for the steel industry, in particular for electric arc furnaces, including oxy-fuel burners, material injection systems, control- and automation systems, preheating and drying combustion systems, since 1993.

Save chemical energy for your EAF with INTECO PTI's chemical energy systems.



Increase your EAF operator safety with INTECO PTI's SwingDoor.

Control material injection at its best with INTECO PTI's carbon and lime injection systems.

The ultimate control and flexibility or your steel production with preheaters and dryers.

Automatic stirring gas supplied by INTECOS automatic gas coupler systems guarantee operator safety.

Increase your EAF operator safety & efficiency with temperature measurement & metallurgical samping.

Nucor Berkeley I USA

New tundish dryer upgrade package

Nucor Steel Berkeley in South Carolina has ordered a new Tundish Dryer Upgrade Package from INTECO PTI. This package will feature advanced combustion air and natural gas control lines, as well as new burners. As with the other orders, all components will be custom-engineered and built at INTECO‘s workshop in Atlanta, GA.

Nucor Hertford I USA

Successful start-up of INTECO PTI Swingdoor

INTECO PTI recently completed the supply, startup, and commissioning of a Swing Door technology package for Nucor Hertford’s Consteel AC EAF. With special thanks to the Operations and Maintenance team for their excellent support during the installation and start-up process. The Swing Door improves foamy slag control by keeping the slag door closed for most of the heat cycle, only opening for steel sampling and de-slagging. This helps to reduce energy loss, carbon consumption, and increases yield, resulting in indirect savings in CO2 emissions through reduced electrical energy and electrode consumption.

Nucor Decatur I USA

New tundish dryvibe upgrade package

Nucor Steel Decatur in Alabama has placed an order with INTECO PTI for a Tundish Dryvibe Mandrel Upgrade Package. The new mandrel will feature combustion air and natural gas control lines, with all components mounted on a skid for heat protection and ease of maintenance. The gas train will include the necessary control and safety devices. All preheater components will be custom-engineered and built in INTECO‘s workshop in Atlanta, GA.

Gerdau Midlothian I USA

Customized horizontal ladle preheater

Gerdau Midlothian in Texas has placed an order for a fully customized horizontal ladle preheater from INTECO PTI. The package includes engineering, project management, installation, start-up and commissioning, along with state-of-the-art software and preheater controls to optimize utility consumption. The unit will feature a cast refractory lid, an exhaust connection to the main duct, and maintenance gates on the side. All components will be custom-built at INTECO‘s Atlanta workshop.

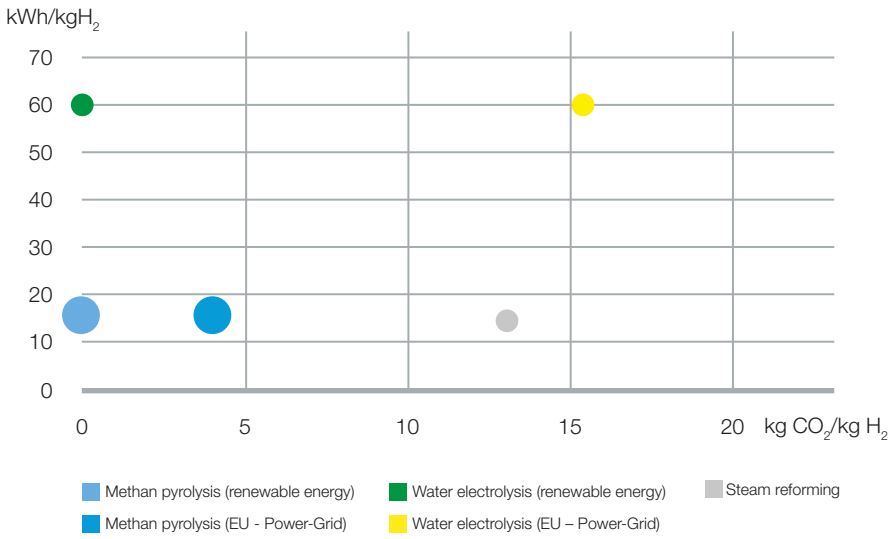
Road to industrial-scale H_2 production

Methane pyrolysis represents a groundbreaking advancement in hydrogen production technology, offering a cleaner, more efficient alternative to traditional methods. Explore more about INTECO's initiatives to revolutionize the industry with zero-emission hydrogen production.

Why methane pyrolysis?

... very low energy input
... zero CO_2 emissions
... for natural gas and bio gas

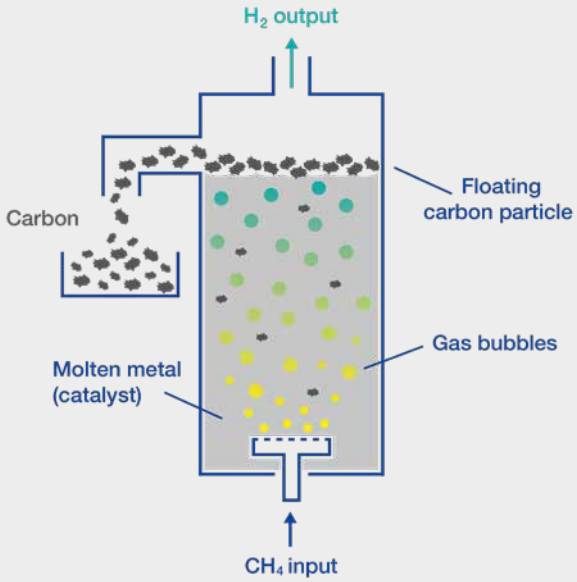
Hydrogen production process (EU-Power-Grid)



Partnership to advance methane pyrolysis technology

Methane pyrolysis, one of the most promising technologies for large-scale hydrogen production, is at the core of a new partnership between INTECO and Montanuniversität Leoben. This cutting-edge process breaks down methane (CH_4) into gaseous hydrogen and solid carbon, making it possible to produce both with nearly zero emissions from natural gas. Furthermore, biogas can also be used as a feedstock.

Currently, most hydrogen is produced through steam methane reforming (SMR), a process that involves reacting methane with water at high temperatures to produce hydrogen and carbon dioxide (CO_2). While SMR is efficient and widely used, it results in significant CO_2 emissions. Methane pyrolysis, in contrast, requires a comparable amount of energy but offers a transformative advantage: it produces hydrogen without emitting CO_2. Instead, the carbon is captured as a solid byproduct, significantly reducing its environmental footprint.



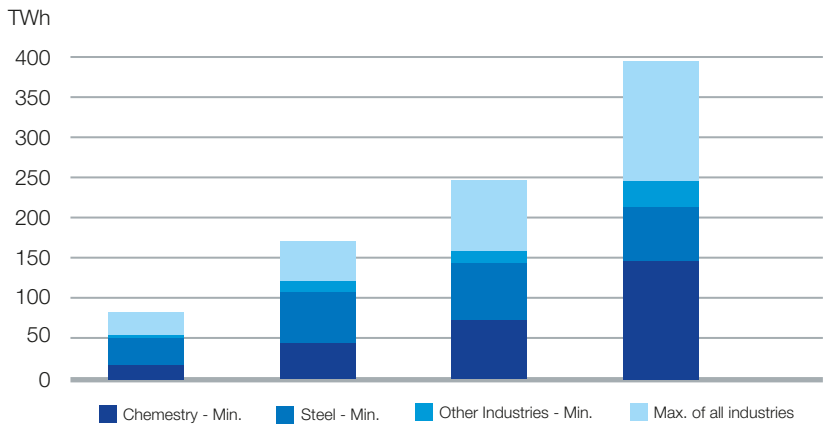
Methane pyrolysis process

Methane pyrolysis based on a liquid metal bath is an innovative method for producing hydrogen with minimal carbon emissions. In this process, methane is injected into a bath of molten metal at high temperatures. The liquid metal facilitates the thermal decomposition of methane into gaseous hydrogen and solid carbon. The key advantage of using a liquid metal bath is that it prevents the solid carbon from forming deposits on reactor surfaces, allowing for continuous and efficient operation. Additionally, the solid carbon can be collected for use in other industries, making the process nearly waste-free. Another major advantage of methane pyrolysis is its remarkably low energy requirement — it only needs about one-fifth of the energy required for hydrogen production via water electrolysis.

Economic hydrogen production at an industrial scale is critical for Direct Reduced Iron (DRI) production, a key input material for the steel industry‘s transformation. As electric arc furnaces (EAFs) increasingly replace traditional blast furnaces, the availability of hydrogen produced through low-energy, low-emission methods will play a vital role in decarbonizing steelmaking. Moreover, the product gas from methane pyrolysis can be tailored to optimize the carbon content in DRI. Beyond steel production, hydrogen is also being explored as an alternative fuel for industrial furnaces, such as reheating furnaces and heat treatment facilities, further emphasizing its versatility.

This collaboration is closely tied to Montanuniversität Leoben's Forschungszentrum für Wasserstoff und Kohlenstoff, a leading facility focused on advancing hydrogen-related technologies. Building on earlier research and the development of a pilot plant, the next step in the R&D project involves scaling methane pyrolysis to industrial levels. This upscaling effort is supported by trials conducted at the Forschungszentrum für Wasserstoff und Kohlenstoff, with the goal of demonstrating the feasibility of large-scale, efficient hydrogen production. The partnership between INTECO and Montanuniversität leverages both INTECO's engineering expertise and the university's research capabilities to unlock the full potential of this transformative technology, positioning it as a cornerstone for sustainable hydrogen production and a critical enabler for the green transition in steelmaking and other industries.

Forecast hydrogen demand of German industry



Source: Nationaler Wasserstoffrat (May 2024)

H_2 demand for steel industy

The minimum demand for the German steel industry is projected to be 67 TWh (2 million tons) by 2045. But there is far more demand on H_2. The total demand for the entire German industry could reach up to 400TWh by 2045.

Hydrogen in the steel industry is used as a reduction agent and works as a energy carrier for high temperature processes such as EAF burner systems and industrial furnaces.

Steelmaking

INTECO covers the entire spectrum from melting in electric arc furnaces to further processing of liquid steel in ladle furnaces, RH plants, VD/VOD units, or an AOD converter. Casting is handled by INTECO's Advanced Teeming Systems and highly innovative casting machines. Learn more about our versatility and commitment to innovation across different sectors in the steel and non-ferrous industry.

Impressions of the first heat of the 60t electric arc furnace and ingot casting facility at GMTC

60t electric arc furnace (right) and ingot casting faicility (left) in operation at GMTC

Gloria Material Technology Corp. I Taiwan

First steps of the melt shop start-up completed

INTECO has reached a major milestone in its partnership with Gloria Material Technology Corp. (GMTC), with the first heat of the 60t electric arc furnace (EAF) successfully completed in July 2024. This achievement marks a significant step forward for Gloria‘s state-of-the-art special steelmaking complex, designed and equipped by INTECO.

INTECO supplied the technologies and equipment for Gloria’s state-of-the-art steel complex:

- An electric arc furnace (EAF): The heart of the complex, designed for efficient, high-quality steel production.
- Secondary metallurgical complex: Featuring ladle furnace (LF), vacuum degassing (VD/VOD), and argon oxygen decarburization (AOD) units. These systems ensure precise control over the chemical composition and quality of the steel.
- Expanded casting facilities: INTECO has equipped the casting area with cutting-edge technology, including both conventional ingot production with a teeming car for large forging ingots and its Advanced Teeming System (ATS), a highly efficient solution for high performance ingot casting.
- One of the most impressive pieces of technology installed at Gloria’s facility is the INTECO Segment Caster, capable of producing ingots with diameters of up to 1200mm. The combination of INTECO’s ATS and Segment Caster makes the steel mill one of the most versatile and advanced facilities for special steel production globally.

The entire steel mill is on track to gradually ramp up to full production capacity in the next year.

Confidential Customer I Europe

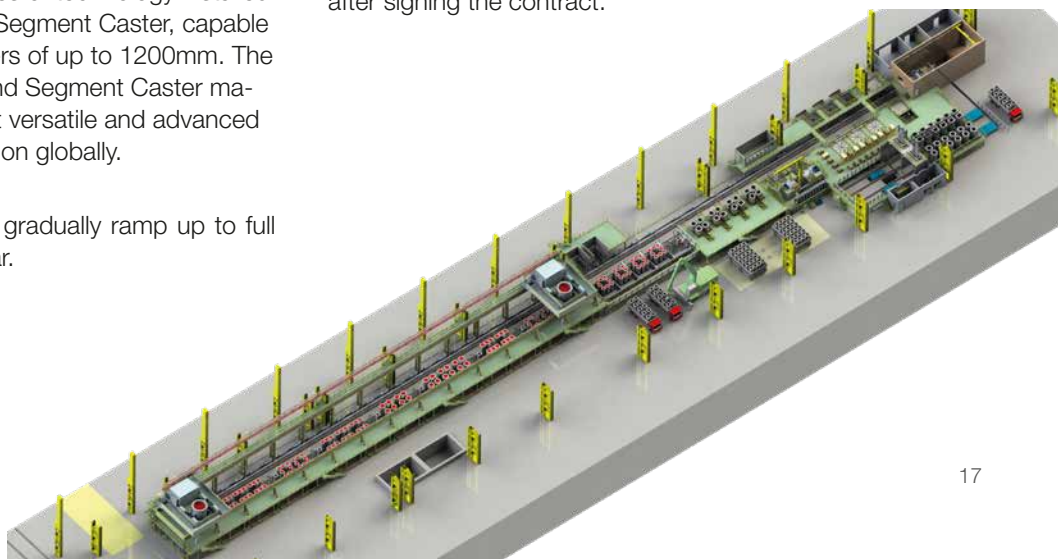
Cutting-edge ingot production line awarded

In the beginning of October, INTECO was awarded a contract to design and supply an advanced ingot production line for a leading European manufacturer, with a production capacity of up to 200,000 tons per year. The Advanced Teeming System (ATS) can handle ingots ranging from 5 to 12 tons, offering a state-of-the-art solution tailored to the customer‘s specific needs.

INTECO’s ATS systems are custom designed for each application and offer several key advantages, including:

- Enhanced work safety and an improved working environment
- Reduced manual labor and improved ergonomics
- High integration of robotics
- The option to implement a high-quality tracking system with full traceability, from scrap yard to finished ingot
- Better quality control and increased product yield
- Greater control over metallurgical conditions, leading to improved steel quality

With a commitment to efficiency, the commissioning of this advanced production line is set to take place just one year after signing the contract.



INTECO can do it all:
With extensive expertise and know-how we develop and tailor furnaces from scratch to your field of application.

Confidential Customer I Europe

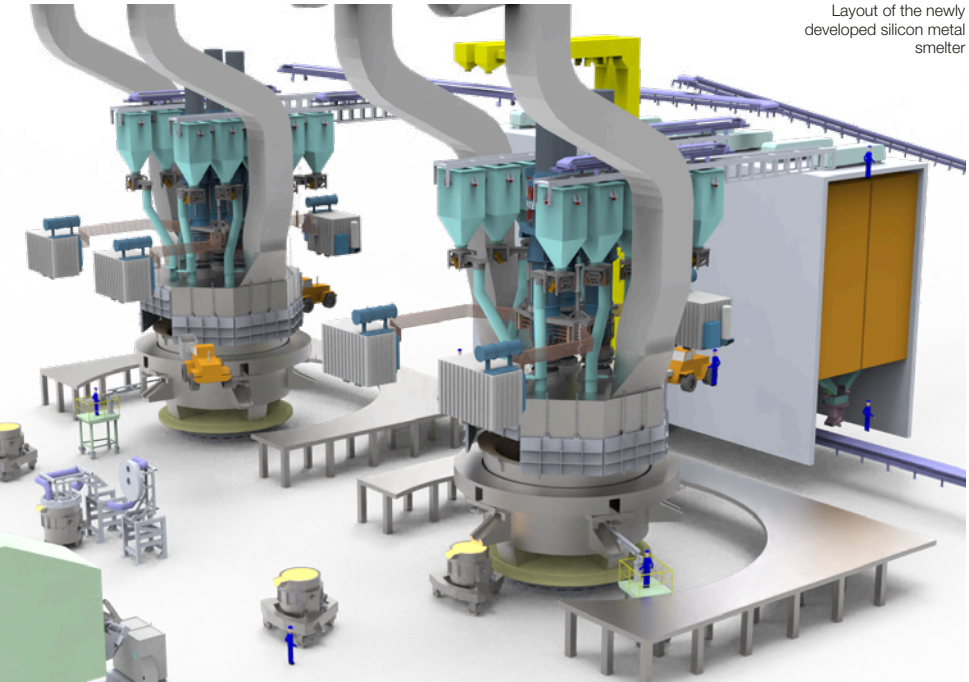
Electric furnace for stone wool production

In the responsible manufacturing of stone wool, electric melting is a key focus area. INTECO was contracted by a renowned manufacturer for its expertise to help them switch to a new type of transformer for an electric arc melting furnace. To support this, we took electrical measurements on both the primary and secondary sides of the furnace transformer and wrote a technical report on the current status. This report provides an overview of energy transmission to meet the furnace's demands and outlines potential improvements related to the planned transformer replacement.

INTECO took these measurements using certified portable power quality analyzers operated by its in-house experts. The goals for this specific project included:

- Calculating the circular diagram for the existing transformer
- Evaluating the working points and their accuracy in the process
- Calculating the circular diagram for the new transformer
- Recommending adjustments to translate current working points to the new transformer
- Providing an assessment of expected challenges and behavior of the new transformer

INTECO offers valuable expertise even for specialized requests, ensuring precise analysis and tailored solutions. Our ability to handle complex projects underscores our commitment to delivering high-quality results across various technical challenges.



Layout of the newly developed silicon metal smelter

Confidential Customer I Asia

INTECO advances silicon metal smelter project

INTECO has recently completed a comprehensive engineering study for the development of a new silicon metal smelter on behalf of a long-term client in the Middle East. With a projected output of 30,000 tons of silicon metal annually, this state-of-the-art facility will support the region's growing demand for high-quality silicon in sectors such as chemicals, aluminum, and photovoltaic (PV) manufacturing.

The plant will be equipped with two high-performance furnaces, each designed to optimize output while minimizing the environmental impact and energy consumption. A key focus of the project is the efficient use of by-products, such as micro silica, which can be repurposed for the cement industry, adding a valuable sustainable element to the process. Additionally, future plans for the facility include the installation of an atomizer, which will enable the production of silicon metal powder.

The furnace design also offers flexibility with electrode technologies. It accommodates a range of electrode types, including aluminum casing Söderberg electrodes, which are known for their cost-effectiveness and low operational expenses. This choice in electrode technology allows the client to maintain competitive manufacturing costs while ensuring high-quality silicon output.

INTECO will equip the new fused magnesite furnaces with components and features for

improved productivity

improved safety

reduced energy consumption

lowered maintenance costs

consistent product quality

View insight a fused magnesite furnace from a previous project

Maithan Ceramic Ltd. I India

Advanced fused magnesite furnaces

We are thrilled to announce a significant new project in collaboration with Maithan Ceramics Ltd., one of India's leading refractory manufacturers. INTECO will supply the engineering and core components for several state-of-the-art fused magnesite furnaces.

The new fused magnesite furnaces will be equipped with advanced features designed to enhance energy efficiency, production yield, and overall operational control. Key features include:

- INTECO's Smart Electrode Controller (ISEC): Ensures precise control over the fusion process, which improves productivity and reduces energy consumption.
- Water-Cooled Furnace Shells: These will enhance the durability of the furnace, lowering maintenance costs while improving safety.
- Rotating Fusion Platform: This feature will optimize the uniformity of the fusion process, ensuring consistent product quality.

These technologies are designed to reduce energy usage and increase output and yield.

This high-profile project will be coordinated by INTECO's local branch in India, ensuring that the engineering, delivery, and installation process runs smoothly and efficiently. Having a local team allows for quicker response times and tailored solutions that will meet Maithan Ceramics Ltd's specific needs.

Maithan Ceramics Ltd. has built a strong reputation as a leading player in the ceramics and refractory market, specializing in the production of high-quality refractory materials used in steel, cement, and other high-temperature industries. Their commitment to innovation, quality, and sustainability has made them a trusted partner for industries across India and internationally. With this new partnership, Maithan Ceramics Ltd. is set to enhance its production capabilities in the fused magnesite segment.

The start-up of the new fused magnesite furnaces is scheduled for the last quarter of 2025. The project marks a significant milestone for both Maithan Ceramics Ltd. and INTECO.

Confidential Customer I North America

Ferro-alloys production from waste slag

This confidential client is planning the construction of a greenfield facility to produce ferro-alloys from waste slag. The wet slag will be dried on-site before it is blended with a carbonaceous reductant, fluxes, and recycled materials and then fed into the smelting furnace. Leveraging its extensive experience in designing ferro-alloy smelters, INTECO has been contracted to develop a completely new furnace design, tailored from scratch to accommodate this unique process and raw material. This plant will be the first of its kind, pioneering a new metallurgical process, with start-up scheduled to commence in approximately 1 ½ years.

Saarstahl AG I Germany

Secondary metallurgical facility to meet the needs of new EAF production

Saarstahl AG is pushing the boundaries of sustainable steelmaking with its ambitious Power4Steel project, which entails transitioning from conventional blast furnace technology to electric arc furnace (EAF) steelmaking. The Power4Steel project includes the construction of a cutting-edge secondary metallurgy facility featuring a 200t twin ladle furnace, a 200t RH degasser with high-performance mechanical vacuum pumps, and a comprehensive material handling system. These components are tailored to meet the distinct refining needs of new EAF production. This latest collaboration with INTECO, following the successful installation of twin ladle furnaces and an RH degasser in 2014, highlights the strong partnership between the two companies, with the objective of completing the first heat by January 2027.

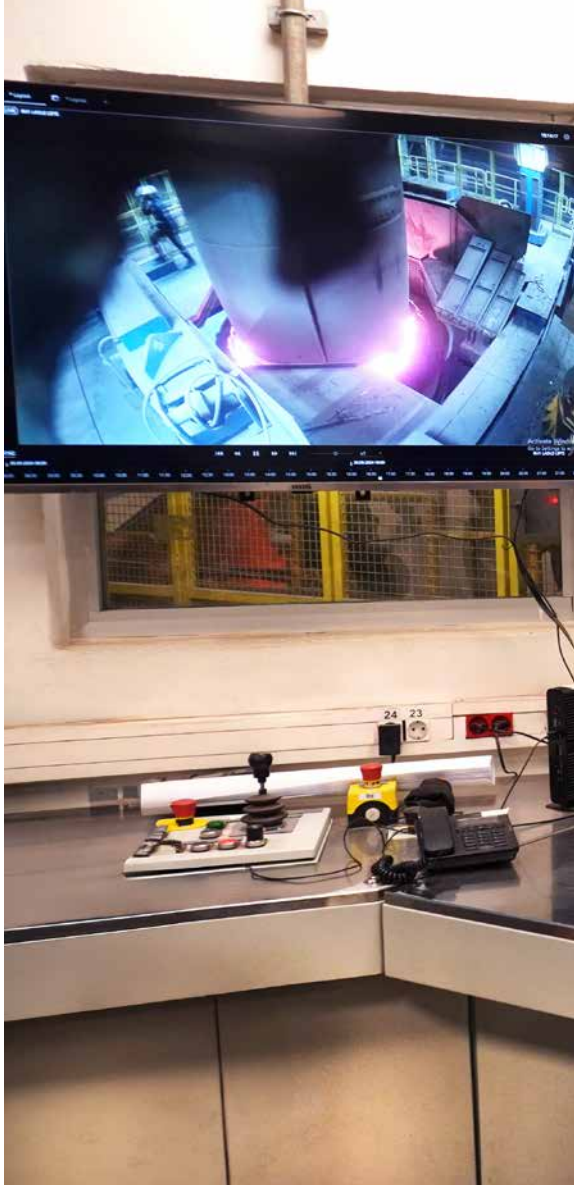
Central to the new RH plant is INTECO's custom-designed dry mechanical vacuum pump skid. The system eliminates the need for steam generation, effectively cutting CO_2 emissions, and reduces water use by eliminating the need for water conditioning and condenser cooling. The use of small, energy-optimized vacuum pumps provides flexibility and safety, further streamlining operations and maintenance.

Tata Steel I The Netherlands

INTECO and Tenova collaborate to revolutionize secondary metallurgy

With the increasing demand for the electrification of integrated steelmaking plants, secondary metallurgy processes must be re-evaluated and upgraded. In response to this, INTECO is excited to collaborate with Tenova on a major project for Tata Steel Netherlands. Together, we are leveraging our combined expertise and state-of-the-art technologies to ensure the success of this ambitious initiative. As part of the project, we will provide the engineering for two 330t RH degassers. These systems will feature a hot offtake car for a quick exchange of the split-type vessel, along with an oxygen lance for efficient decarburization. The hydraulic lifting system will raise the ladle with the transfer car, while a material feeding system will allow for alloy additions under vacuum conditions. In addition to the RH degassers, a desulphurization station will be designed and equipped with an automatic lance manipulator for precise lime and calcium carbide injection.

Both the RH degassers and the desulphurization station will feature automatic temperature measurement and sampling systems. The advanced Level 2 System will ensure comprehensive process control and monitoring, optimizing efficiency and enhancing metallurgical performance. Basic engineering for the project is expected to be finalized by the end of the year.



Control room of the 200t RH degassing plant at Isdemir

Isdemir Iskenderun Demir ve Çelik A.S. I Turkey

Flexibility and efficiency for commercial production

At the beginning of October, Iskenderun Demir ve Celik A.S. (Isdemir), one of Turkey's largest steel manufacturers, launched the commercial operations of its advanced 200t twin RH (Ruhrstahl-Heraeus) degassing plant, equipped with INTECO technology. Despite considerable challenges encountered by the project teams, the full-performance tests are on track for completion by the end of the year.

The teams encountered numerous obstacles during the project, including an extended halt in operations due to the

devastating earthquake that struck the region in early 2023. This unforeseen disruption led to delays and required the teams to adapt swiftly under challenging circumstances.

Despite these setbacks, INTECO's twin RH system now offers Isdemir exceptional flexibility and efficiency. The system features quick-change capabilities between the two treatment stands, reducing cycle times and enhancing productivity. A shared steam-ejector vacuum pump and a versatile multi-functional top lance offer advanced features such as decarburization, chemical heating, and skull removal. Furthermore, the integrated material-handling system supports both RH vessels and an adjacent treatment stand, which is essential for removing non-metallic inclusions and fine-tuning the chemical composition.

RH degassing system installed at Isdemir

Layout of dust separation system for a VD plant at Uddeholms AB

Uddeholm AB **I** Sweden

Advanced dust separation solution

INTECO, a long-standing partner of Uddeholms AB, has been entrusted with a new project to enhance Uddeholms‘ vacuum-degassing plant. Currently, dust from the vacuum degasser is washed out of the gas flow by the condenser cooling water. However, this dust must then be separated from the water, which presents a significant operational challenge.

To address this, INTECO will install a dust-separation system between the treatment ladle and the steam ejector vacuum pump. This new system will consist of two cleaning stages. The first stage involves a cyclone, which will separate approximately 30% of the dust, while also integrating a gas cooler to reduce the exhaust gas temperature before it enters the next phase. In the second stage, a bag filter system will capture the remaining dust, ensuring more efficient and environmentally-friendly operations. The primary goal of this system is to remove any zinc from the off-gas stream, a crucial improvement for cleaner manufacturing.
The order for this project was placed in May 2024, with the installation scheduled to take place during the summer shutdown in 2025. This development marks another milestone in the long-standing collaboration between INTECO and Uddeholms AB, reinforcing their commitment to innovative and sustainable metallurgical solutions.

Confidential Customer **I** Italy

Innovative stacker system revolutionizes production

In October of 2024, INTECO‘s innovative stacker system was successfully implemented at an European rolling mill. The stacker is equipped with retractable arms and rotating magnets, allowing it to efficiently process a wide range profiles, including rounds, flats, squares, angles, tees, and channels. The project is targeting a production capacity of around 70t per hour.

The stacker is particularly suited for special steel rounds and flats, which need to be packed at temperatures above 500°C to prevent cracking, which exceeds the typical limits of magnetic stackers. In addition to its technological innovation, the system offers low maintenance, high productivity, and precision, and all movements are controlled by electric motors and electromechanical actuators.

INTECO also delivered unloading devices - scheduled to be operational next year – equipped with full weighing capabilities, along with a new safety PLC and HMI for advanced process control. This will allow the plant to adopt Industry 4.0 solutions and benefit from government support for technological advancements.

Innovative stacker system to improve production process by handling different profiles

Making operation safer and more reliant with INTECO‘s automatic gas coupling system

INTECO’s Automatic Gas Couplers continue to add to their success with several new orders, showcasing their industry-leading innovation and reliability:

In the summer of 2024, Gerdau Tultitlan placed an order to equip two ladle transfer cars (including one spare car) and five ladles. Engineering is scheduled to be completed by early November 2024.

USC Taiwan also placed an order for gas couplers for two ladle transfer cars and eight ladles in the summer of 2024. The engineering work is scheduled to be completed by early December 2024. Two significant orders were secured for this plant from leading manufacturers in the steel industry. The first includes equipping one EAF tapping car, two LF transfer cars, and nine ladles, all equipped with INTECO’s renowned non-return valves for enhanced safety and operational efficiency. The second order involves the installation of a gas coupler for one RH transfer car. Engineering is progressing well, with completion expected by the end of 2024, and installation scheduled for the summer of 2025.

In partnership with Ovako Hofors’ engineering department, we developed a tailored gas coupling system for their transfer cars. In October, Ovako placed an order for three male and eight female couplings, demonstrating the adaptability of INTECO‘s couplers to customized requirements.

The gas coupling system for SSAB Alabama was successfully installed on two ladle transfer cars and two VTD tanks during the scheduled shutdown in October. Since its installation, the stirring process has been running flawlessly, underscoring the reliability and efficiency of INTECO’s systems.

Highlights of INTECO’s automatic gas coupling system:

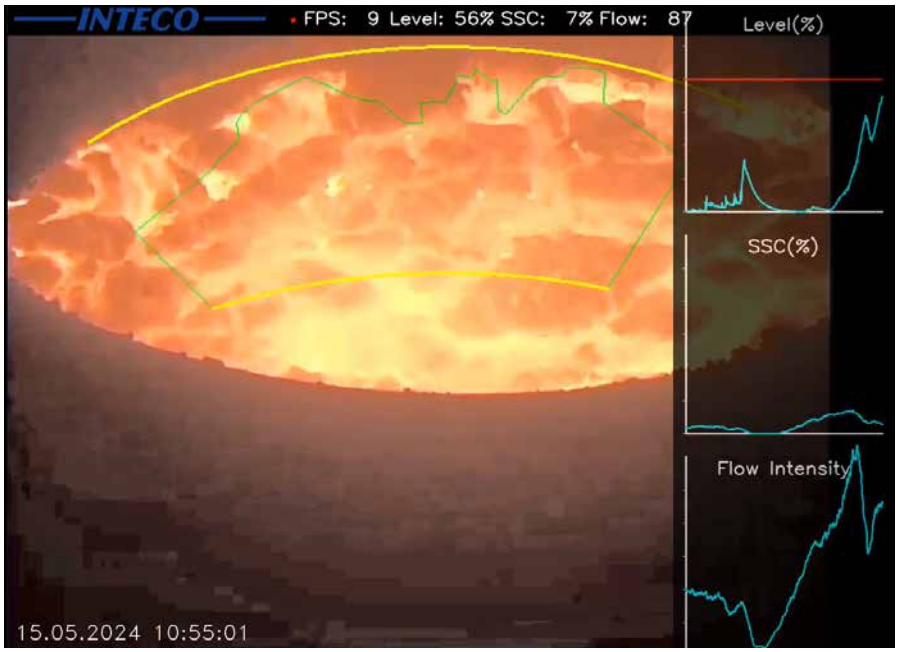
- Quick and safe coupling: INTECO’s gas couplers are designed for rapid, secure connections that ensure operational safety.
- Durability in extreme conditions: Built to withstand the harsh environments of steel production, INTECO’s couplers maintain performance even in high-temperature settings, such as inside vacuum tanks.
- Customizable solutions: Our gas couplers can be tailored to specific plant requirements, offering flexibility across various applications.

Application of INTECO‘s automatic gas coupling systems

- Tapping car
- Within the deslagging station
- VD/VOD (up to 600 °C in the vacuum vessel)
- RH plants
- Ladle furnace
- Ladle stirring station
- Ladle turret

Special application to optimize vacuum tank degassing

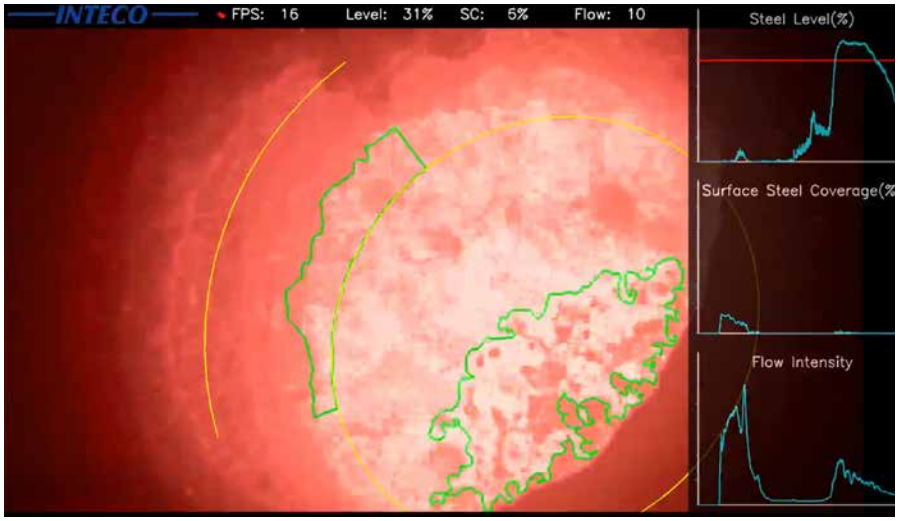
Improve your vacuum tank degasser by implementing INTECO's real-time video analytics technology (IRVA-VD) to measure all parameters. Don't want to make a big change? No problem! Our technology is compatible with your existing optical or IR camera.



The slag foaming phenomenon in vacuum tank degassers leads to slag overflow and therefore not only reduces productivity and increases the rejection rate, but also presents notable health risks to your employees during ladle rim cleaning and on the caster deck. Though it might seem feasible to measure slag levels in the VD using extra sensors, this approach does have considerable disadvantages: It comes with mechanical modifications, it can create potential leakage spots, and it requires regular equipment maintenance.

In comparison, INTECO's IRVA-VD comes with none of these issues and offers even more than alternative systems do. The IRVA-VD transforms any existing camera into a powerful tool for monitoring and optimizing vacuum tank degassing processes. The algorithm evaluates the effectiveness of gas stirring, the exposed stirring eye and the critical slag foaming events through real-time video analysis. This contributes to proactive process management and further improves the accuracy of degassing models.

Superior method for monitoring and optimizing vacuum tank degassing processes to improve productivity and safety without the drawbacks of traditional sensor-based methods.



- Advanced algorithms analyze the video stream in real-time
- The bath level is measured and transferred to the PLC for automatic pressure regulation.
- Steel surface detection improves the degassing process and provides input for automatic stirring control.

existing

Any standard client can be used to display the RTSP live video stream with information overlay.

The PLC can use the signals from the analysis algorithms directly in the logic to implement automatic flooding and fully automatic pressure control.

RTSP

OPC-UA

IRVA-VD

An industrial PC runs the advanced real-time video analytics. The software can be supplied as a standard service for Windows or Linux devices or as a SIEMENS SIMATIC EDGE application.

existing

The application is designed to work with both optical and infrared camera systems. If you have existing cameras that you would like to use, we can supply a package that includes a new camera and an adapter.

Benefits of IRVA-VD

- Slag level measuring provides slag foaming measurement/ slag overflow prevention for improved safety and serves as an input for automatic pressure control and automatic stirring control for reduced pump down and degassing times
- Steel surface measuring improves the degassing process through automated gas stirring operation and degassing model accuracy
- Compatible with existing optical or IR cameras for optimal vision during low visibility (dusty) phase

Casting

INTECO is proud to offer you not only all well established continuous casting technologies for blooms, beam blanks, slabs and billets, but also machines for special casting techniques such as horizontal and vertical casting.

Confidential Customer **I** USA

Successful commissioning of horizontal caster

INTECO has been recognized for its technological support and commissioning assistance in the successful start-up of a horizontal caster in Indiana, USA. Thanks to the excellent cooperation between both teams, the one-strand horizontal billet caster was successfully put into operation in 2024, delivering quick results.

The caster features a specially designed mould tailored to the unique demands of horizontal casting, a novel electromagnetic stirrer for challenging steel grades, and state-of-the-art secondary cooling equipment. With INTECO's expertise, the US-based customer is now well-positioned to enter the domestic market for high-quality products. The plant has already successfully produced 125mm-diameter billets of gray cast iron and ductile iron but is also capable of casting high-demand tool steel grades.

The customer expressed deep gratitude to INTECO's team, emphasizing that their technical support was instrumental in laying a solid foundation for the project's success and its promising future.

GMH Group **I** Germany

Redesigning the existing section size of a caster in operation for years

In August 2023, the German steel manufacturer Stahlwerk BOUS, part of the GHM group, commissioned INTECO to redesign the section size of their continuous caster, with the objective of optimizing the equipment for a section size of 430x320mm. This redesign was essential, since the existing equipment had been in operation for nearly 20 years and was nearing the end of its service life.

The project's scope includes engineering and supplying new equipment for Bous' two-strand bloom caster, specifically tailored for the 430x32 mm section. The contract covers three sets of moulds and the casting segment, complete with a linear stirrer and templates for their maintenance shop. This state-of-the-art design is intended to streamline operations and maintenance while enhancing production quality. With the equipment now fully delivered, it is prepared for the first casting operation, and we anticipate a significant improvement in quality compared to the previous production output.

Expanding caster features

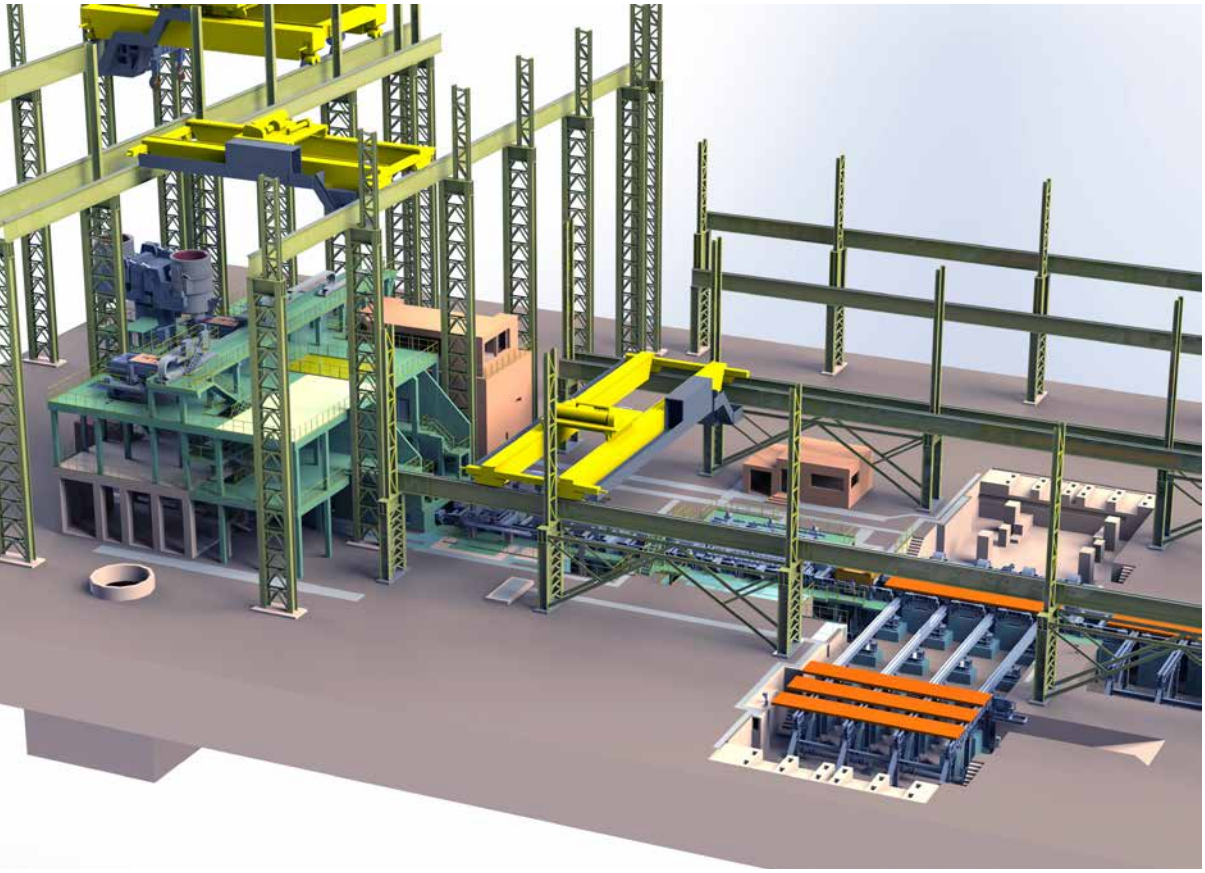
INTECO recently introduced a groundbreaking “combined 5-strand continuous caster”, capable of producing a versatile range of casting formats. This includes round formats ranging from 250mm to 450mm, 140mm square formats, and 280x380mm rectangular formats.

The caster incorporates advanced features like soft reduction, dynamic secondary cooling, electromagnetic stirring, and continuous unbending, making it a state-of-the-art solution for the steel industry. Following its successful commissioning and ramp-up support, the caster began producing round sections with a 250mm diameter and 200mm squares, delivering excellent quality results. Although the caster was primarily designed for round section production, we also applied soft reduction capabilities to these products to improve the quality.

In response to the changing market demands, which often require high-carbon rectangular formats with minimal segregation, the customer requested modifications from INTECO. These changes are designed to enable soft reduction for both rectangular and round formats while minimizing machine downtime. We also have plans in place to introduce a new, larger round format of 520mm. The installation of an electro-plasma heating device has also been engineered to handle potential slowdowns caused by ladle delays, which will prevent interruptions due to ladle freezing.

This adaptability highlights INTECO’s commitment to long-term partnerships, supporting customers in enhancing product quality and expanding their product lines. The success of this project has garnered significant attention and praise from casting experts at various international conferences, cementing INTECO’s reputation for innovation in the field.

Enhancing product quality and expanding your product range – from initial round formats to square formats and applications for improved quality and additionally adding larger formats – INTECO is flexible and will adjust your caster to the needed requirements while taking all aspects into account.



Slab caster layout for our confidential customer (left) and slab caster in operation and to be revamped (right)

Confidential Customer I Asia

Advancements in engineering excellence

INTECO has reached a significant milestone in its company history with the award of its very first slab caster project. This contract to design and supply a state-of-the-art slab caster will greatly enhance INTECO’s portfolio of continuous casting products. This accomplishment not only reflects years of dedicated development work and intensified sales efforts but also marks a pivotal moment for the company. During the engineering phase, INTECO demonstrated its flexibility by successfully meeting the customer's request to extend the width range of the caster up to 2500mm.

At INTECO, we recognize that continuous innovation is the key to progress. As a result, we are committed to continuously improving our engineering processes. After completing the engineering phase, the team proposed a significant design upgrade by replacing the hydraulic oscillator drive system with a servo drive system. This innovative modification enhances reliability while reducing both operating and maintenance costs. The servo drive oscillator, which has already proven effective in billet and bloom casters, is now being adapted for slab casting, representing a significant technological advancement.

The customer welcomed this proposal, making them the operators of the world's first slab caster equipped with a servo drive oscillator. This development underscores INTECO's commitment to evolving engineering solutions and providing innovative technology to its clients.

The project is currently in the manufacturing stage, and updates on its progress, as well as a smooth commissioning process, will be shared in the next issue of the newsletter. INTECO is excited about this new chapter in its journey and is looking forward to further innovations in the field of continuous casting.

INTECO always strives to deliver suitable state-of-the-art equipment to the customer. This dedication doesn't even stop during the engineering phase. Suggestions and changes to the scope of supply are made to the customer, to further improve their production capabilities.

Confidential Customer **I** Asia

Revamping of caster facilities

To ensure high-quality cast products, every phase of the process is critical, beginning with steel handling operations. Following this principle, a confidential Asian customer has chosen to upgrade its aging casters and has entrusted INTECO with revamping two of its 2-strand slab casters. The primary modifications include a modification of the ladle turret to allow it to lift the ladle and designing a new tundish car to accommodate a larger tundish.

These seemingly simple upgrades will significantly improve the surface quality. Modifications to the ladle turret will streamline the ladle change operations, leading to a substantial reduction in steel re-oxidation, which in turn will significantly reduce any inclusion defects in the final product. The larger tundish will extend the steel residence time, resulting in enhanced cleanliness of the products.

Additionally, the upgrade includes the implementation of INTECO's Mould Level Master, a state-of-the-art system that will improve the stability of the mould level. This enhancement provides extra assurance that the cast products will exhibit excellent surface quality.

Confidential Customer **I** Asia

Slab caster upgrade for quality improvement

An Asian customer has awarded INTECO a contract to modernize its 2-strand slab caster, in order to enhance product quality and establish a competitive edge. This retrofit project covers various machine components, combining upgrades to existing features with new installations.

To achieve superior surface quality, an electromagnetic mould stirrer (M-EMS) will be installed to control flow within the mould, minimizing inclusions. For internal quality improvements, an additional strand stirrer (S-EMS) will be integrated in the strand area, which will allow them to manufacture new steel grades, including high-quality stainless steels.

The project involves considerable challenges, since integrating new features into an existing setup requires optimal technology solutions within the current plant configuration. Beyond the electromagnetic stirrers, the upgrades will include modifications to the mould, the installation of a new oscillator, and adjustments to the bending segment. Further improvements include a new mould level control system and a major software upgrade for the soft reduction application.

Following the completion of the engineering phase, installation of the new equipment is scheduled to begin in early 2025.

Revamped beam blank caster already in operation at this European confidential customer

Confidential Customer I Europe

Revamping for optimized beam blank caster

Following the successful revamp of an existing 6-strand beam blank caster, INTECO has secured a follow-up project from the same renowned European steel manufacturer. This new project is focused on improving bloom quality and preventing longitudinal cracks. As part of this effort, INTECO engineered an optimized beam blank section measuring 360x420mm, with a metric weight of approximately 685kg/m. Over a 12-month period, INTECO designed, manufactured, and delivered new moulds, segments, dummy bars, and other essential components.

After some fine-tuning, initial casting trials were conducted in March 2024, showing promising operational results. INTECO is now working closely with the customer to scale up production and further refine the bloom quality for this new section size. The equipment is being used for both open and shrouded casting, and each cast beam blank has been successfully released for rolling, with no defects detected in the end-products.

The positive results have led to discussions about supplying additional equipment sets, and the project is nearing completion with acceptance discussions underway. INTECO's ability to deliver high-quality equipment and process technology has further strengthened its relationship with this customer over the years. INTECO is looking forward to the results of the ongoing discussions regarding future collaborations and projects with this esteemed partner.

Mould Level Master:
The quality of the product is determined by many details and technological features.

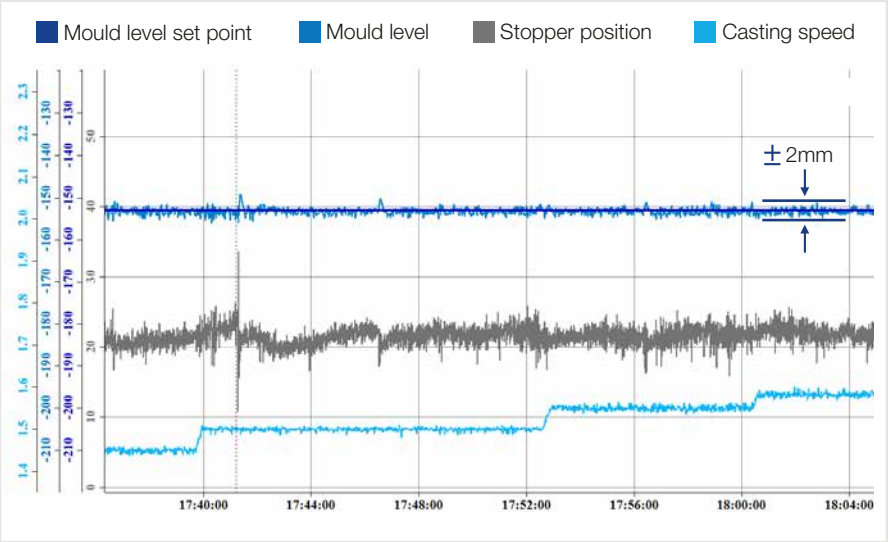
Maximize your level of control with INTECO‘s MLM

The INTECO MLM (Mould Level Master) system represents a cutting-edge control solution engineered for precise mould level control during the continuous casting process. Designed to deliver accuracy and stability across various conditions and disturbances, the MLM package is applicable not only to INTECO’s own continuous casting machines but also to upgrades on other caster types and section sizes, regardless of steel grade or sensor type.

Guided by the principle that “Quality is when the customer returns, not the goods,” INTECO recently secured an order from MAKSTIL AD (North Macedonia) for an MLM upgrade on their second caster. This decision was made following the successful installation of the system on MAKSTIL’s first caster, which demonstrated notable quality improvements for the North Macedonian steel manufacturer.

Similarly, after successful results on a slab caster over 3 meters wide for a U.S.-based steel group, INTECO's technology is scheduled to install two additional thin-slab casters within the group by Q2 2025.

INTECO's MLM technology has also proven adaptable for non-ferrous industries, with successful applications on nickel alloys and other non-ferrous materials. This flexibility has earned INTECO the trust of a prominent European copper manufacturer, who plans to install an MLM system on a vertical caster in Germany in early 2025. This installation will incorporate advanced eddy-current ledge-type sensors.



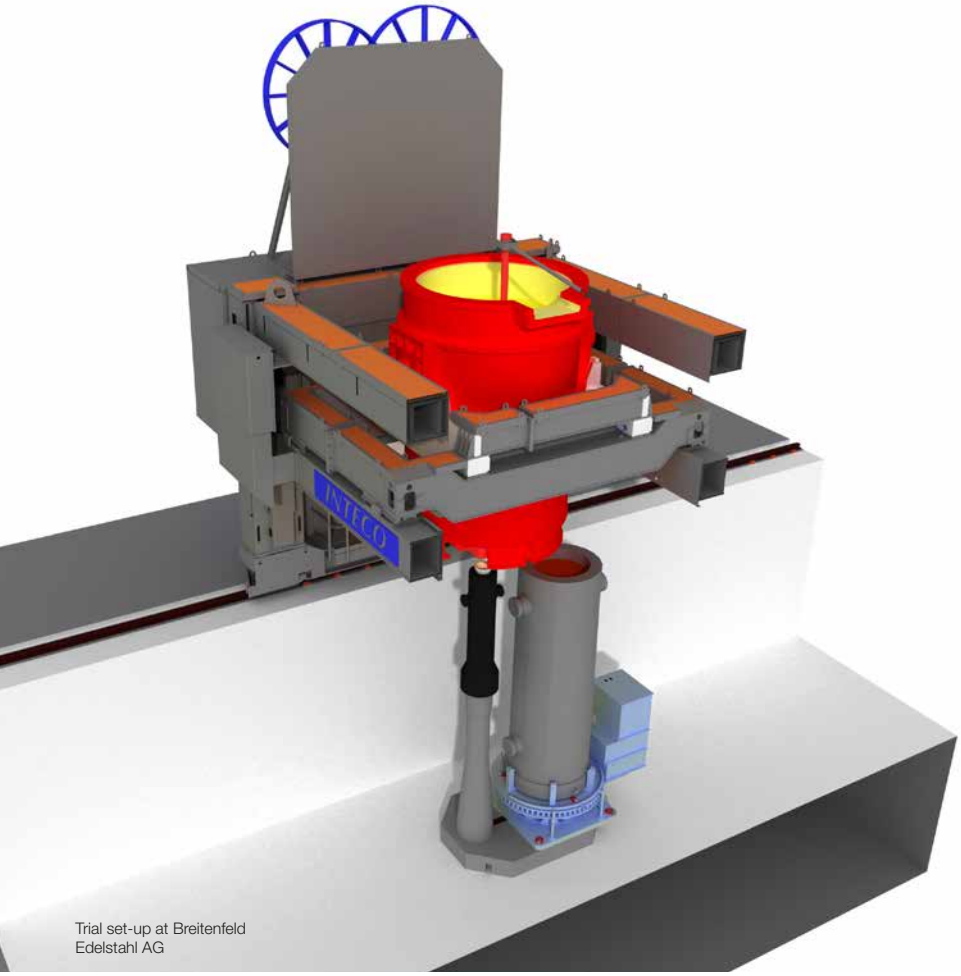
In Asia, a long-standing client has chosen the MLM system for a two-strand slab caster, including additional upgrades such as a ledge-type sensor, new oscillator, M-EMS, S-EMS, revised secondary cooling, and soft reduction.

Another recently completed project equipped two two-strand slab casters with upgraded tundish cars featuring comprehensive onboard applications like weighing control, horizontal adjustment, lifting/lowering, shroud changers, and bath-level regulation.

INTECO’s MLM technology has successfully expanded across a dozen strands this year, underscoring the importance of INTECO’s research, customer confidence, and the strength of its advanced mould level control solutions.

Rotation is power: Advancements in casting technology

Explore more about INTECO's initiatives on advanced solidification control in vertically cast ingots, promising a market-changing casting technology.

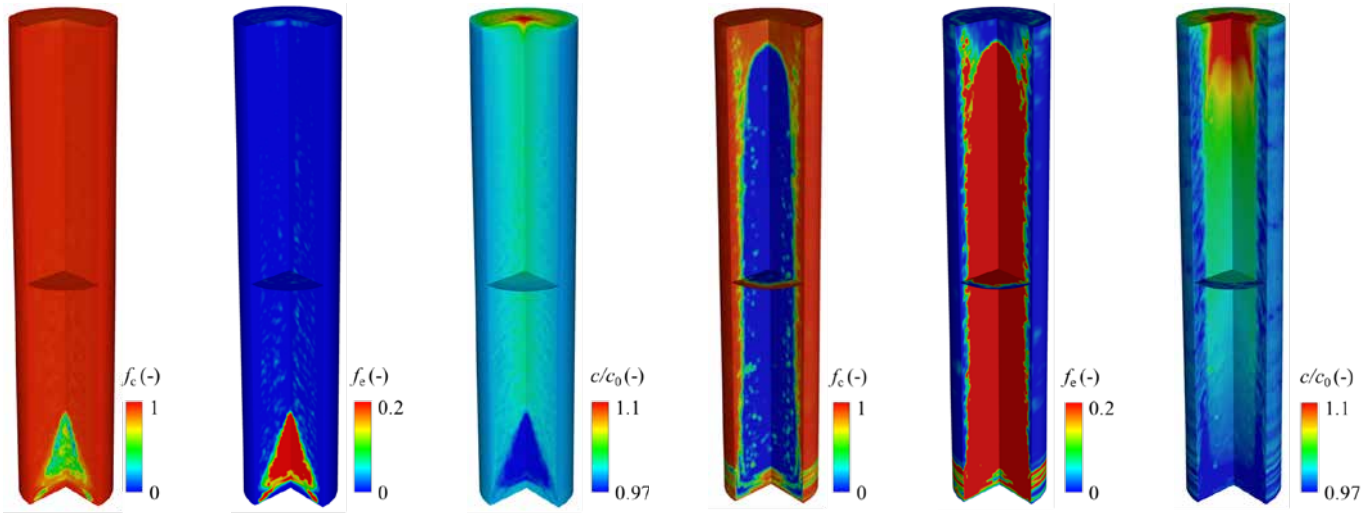


Trial set-up at Breitenfeld Edelstahl AG

The effect of fluid flow on the formation of the microstructure and compositional heterogeneity (macrosegregation) in the cast ingots remains poorly understood despite the long history of casting technologies.

Some ideas to manipulate the flow during solidification were proposed in the past. One is to stir the melt with electromagnetic field (EMS) to modify the as-cast structure by balancing the equiaxed and columnar structure zones. In the production of large-scale ingots or strands, however, high electrical power is needed to achieve an efficient stirring. Another idea is to rotate the casting mould (RCM) during solidification. The former (EMS) seems to be successfully implemented in steel industry for continuous castings; the later (RCM) remains in the laboratory concept with less industrial applications. Implementing these ideas into industrial practice is not possible without

Revolutionizing casting: From lab experiments to industrial application.



(a) (b) (c) (d) (e) (f)

Simulation results without mould rotation

Simulation results under alternative mould rotation

a series of costly experiments (from laboratory, pilot-plant, to the final production). The knowledge obtained from laboratory experiments cannot be simply scaled-up to industry process. Therefore, a physical-based numerical model, considering the multiphase flow phenomena and solidification kinetics, is demanded.

For this purpose, a collaboration between the SMMP (Chair for Simulation and Modelling of Metallurgical Processes) at the Montanuniversität Leoben and INTECO was established through a research project. The ultimate goal of this project is to develop and tune a volume-average solidification model, considering multiphase flow nature, which can quantitatively simulate an innovative solidification process of large vertically-cast ingot, i.e. segment casting, or other similar casting processes.

Within this project, we have successfully conducted laboratory-scale vertical casting experiments. These experiments not only provided critical experimental data but also validated the accuracy of the solidification model. The model developed at the university accurately predicts the flow patterns under different rotating conditions, as well as the complex interactions between flow and solidification. The findings demonstrated an excellent agreement between the simulation results and experimental observations, providing a solid theoretical foundation and technical support for further process development. Some modelling results are shown above.

Calculated volume fraction of columnar phase f_c (a) & (d)
Calculated volume fraction of columnar phase f_e (b) & (e)
Calculated segregation index c/c_0 (c) & (f)

Following the success of lab-scale trials, the project team plans to apply rotational casting to industrial-scale ingots, with test diameters reaching up to 1000mm. Both INTECO and Montanuniversität Leoben are optimistic about the technology's industrial feasibility.

This project is a high priority for INTECO, aligning with the goal of developing advanced casting technologies for high-quality steels. This initiative has the potential to introduce a market-changing casting technology in the medium term.

The knowledge gained in this project will enhance solidification process understanding and innovation in casting, with promising advancements for large-scale, high-quality steel production.

Special metallurgy

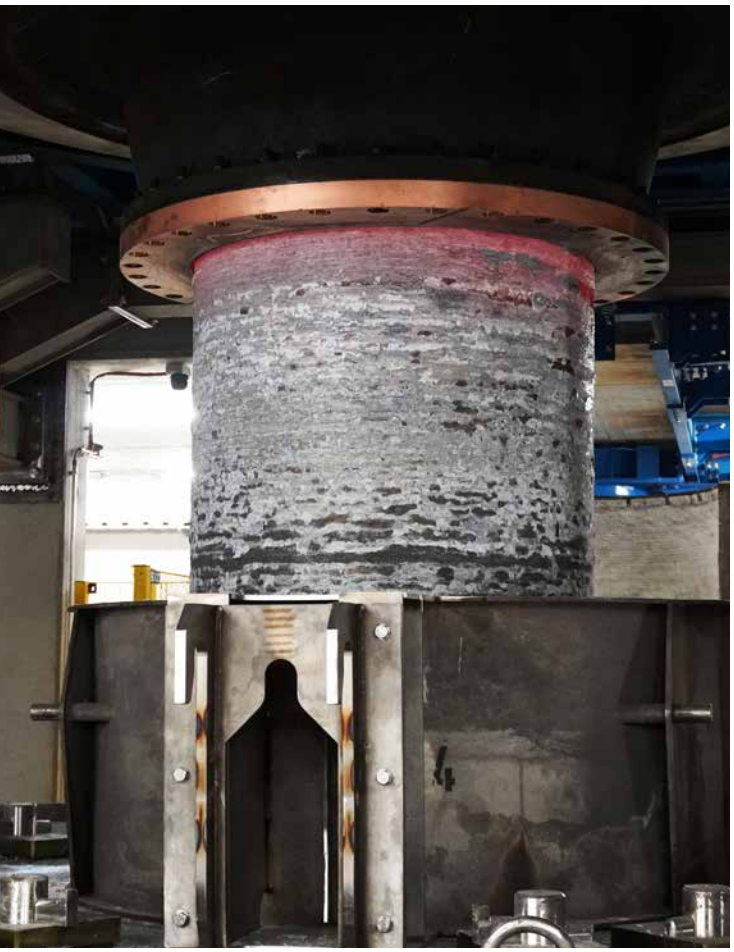
INTECO is proud to be the world's leader today in metallurgical process technology and related equipment. We offer controlled melting, remelting, atomization, and solidification processes for special steels, superalloys, as well as titanium and its alloys.

Schmiedewerke Gröditz I Germany

Excited like a kid with a new toy

For more than 25 years, Schmiedewerke Gröditz GmbH (a GMH Group company) and INTECO have shared a strong partnership rooted in continuous collaboration. This relationship began when INTECO assisted Schmiedewerke Gröditz in launching its first ESR furnace – a unit that is still operational today thanks to regular upgrades to ensure modern standards and quality improvements.

To keep pace with market demands, a contract for a new ESR furnace was signed in August 2022. This advanced furnace is designed to produce ingots with a maximum diameter of 1,800mm and a weight of approximately 85 tons. Utilizing a proven short-collar mould design, it also incorporates electrode exchange technology compatible with



85t ESR furnace in operation now at Schmiedewerke Gröditz

existing moulds. A key advancement in the new furnace was to add protective gas operations, which ensures a consistent production process and exceptional ingot cleanliness.

After a smooth assembly and test phase, both parties celebrated the successful production of the first ingot on October 30, 2024. The on-schedule commissioning brought relief and celebration for both teams. Building on this success, the experts will continue with the final commissioning steps to prepare the furnace for full-scale production as soon as possible. Ultimately, this success underlines INTECO's expertise and market leadership, particularly in the market for super-sized ESR furnaces.

Asil Celik **I** Türkiye

Remelting capacities to be more than doubled

With the installation of a new electroslag remelting furnace, INTECO is set to more than double the ESR remelting capacity of the Turkish special steel manufacturer Asil Çelik. Asil Çelik initially entered the remelted steel market a few years ago with the help of a 20t ESR furnace supplied by INTECO. Since establishing a well-controlled remelting practice, Asil Çelik has seen a significant increase in demand and is now preparing to expand its capacity with a second furnace.

The first project was the start of a great partnership, which contributed to signing a new contract for a 30t ESR furnace in November 2023. This new plant, similar in design to the existing one, will feature a static crucible and the ability to manufacture ingots up to 30 tons and 1,250mm in diameter. Equipped with cutting-edge technology, the new furnace will enable Asil Çelik to produce superior-quality ESR ingots tailored to the most demanding applications.

INTECO is particularly proud of this project, which reflects its commitment to fostering long-term, mutually beneficial relationships with its customers. To support Asil Çelik in meeting market demands as quickly as possible, INTECO is planning to deliver the new furnace a few weeks ahead of the contractual schedule, which will allow the company to start commercial production sooner and meet customer requirements effectively.

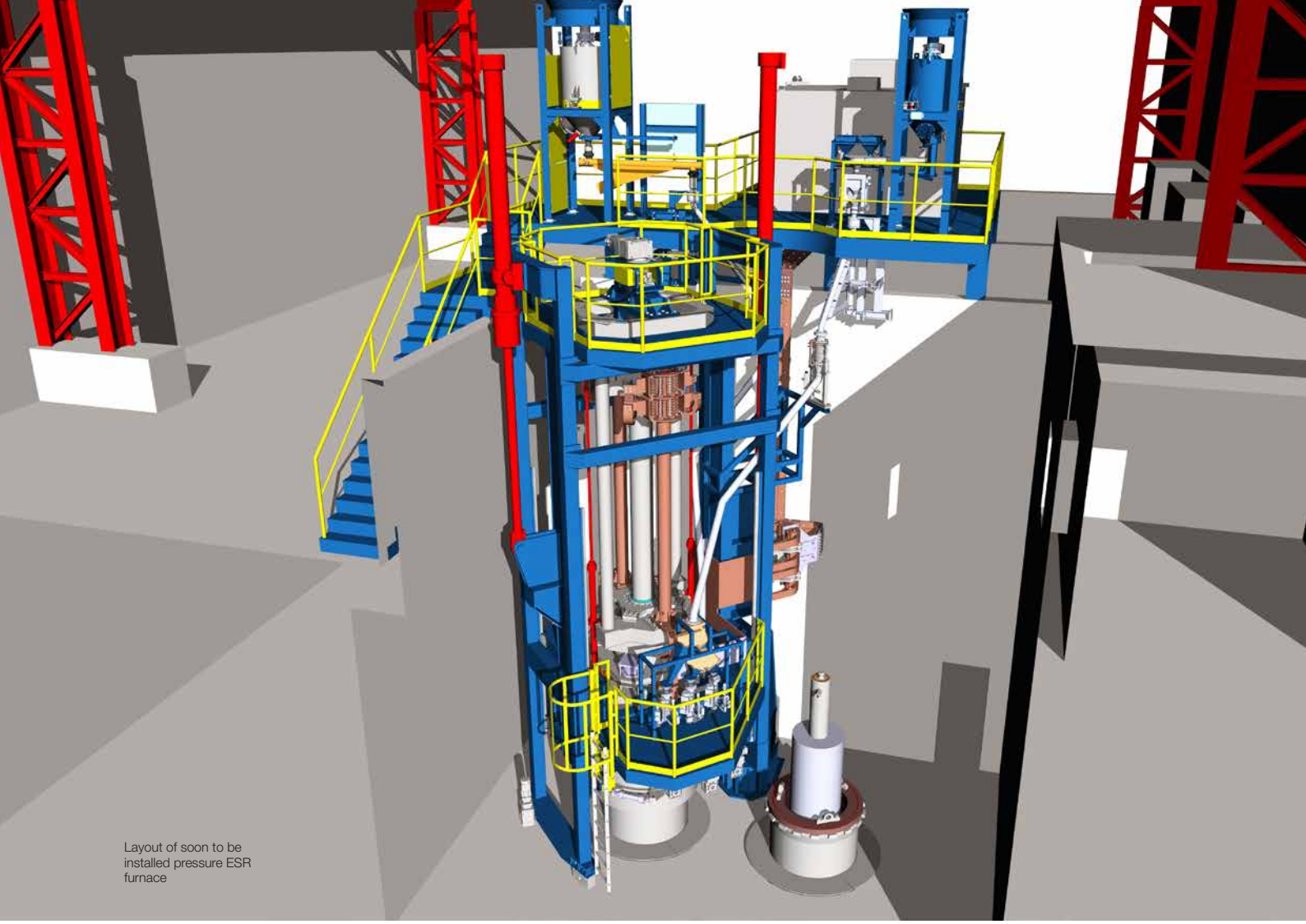
Super-sized ingot produced by the 160t ESR furnace

China First Heavy Industries Corp. **I** China

New technology is gaining ground

New technology is gaining momentum, and INTECO remains at the forefront as the global leader in the electroslag remelting sector, continually setting new standards and technological benchmarks.

As a result of the current market dynamics, particularly in the power generation sector, there has been a significant increase in demand for super-sized ESR ingots. A few years ago, the largest ESR furnace in China began operations at Erzhong, marking a new era of super-sized ESR production using INTECO's technology. The project set new benchmarks and delivered impressive results, which played a key role in China First Heavy Industries Corp.'s decision to place an order with INTECO. The newly designed furnace will produce ingots up to 160 tons,



Layout of soon to be installed pressure ESR furnace

surpassing the previous record of 150 tons remelted at Erzhong. The furnace set-up includes a central static mould melt station and an outer static mould melt station, each equipped with two fully operational furnace heads. The central station, utilizing electrode change technology, can produce the largest ingots with a diameter of 2,250mm and a weight of 160 tons. The outer station, using single electrode remelting, will produce ingots up to 60 tons with a diameter of 1,350 mm.

After an impressive delivery time of approximately twelve months, the assembly and cold commissioning have been successfully completed, and all acceptance heats have been finalized. The customer was highly satisfied with the results, particularly with the Cost FB2 ingot, which weighed more than 100 tons and not only underwent successful remelting but has already been fully qualified. Both INTECO and the customer are now in discussions to sign the final acceptance certificate, officially handing over the plant for commercial production. After setting new benchmarks in China and securing this flagship project, INTECO is excited to continue expanding its market leadership.

The company remains committed to supporting China First Heavy Industries Corp. in their goal of becoming a leading manufacturer of premium ESR products, and strengthening INTECO‘s position as a trusted long-term partner in the industry.

Confidential Customer **I** Germany
DAYE Special Steel **I** China

INTECO operates at elevated pressure levels

INTECO has made significant advancements in the pressurized ESR process to meet the growing market demands. This process involves the addition of nitrogen-containing alloying agents during remelting, allowing the production of steel with higher nitrogen content due to the increased nitrogen solubility under high pressure in the furnace atmosphere.

With decades of experience in various system designs and pressure ranges, INTECO has developed a new plant capable of operating at pressures up to 40 bar and producing ESR ingots up to 1000mm in diameter. The plant features a “-live” mould design and an enhanced and redundant alloying system to ensure greater process stability and repeatability.

In 2024, INTECO secured contracts with both German and Chinese customers, major players in the market, and is currently in negotiations with others to meet the growing demand for nitrogen-alloyed steels. These new agreements are seen as strong references that could lead to future orders in this specialized niche.

16t VAR furnace in opartion at Breitenfeld Edelstahl

Breitenfeld Edelstahl industrial area & 16t VAR furnace (left), 12t VAR furnace at SeAH Speciality Steel (right picture)

Breitenfeld Edelstahl **I** Austria

A good neighbor is a blessing

A new remelting furnace near INTECO's headquarters has been successfully commissioned, further strengthening INTECO's partnership with Breitenfeld Edelstahl. In 2023, INTECO finalized the contract for a second vacuum arc remelting (VAR) furnace, designed to handle ingots up to 16 tons, marking a significant enhancement of Breitenfeld's remelting capabilities. This latest addition brings Breitenfeld's remelting shop to a total of five furnaces—three ESR and two VAR—each supplied by INTECO, which together process up to 15,000 tons per year. Breitenfeld, anticipating an increase in market demand, has proactively expanded its facility to allow space for four more remelting units in the future. Assembly of this new VAR plant began in early April, two weeks ahead of schedule, thanks to the exceptional collaboration between INTECO and Breitenfeld's project teams. This collaboration paved the way for a smooth start-up and handover of the furnace, which was completed by signing the Final Acceptance Certificate in September. Over the past two decades, Breitenfeld has become a formidable player in high-value remelted products and has been supported by INTECO since the installation of its first ESR furnace. Breitenfeld's choice to partner with INTECO once again underscores the strength of their long-standing business relationship.

In addition to the installation projects, INTECO values Breitenfeld's continuous openness to hosting reference visits for INTECO's clients and its willingness to collaborate on various R&D topics, including important developmental trials. This partnership has been instrumental in advancing technical innovation, and INTECO is looking forward to the next chapter in this trusted relationship with its "neighbors" in Breitenfeld.

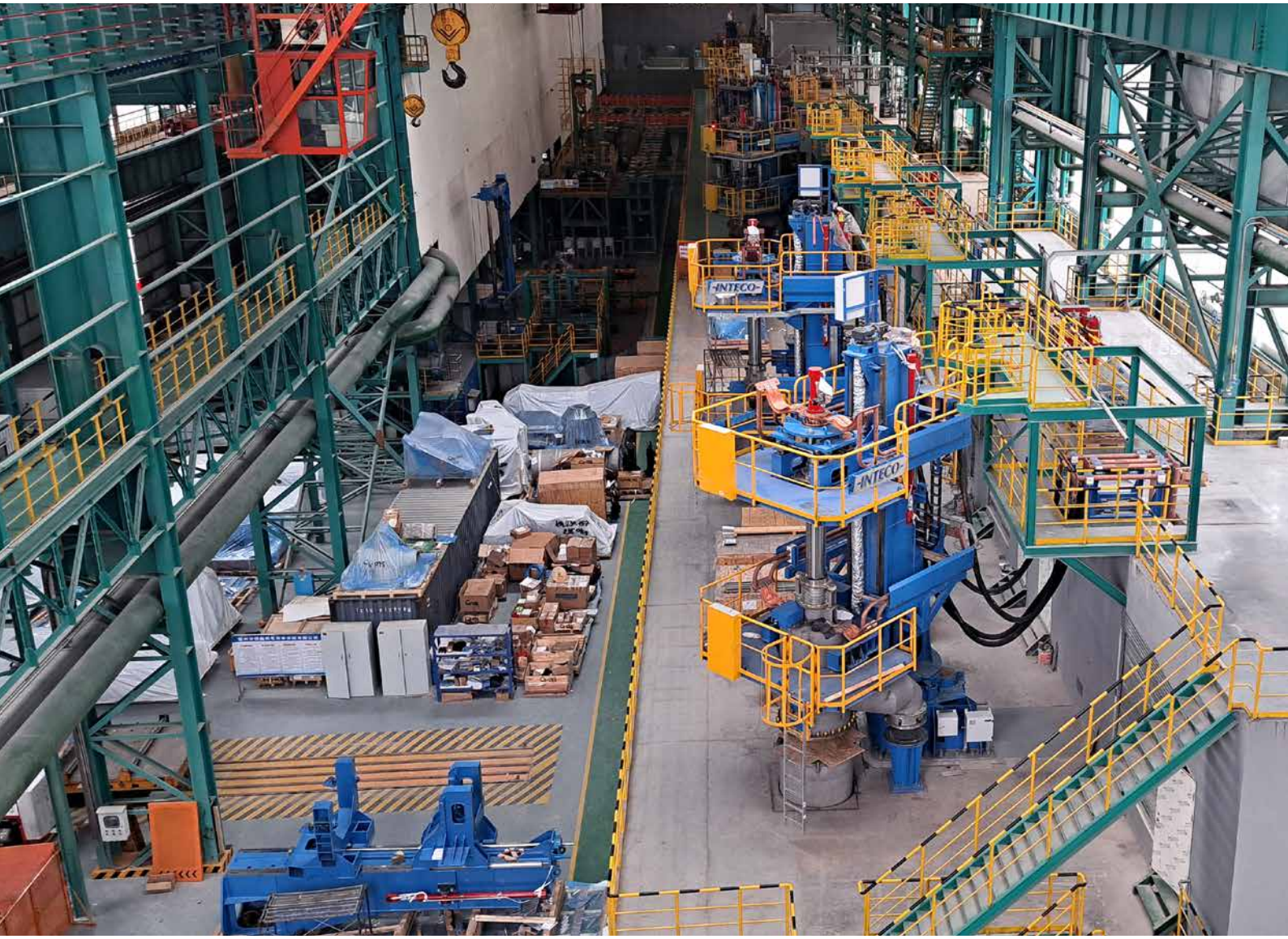
SeAH Specialty Steel **I** Korea

Expanded VAR capacities

The partnership between INTECO and SeAH Specialty Steel (SeAH CSS) spans nearly two decades, beginning with the successful operation of a highly innovative ESR furnace featuring rapid remelting (ESRR). This early collaboration established a solid foundation of trust, that allowed INTECO to later undertake a significant project: implementing a special melting and remelting facility at SeAH CSS in Korea. This facility, customized for ingot sizes up to 8 tons, included a vacuum induction melting (VIM) furnace, two electroslag remelting (ESR) units, and one vacuum arc remelting (VAR) furnace.

In response to increasing market demands, SeAH placed a strategic order with INTECO in March 2023 for an additional VAR furnace mirroring the configuration of the existing plant. The new facility was designed to handle 8 ton ingots with a diameter of 735mm, complemented by an advanced control system using Siemens TIA software with WinCC for visualization. After an efficient ten-month delivery, followed by a smooth installation and testing period, the new VAR furnace was successfully commissioned, culminating in the issuance of the Final Acceptance Certificate in October.

INTECO's engineers look forward to continuing their collaboration with the skilled SeAH CSS team, strengthened by mutual exchange and shared expertise that benefits both organizations.



Installation of VAR furnaces nearly finished at Daye Special Steel

Daye Special Steel **I** China

Massive increase in VAR capacities

The collaboration between INTECO and Daye Special Steel, which began over two decades ago with INTECO's first electroslag remelting (ESR) furnace installation in China, has become a hallmark partnership. As Daye Special Steel expands its production capabilities and solidifies its position as a leading Chinese manufacturer of special steels and superalloys, INTECO has continued to support this expansion with advanced technology and technical expertise.

In 2023, Daye Special Steel contracted INTECO to supply four vacuum arc remelting (VAR) furnaces, each designed to produce ingots of approximately 12 tons and 900mm in diameter. The delivery is being completed in two phases, with two furnaces already in the installation phase and the remaining two en route. This contract is a pivotal moment for INTECO, further solidifying our company as a leading supplier in the VAR market. It represents the strengthening of an enduring relationship and supports INTECO's strategic vision of building long-term alliances with key clients.

INTECO's technical expertise and history of successful cooperation were key factors in securing this contract and the recent addition of a P-ESR furnace project, as noted in another section of this newsletter.

„INTECO is your premium supplier for titanium technology with experience of more than 20 years.“

Titanium ingor procuced by an INTECO Ti-VAR

Confidential Customer **I** Asia

One plus one equals two

INTECO is pleased to announce a new project in Türkiye, one of the fastest-growing markets for special steels and superalloys. This project introduces a highly innovative combined ESR/VAR furnace concept, which builds on the success of a similar installation completed for another client around two years ago. The remarkable performance of that furnace inspired this subsequent order. The new combined furnace is designed for flexibility, it can handle ingots up to 3 tons in weight and 500mm in diameter and allows for both ESR and VAR operations. This addition reinforces INTECO's leading role as a technology and equipment supplier in the special steels and superalloys industry. The equipment is scheduled for delivery later this year, with both teams looking forward to a smooth commissioning process. Meanwhile, discussions are ongoing about additional projects to expand the customer's production capacities, enhance quality, and explore new process routes.

Baoji Xigong Titanium Alloy Products **I** China

VAR business is experiencing significant growth in China

With nearly 20 years of experience as a premium supplier in the titanium industry, INTECO offers advanced melting and remelting technologies along with comprehensive production expertise for titanium production lines. Recently, INTECO secured a new contract for a 12t titanium vacuum arc remelting (Ti-VAR) furnace. The contract was signed in August 2023, just three months after the initial discussions began with Xigong, a new client based in Baoji, China. This rapid progression from initial contact to contract underscores INTECO's strong reputation as a top-tier equipment supplier within China's titanium sector, currently the largest globally. The project involves engineering and supplying core components for the 12t Ti-VAR furnace, with equipment manufacturing organized according to INTECO's engineering specifications and designs. Equipment is currently en route to China or being locally manufactured, with assembly set to begin immediately upon arrival. INTECO is looking forward to solidifying its presence in the rapidly growing Chinese titanium market with this significant addition to its portfolio.

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