

HICON®

EBNER GROUP Journal for Technology and Progress





EBNER GROUP

Ladies and Gentlemen,
 Esteemed readers of the
HICON® Journal,
 Dear friends and colleagues
 of the **EBNER GROUP!**



Driving Green Technologies is the guiding vision of the **EBNER GROUP**, pushing us to develop green technologies that empower our customers to achieve their sustainability goals.

Inspired by this vision, intensive research and development has allowed **EBNER** to develop a revolutionary new heating method for bell annealer furnaces. This innovative technology, to be unveiled at a global launch event on November 13, 2024, at our Leonding headquarters, is characterized by exceptional energy efficiency and significant emissions reductions.

This technology is, however, not our only new development: at the upcoming Aluminium Düsseldorf trade fair, our digitalization team will introduce a tool designed to assist our customers in meeting EU climate targets.

We are also committed to sustainability at our own facilities. Photovoltaic projects have already been successfully implemented at our production sites in Taicang, China, and Wadsworth, USA. Our Leonding headquarters is currently in the process of installing its own photovoltaic system.

Ultimately, all **EBNER GROUP** companies contribute significantly to green technologies. Examples range from TPS's plasma torch technology to a carbon-neutral heating process, Hazelett twin-belt casting technology, and Gautschi's multi-chamber furnace.

This edition places a strong emphasis on green technologies, and includes articles covering several interesting customer projects involving sustainability.

Yours,
 Robert Ebner
 CEO **EBNER GROUP**

4-7		A NEW ERA OF HEAT TREATMENT. EBNER HICON/H₂® BELL ANNEALING FURNACE EBNER THERMAL PROCESSES	EBNER®	BUNTMETALL COPPER BASE METAL
8-9		FURNACE MODERNIZATION. EBNER PUSHER FURNACE EBNER THERMAL PROCESSES	EBNER®	ALUMINIUM ALUMINIUM
10-11		GET THE LEAD OUT. EBNER HARDENING AND TEMPERING LINE EBNER THERMAL PROCESSES	EBNER®	STAHL STEEL
12-13		AN INNOVATIVE PARTNERSHIP. GAUTSCHI & HPI NEWS EBNER GROUP. THERMAL PROCESSES	Gautschi® HPI	ALUMINIUM ALUMINIUM
14-15		PROVEN SUCCESS. GAUTSCHI & HPI NEWS EBNER GROUP. THERMAL PROCESSES	Gautschi® HPI	ALUMINIUM ALUMINIUM
16-17		A GREEN MILESTONE. EBNER BATCH-TYPE FURNACE EBNER GROUP. THERMAL PROCESSES	EBNER®	ALUMINIUM ALUMINIUM
18-19		CASTHOUSE R(E)VOLUTION CENTER. C-R-C EBNER GROUP. THERMAL PROCESSES	CRC	ALUMINIUM ALUMINIUM
20-21		JOINT FORCES. GNA NEWS EBNER GROUP. THERMAL PROCESSES	GNA	ALUMINIUM ALUMINIUM
22-23		BEING SMART IN RETROFIT. EBNER DIGITALIZATION EBNER THERMAL PROCESSES	EBNER®	DIGITALISIERUNG DIGITALIZATION
24-27		GREENCAL® EBNER GREENCAL® EBNER THERMAL PROCESSES	EBNER®	STAHL STEEL
28-31		EBNER EFFICIENCY UPGRADES. EBNER SUSTAINABILITY EBNER THERMAL PROCESSES	EBNER®	NACHHALTIGKEIT SUSTAINABILITY

INTERNET: The **HICON®** Journal articles are available on our website at www.ebnergroupp.com.
 Click NEWS & PRESS / **HICON®** Journal to download this and past issues of the magazine.



IMPRINT: **HICON®** Journal: The **EBNER** Customer Journal, Issue 2, October 2024 / Copyright: **EBNER** Industrieofenbau GmbH, Ebner-Platz 1, 4060 Leonding, Austria / Tel.: (+43) 732 68 68-0 / Fax: (+43) 732 68 68-1000 / Email: hiconjournal@ebner.cc / Reproduction, in full or in part, is authorized only with the express written permission of **EBNER** Industrieofenbau GmbH. **Photography:** **EBNER** Industrieofenbau GmbH. **Layout:** **EBNER**. www.ebnergroupp.com / **Chinese Translation:** Chen Lin / **Editing:** Viktoria Steinmaier/ Published twice yearly



REINHARD LEITHNER
Senior Sales Manager
EBNER

Aurubis Stolberg, a leading manufacturer of high-precision copper and copper alloy strip and rod, has modernized its production with a new HICON® bell annealer facility. With this facility, which went into operation in February, 2024, the company has taken an important step forward in implementing its decarbonization strategy.

NEW EBNER BELL ANNEALER REPLACES A FACILITY THAT WAS OVER 40 YEARS OLD

Aurubis Stolberg was severely hit by Germany's devastating floods in July, 2021, and the production area (including the pit for the existing gas-fired bell annealer) was completely underwater. Together with the Aurubis maintenance team, **EBNER** service technicians succeeded in repairing the existing bell annealer and returning it to operation. At the same time, Aurubis took the opportunity to begin planning the installation of a modern bell annealer facility with electric heating.

100% ELECTRIC AND STATE-OF-THE-ART

The new facility, which incorporates 8 workbases, is powered exclusively by electricity. By combining green electricity with state-of-the-art **EBNER** technology, Aurubis has taken a significant step towards carbon neutrality.

INCREASED EASE OF OPERATION AND AUTOMATION

One of the special features of the new **EBNER** facility is the ease with which it can be operated. It features automatic utility couplings for electrical power and cooling water lines, as well as an automatic coupling system that allows cooling bells and inner covers to be transported at the same time. The high degree of automation and a state-of-the-art process control system have replaced a wide variety of manual tasks, leading to significantly more efficient and user-friendly operation.

TWO CHALLENGING PHASES OF INSTALLATION AND COMMISSIONING

To allow production to continue at the existing bell annealer facility while the new facility was installed and commissioned, the new bell annealer was implemented in two phases. During each phase, half of the old facility was shut down and removed. This allowed the new facility to be installed and started up while the other half of the existing equipment continued to operate. Despite the complexity of fulfilling tasks within this framework, the new facility was able to go into operation on schedule and fully meets the high requirements placed by Aurubis.

A MILESTONE FOR DECARBONIZATION

The investment in the new **EBNER** furnace is another step towards Aurubis' decarbonization goals.

A NEW ERA OF HEAT TREATMENT.

Electrically heated bell annealing furnace at Aurubis Stolberg.





“
“EBNER’s solution-oriented approach and the absolutely appreciative communication at eye level have led to a very high level of trust on our part.”
- Enrico Flechtner, Project Engineering

“At Aurubis, we have a clear decarbonization roadmap in which thermal processes play a major role, and we see EBNER as an important partner at our side for future projects as well.”
- Dr. Benjamin Cappi, Managing Director
”





PETER ANEXLINGER

**Mechanical Design and
Spare Parts
EBNER Furnaces**

Logan Aluminum has installed three **EBNER** pusher furnaces over the years, some of which have been running since the early 90s.

Logan Aluminum is an industry leader in developing innovative and effective ways to ensure strong reliability processes, creating clear reliability standards and objectives for their operations. This includes setting performance metrics, establishing benchmarks based on historical trend data and implementing systems to continuously monitor performance against these standards. The company follows a rigorous schedule for routine maintenance tasks, and its predictive maintenance program ensures that equipment is serviced regularly: potential issues are addressed before they become critical. As part of this emphasis on reliability, Logan partnered with **EBNER** to develop a long-term plan for keeping their furnaces healthy.

As with many other things, some TLC is required to ensure that equipment continues to operate efficiently and trouble-free in the future. For its furnaces, Logan started this process some time ago by rebuilding the internal elements of the sidewalls and roof. The existing inner casing, baffles, plenum chambers, and lining materials were removed, and the furnaces were upgraded to the latest design standards. It was then time to finish refurbishing the first furnace by rebuilding the rails, supports, and floor sections, a process that started a few years ago when Logan placed an order for a new set of supports and rails.

About a year later, the company ordered the remaining floor elements. These components are scheduled for

installation next spring, and as one can imagine this will involve a major shutdown. Timing will be critical, as within a few short weeks the entire floor and support structure will be stripped down to the outer shell and rebuilt with new materials.

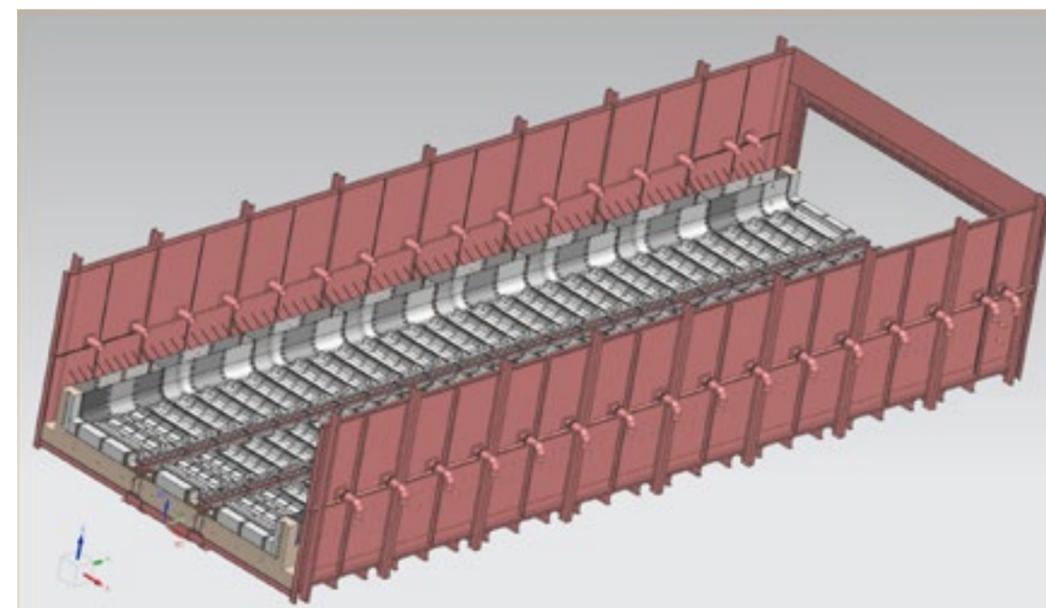
The rebuild project will require a large crew of welders, fitters and lining specialists, all working with **EBNER**'s installation supervisors and Logan's maintenance crew. However, all those involved have developed and fine-tuned the logistics and planning for this type of upgrade over the years, and what may look like a daunting job at first has evolved into something that could almost be called routine.

As part of the preparations for the shutdown, Logan and **EBNER** have been working with the expected subcontractors to put a detailed schedule in place, including milestones for each phase of the project. Prior to the start of the outage, all materials will be on site, and staged to be ready for use, preventing delays during the installation phase. Another part of the pre-project preparation is the establishment of strong safety protocols, as Logan prides itself on having a strong safety culture across all facets of its business. The company takes extra steps during large projects both to ensure that all participating parties are aware of safety procedures and to ensure they are being followed, as well as to ensure that all equipment required to complete the job safely is on site.

Once the project is completed, the furnace will be brought back into operation for another long stint of productivity. Logan Aluminum and **EBNER** are working closely together to ensure that the pusher furnace modernization project is successfully completed, allowing the furnace to resume production with enhanced efficiency and reliability.

FURNACE MODERNIZATION.

EBNER is excited to partner with Logan Aluminum in their next adventure: maintenance and improvement of their EBNER furnaces.





HERBERT GABRIEL

Managing Director
EBNER Furnaces

“Get the lead out!” - This idiom is believed to have originated during World War II and was used to signal soldiers to drop their equipment and ammunition, enabling them to be able to move quicker in certain situations.

In modern times, **“get the lead out”** has taken on a broader meaning beyond its military origins. It now refers more generally to any situation in which there is a need to act quickly or decisively. This is exactly what Blue Blade did when it was faced with making decisions to improve its market position.

The traditional method of hardening high carbon steel strip in continuous lines is to quench it from austenitizing temperature in a bath containing a liquid mix of lead and bismuth. The two metals form a eutectic system with a melting point below that of either pure metal and, more importantly, below the martensitic start temperature. Due to high rate of heat transfer in the molten-metal bath, achieving fully martensitic structures is relatively easy. There is, however, a strong desire to literally get the lead out of the process.

Once Blue Blade recognized the limitations of its existing technology in terms of throughput, flatness and surface quality, it began to search for a new approach. After extensive research Blue Blade found a technology that had proven itself in critical applications throughout the world and that it could introduce to the US market – a technology that would make it the first and only option for American-made H&T strip steel. The heart of this new technology, known as **EBNER H2Q**, is the use of hydrogen gas jets as a quench media instead of the traditional molten metal.

In 2020, a major upgrade to Blue Blade’s existing **EBNER** hardening and tempering line with H2Q technology was implemented. This upgrade enabled lead-free quenching at a high throughput and with superior surface quality, while still meeting the mechanical property requirements of martensitic steel at gauges up to 2 mm (0.100”). Not a small feat, considering that quenching from austenitizing temperature (around 1800 °F) to below the martensitic start temperature (about 420 °F) must take place within roughly 1 second. **EBNER’s** H2Q technology also offered the advantage of fast change-over times, as the system has almost no thermal latency in comparison to a molten-metal quench.

The upgrade project was commissioned in 2020, just as COVID was entering our vocabulary. Despite the difficulties this caused when ramping up production, the advantages of hydrogen quickly come into focus. Fast forward a few months, however, and a building fire destroyed most of the heat treatment line - once again, it was time to get the lead out.

EBNER’s team in Ohio sprang into action to rebuild the line to a like-new condition. Blue Blade was able to resume production in record time, all made possible by hard work and the close cooperation between Blue Blade and **EBNER**.

During this second rebuild, the existing leveling and tempering sections were replaced with current **EBNER** technology - elevating Blue Blade’s line to the most advanced heavy gauge hardening and tempering line in the Americas. What gains made it worthwhile to get the lead out? Blue Blade Steel has been able to enter new markets including those for automotive, aerospace, and medical applications.

GET THE LEAD OUT.

Blue Blade Steel’s quantum leap.





AN INNOVATIVE PARTNERSHIP: NEW STANDARDS FOR FORGING STOCK

Gautschi Engineering GmbH and HPI High Performance Industrietechnik GmbH supply a complete forging stock production line to Bharat Forge Aluminium USA.



OLIVER JANSEN
Head of Sales
Gautschi Engineering GmbH

Bharat Forge Aluminium USA is a subsidiary of India's Bharat Forge Limited, a global leader in the metalworking and forging industry. The company specializes in manufacturing high-quality aluminum forgings that are used primarily in the automotive and aerospace industries.

Gautschi and HPI, both members of the **EBNER GROUP**, have recently collaborated in supplying a state-of-the-art casthouse for Bharat Forge Aluminium USA. This line will produce horizontally-cast aluminum rod, which will serve as the starting material for forged products. Bharat



RAINER EDTMEIER
Managing Director
HPI High Performance
Industrietechnik GmbH

Forge's primary goal is to automate production to the greatest extent possible, enabling it to offer extremely competitive per-unit prices to the automotive industry. At the same time, the high degree of automation will maximize workplace safety for Bharat Forge's employees.

FROM SCRAP TO BILLETS TO DIRECT-FORGED PRODUCTS

Production begins with one of the two tiltable Gautschi single-chamber furnaces, which work in tandem as melting/casting furnaces. Charging is carried out by an

HPI charging machine, which ensures efficient charging by minimizing the opening time of the furnace door and protecting the furnace lining from damage. Dross is cleaned from the surface of the bath by a rail-mounted HPI skimming machine.

The furnaces are equipped with Gautschi's innovative VAREGA^{ENVICOM} regenerative burners, providing an output of 5200 kW. These burners have a number of advantages including long burner cycles, which provide a high effective melting rate paired with low NO_x emissions. No external recirculation is required, which both has an additional positive effect on NO_x emissions and means that maintenance requirements are low. Furthermore, the design of the refractory materials in a Gautschi regenerative burner means that the surface temperature of the burner is lower than that found in competitors' products – minimizing heat losses in the area around a burner.

With a nominal capacity of 35 metric tons of liquid metal and a melting rate of 7 metric tons per hour, the Gautschi furnaces are perfectly matched with the casting equipment supplied by HPI. The installation of a pair of furnaces ensures that production is never interrupted, even if one of the furnaces is emptied. Thanks to the continuous supply of liquid metal to the caster, production runs of up to 36 hours are possible. Depending on the diameter of the product, outputs as high as 5000 kg/h may be achieved when casting 6xxx aluminum alloys.

The casting machine is equipped with the new HPI ForgeMaster[®] mold technology, providing the smallest possible edge zone (columnar edge) and a homogeneous microstructure. This is particularly important for forging stock, as the optimal conditions for solidification enable the billets to be directly forged - without an addi-

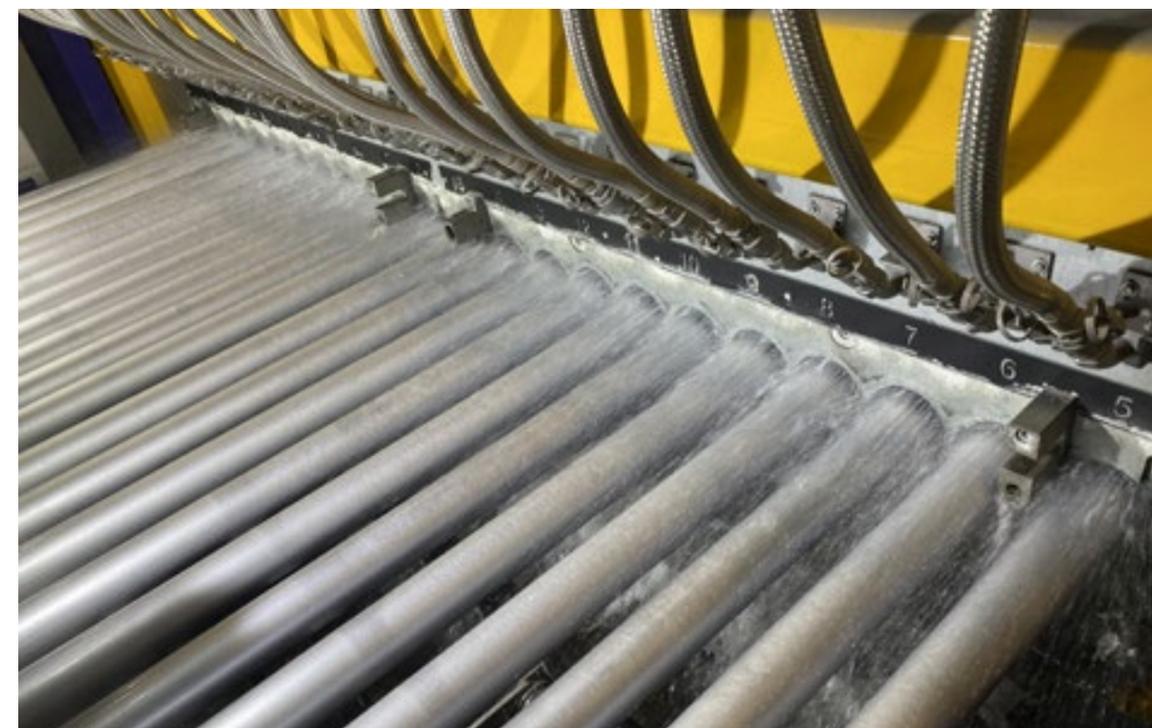


HPI ForgeMaster[®]

tional homogenization step. The excellent surface quality significantly reduces the amount of chips produced during the peeling process, which can reduce material losses by up to half.

All additional processing steps are carried out in a continuous in-line sequence: after casting, the cast rod is ultrasonically tested, peeled, inspected for surface defects, sawn into short lengths, chamfered and automatically packed into boxes. The billets are then transported directly to the adjoining forging plant, where they can be processed into high-quality parts for the automotive industry.

This joint project with Bharat Forge and the close cooperation between Gautschi and HPI will significantly change how forging stock is produced. Through its use of state-of-the-art technology and the highest standards for safety and environmental friendliness, this cooperation has set new standards for the industry. Together, the three companies are shaping the future into one that is efficient, innovative and sustainable.



**OLIVER JANSEN**

Head of Sales
Gautschi Engineering GmbH

**RAINER EDTMEIER**

Managing Director
HPI High Performance
Industrietechnik GmbH

Jiangsu Pacific Precision Forging Co., Ltd., headquartered in Jiangsu Province, China, is a leading company in the metal processing industry that specializes in precise hot forging techniques. Since its founding, the company has earned an excellent reputation through its commitment to the highest quality standards and innovative technological solutions.

Utilizing state-of-the-art manufacturing technologies and continuous investments in research and development, Jiangsu Pacific Precision Forging offers customized solutions for various industries, particularly those in the automotive and machinery sectors. The company places great emphasis on sustainability and efficiency to further strengthen its market leadership in precision forging technology, and is drawing on the expertise of HPI and Gautschi to do so.

Pacific Precision Forging is currently reinvesting in its production capacity. As the first phase in PPF's expansion of its forging capacity, HPI and Gautschi supplied a comprehensive package for the design, engineering, manufacture, delivery, installation supervision, commissioning and testing of new equipment.

This original facility, Casting Line 1, included next-generation HPI type 3000 horizontal casting machines, two stationary rectangular melting furnaces with capacities of 20 t and one tilting rectangular casting furnace with a capacity of 23 t. All furnaces were equipped with the most advanced Gautschi burner technology, with a particular highlight being the Gautschi VAREGA^{ENVICOM} regenerative burners for the two melting furnaces.

The selection and design of the plant and equipment were carefully made to ensure excellent operability, quality, and reliability. All requirements for casthouse safety, explosion risk management, and advanced automation were considered.

Due to the great success of the first casting facility and PPF's satisfaction with it, PPF has decided to order an identical facility that will be designated as Casting Line 2. Once again, HPI and Gautschi will use their extensive expertise and proven technologies to implement the new casting line.

PROVEN SUCCESS.

PPF expands its casting capacity with HPI and Gautschi equipment.





MICHAEL SCHIESSER
VP Customer Service
EBNER

The global aluminum industry is currently facing one of its greatest challenges: that of making its production processes more sustainable and climate friendly. One of the most important elements in this transformation process is decarbonization, with the use of renewable energies and a reduction in CO₂ emissions being key elements in the decarbonizing process. Aluminum undergoes various processes during its manufacture, with heat treatment playing a crucial role. In this particular process, industrial heat treatment facilities heat aluminum ingots, plates and coils to change the mechanical properties of the metal.

Concrete examples of decarbonization are the **EBNER E³** Upgrade & Rebuild product solutions for the aluminum industry.

As far back as 2019, a customer from the aluminum industry had tasked **EBNER** with conducting feasibility studies on methods of decarbonizing heat treatment facilities. Over the course of these studies, various heating systems were evaluated, time and cost projections (CapEx + OpEx) were created and overall assessments were made. With this work as a foundation, **EBNER** received an order this year to decarbonize a group of existing gas-fired heat treatment facilities by installing its newly developed electric heating system.

THE TECHNICAL ASPECTS OF DECARBONIZATION USING EBNER E³ PRODUCTS FOR EXISTING HEAT TREATMENT FACILITIES

Converting a heat treatment facility from a combustion system using fossil fuels to an alternative heating method, for example an electric heating system, is technically demanding. It requires detailed planning and meticulous implementation to ensure that a customer's high quality requirements can continue to be met in the future. Essential steps in the conversion include:

- **ANALYSIS OF ENERGY CONSUMPTION**
Before a conversion can be made, the energy consumption of the existing gas-fired plant must be determined. This analysis forms the basis for the design of the new carbon-neutral heating system, ensuring that it can provide the required flow of thermal energy.
- **SELECTION OF HEATING TECHNOLOGY**
Carbon-neutral heating systems can be implemented in various forms, for example those that use resistance heating elements/cartridge heaters, those that use coiled heating elements

or those that use carbon-neutral gas burners. The choice of technology depends on the specific requirements for heat treatment, the physical properties that are desired and the space available in the facility.

- **INTEGRATION INTO THE EXISTING SYSTEMS**
Once selected, the new **EBNER** electric heating technology is integrated into an existing **EBNER** heat treatment facility - where it can be efficiently operated by simply supplementing the automation and control systems. Such a system is compatible with both **EBNER** and non-**EBNER** heat treatment facilities, and is easily installed as part of an upgrade.
- **COMMISSIONING AND TEST PHASES**
A comprehensive testing phase follows successful installation. During testing, the performance and efficiency of the facility are analyzed under real production conditions. Among other things, the high quality standards prevalent in the aluminum industry require precise temperature control; this is optimized and its performance is demonstrated during the commissioning phase.

The conversion of heat treatment facilities by rebuilding gas-fired heating systems into electric ones is an important step in decarbonizing the aluminum industry. This transformation not only benefits the environment but also offers the potential for higher efficiency, increased throughput and improved product quality. The challenges associated with a conversion can be overcome through careful planning, investing in modern technologies, and increased use of renewable energies. Over the long term, the electrification of industrial processes will play a central role in shaping sustainable and climate-friendly aluminum production processes.

In view of the global efforts being made to reduce greenhouse gas emissions, the electrification of industrial processes is becoming increasingly important. State-of-the-art **EBNER E³** heating technologies, operated with renewable energy, offer a promising alternative to conventional facilities heated by burning fossil fuels. Depending upon the configuration of an existing facility, our new **E³** technologies can be easily installed during a rebuild. They demonstrate that older facilities can continue to heat treat aluminum for some time to come, even in a green future.

We would be happy to discuss the ways in which emissions can be reduced at your existing heat treatment facility - please feel free to contact us!

A GREEN MILESTONE.

A milestone along the path to a sustainable aluminum industry has been passed by implementing state-of-the-art **EBNER** technology.

CASTHOUSE (R)EVOLUTION CENTER.

We are your casthouse for special alloys and individual demands.

PLEASE FEEL FREE TO
CONTACT US!

info@gautschi.cc
www.c-r-c.info



STEFAN PELECH

**Managing Director
Casthouse (R)Evolution Center**

The Casthouse (R)Evolution Center (C-R-C) in Ranshofen, Austria is a full-scale industrial foundry, incorporating a horizontal casting facility operated by HPI and a vertical casting facility operated by Gautschi. Both facilities are available for customer demonstrations, alloy trials, operator training, and small, quick and/or special production runs. The facilities are also used to further develop our state-of-the-art molds and casting systems.

HPI equipment installed at the C-R-C includes a 1.7 t electric melting furnace, a rod feeder device for grain refinement and of course the heart of an HPI casthouse: a horizontal continuous casting machine (HSG) with a flying saw. This equipment offers an entire production process, from melting the base material to production of first-class semi-finished aluminum products in both round and rectangular formats.

In addition to the HPI equipment, the technology center is equipped with a 7.5 t melting furnace from Gautschi. When required, this furnace can supply the HPI casting line with liquid metal for an extended period of time.

There is also a Gautschi vertical casting machine, which is capable of casting slabs and billets in any alloy and up to 6.8 m in length. This machine is supplied with material by the Gautschi melting furnace, and an inline degasser and a ceramic filter guarantee top quality.

Gautschi has been a supplier of casting machines for both billets and slabs for many years, and has several types of molds on the market. These include the well-known Gautschi billet mold, which has demonstrated its advanced quality and high performance at many locations over the last 20 years, and the recently-developed and newly-introduced Gautschi slab mold.

The proven Gautschi billet mold, based on the AirGlide® technology developed by VAW, has been a huge success thanks to its excellent surface, low segregation zone, high pit recovery and easy maintenance. Gautschi billet molds have been used to successfully cast a full range of alloys, including the most demanding aircraft alloys. It has been continuously improved over the last few years, and at the C-R-C the pilot caster is being used to optimize it even further.

The new Gautschi slab mold was developed by an international team comprised of casting experts and experienced Gautschi design engineers. Making use of their extensive experience in casting difficult and highly-demanding alloys, including slabs used in aircraft and automotive body applications, the experts

focused on providing real 100 % hands-free casting, significantly less scalping scrap and significantly less butt curl for all alloys – even as they ensured that the strictest safety standards were maintained in the manufacturing process. In light of their experience, the team of experts expects that the new Gautschi slab mold will have a definite impact on, as well as meet, both the high demands currently placed by the market and those expected in the future.

Gautschi is not alone in offering state-of-the-art molds, as HPI has also developed a revolutionary mold technology in recent years. This technology allows forging bars or casting ingots to be produced with perfectly smooth surfaces and minimally thin edge zones, adding to the obvious advantages of the horizontal continuous casting systems offered by HPI. Uninterrupted casting over a period of several days already ensures incomparably consistent product quality, and the new HPI molds are being optimized for additional applications and alloys at the C-R-C.

Additional services are offered by the C-R-C's affiliated laboratory, which can provide a detailed evaluation and analysis of the metallurgical properties of a product. In addition to a spectrometer for measuring the chemical composition, the lab also includes a thermal analysis facility to determine the solidification behavior of the alloy and a device to record the hydrogen content in the melt. The equipment available in the lab is rounded out

by small crucible and heat treatment furnaces, which are used for a variety of tasks such as the reproduction of small melts (a few kilograms), homogenization tests and aging tests.

The unique features of the C-R-C technology center promote and support creative processes in the field of mechanical engineering. In cooperation with foundry specialists, new geometries and casting systems can be built in the affiliated mold workshop and tested directly in the lines. The knowledge gained flows directly back into the design.

CONTRACT CASTINGS AT THE C-R-C

Knowledge gathered at the C-R-C finds direct application in production runs for customers. Due to the optimal sizes of the available facilities, cost-effective and high-quality casts of special alloys can be carried out in a wide range of batch sizes, producing either slabs or billets.

The capability of carrying out contract casts was an important factor that contributed significantly to our desire to found the C-R-C technology center. Concentrating many possibilities under one roof, the C-R-C is unique in the field of toll casting. There is an enormous potential for providing customers with high-quality production material on short notice, and orders can even specify whether material is cast horizontally or vertically.

**UDO WEILERSCHIEDT**

**Group Vice President
Incorporation
EBNER GROUP**

GNA is a leading provider of aluminum melting and holding furnaces, homogenizing and annealing furnaces, and cathode sealing equipment. The acquisition marks the culmination of a five-year partnership between EBNER and Ted Phenix, which began in 2019 when the EBNER GROUP acquired a majority stake in GNA.

“We are excited to announce the full acquisition of GNA alutech inc. and would like to thank GNA’s founder, Ted Phenix, for his vision and leadership in building GNA into a successful company over 41 years. Over the last 5 years I was always impressed by the deep understanding and knowledge Ted was able to share with customers. Our strong professional relationship developed to a strong personal friendship” says Robert Ebner, CEO of EBNER GROUP.

As part of the company’s transition, Phenix has handed over the leadership of GNA to Kaleb Wright, President of Business Development, and Chantal Coupal, President of Operations. Wright brings extensive experience in business development and sales to the role, while Coupal has a deep understanding of GNA’s operations and technology.

“I was first introduced to GNA alutech in 2002, when I was working for Hydro Aluminum on the construction of their greenfield casthouse in Commerce, Texas,” says Wright. “The wealth of knowledge Ted and the GNA team held, along with their flexibility as they worked with clients, quickly led to a close relationship between Ted

and I that continued to grow over the following years as we worked together on a number of projects. As I fully embraced GNA’s desire to continue on its path of providing leading technologies to the aluminum industry, I joined the team as CTO in 2019. It is an honor to continue the legacy Ted Phenix established at GNA alutech 41 years ago.”

Coupal also has a strong sense of the company’s legacy. “I began working at GNA in 1995,” she explains. “Since then, my journey with Ted and the team has been incredibly fulfilling. Ted has been a mentor and a remarkable teacher, imparting not only knowledge but also a profound enthusiasm for the aluminum industry and a passion for his work.”

With its new leadership fully aware of the company’s 41-year story of success, GNA remains committed to continuing its focus on green technology and cost-efficient solutions. Now drawing on the diverse strengths of the EBNER GROUP, GNA will continue to provide a full range of technologies and services to their customers – including new and soon-to-be-released technologies such as rotary furnaces, EMS pumps, proprietary regenerative burner designs, zero-carbon (CO₂-free) burners and more.

Leveraging the EBNER GROUP’s core competencies, in-house manufacturing and R&D, full membership in the group will enable GNA to offer its technology worldwide – supplying the highest quality at the lowest prices. GNA’s vision aligns perfectly with the EBNER GROUP’s mission of Driving Green Technologies, and their collaboration will enable them to jointly advance both furnace and casting technology.

JOINT FORCES.

GNA alutech inc. is now fully owned by the **EBNER GROUP**.



BEING SMART IN RETROFIT.

Smart equipment does not need to be new.



LUCAS WINTER

**Business Excellence and
Digitalization
EBNER Industrieofenbau**

The steel and aluminum industries are facing unprecedented challenges: rising energy costs, stricter sustainability regulations, global competition, cyber threats and a shrinking talent pool. In this environment, the most competitive companies are those that implement digital technologies quickly and effectively. This is exactly the area in which existing facilities and digital retrofits can form an extremely effective pairing.

THE ADVANTAGES OF A “SMART RETROFIT”

To immediately become more efficient, more secure and more sustainable, **EBNER** customers are now adding

value to their existing facilities by installing an **EBNER** SECBox. Established, stable production facilities that have been operating for some time are ideally suited for upgrades that will raise them to the next level of productivity.

To reach this next level, the equipment is connected to a private cloud by installing a SECBox - a type of edge device similar to a router - which enables a number of services to be accessed that improve performance. This kind of “smart retrofit” enables a customer to do the following:

- Securely connect existing facilities to a wide variety of systems, such as a Manufacturing Execution System (MES) or other in-house application, and connect far more data than ever before

- Create an independent, decentralized network to provide secure remote connectivity
- Independently manage access to critical infrastructure, e.g. how and where partners or suppliers like **EBNER** are allowed access for Third Party Maintenance (TPM) tasks
- Fully encrypt data at a level that meets the latest standards (e.g. the requirements of NIS-2)

The decentralized, device-centric network provided by an **EBNER** SECBox greatly enhances security without requiring a central access point, providing added protection against cyber attacks. **EBNER** networks meet all current industrial IT standards, and they can be easily and securely implemented by **EBNER** experts. This means that our customers never have to become dependent on external IT providers.

BOTH VISIONARY AND PRACTICAL: THE EBNER SECBOX

EBNER is successful when our customers are successful - whether in terms of production output, quality or sustainability. A smart approach is when all this is possible without the need to invest in a new facility. The **EBNER** SECBox was developed with these goals in mind: it is easy to install, easy to use and can be integrated seamlessly into industrial systems and industrial tools. This supports one of the core competencies of our customers: continually improving their own processes. **EBNER**'s customers are able to make better decisions as they have up-to-date, detailed data, and this gives them an immediate competitive advantage.

An **EBNER** SECBox only supplies data to its owner, allowing our customers to decide for themselves whether data is only used in-house or is shared with **EBNER** and other external partners. When data is shared with **EBNER**'s simulation and heat treatment experts, numerous projects have shown that we can support our customers by optimizing recipes, reducing thermal energy input, reducing utility consumption and reducing maintenance downtimes. In one reference project, this type of support led to our customer saving over 100,000 euros a year in energy and utility costs at a single facility. As an added bonus, this also led to a reduction in carbon emissions.

THE FIRST STEPS

After a SECBox has been installed as part of a smart retrofit and data flows have been integrated into existing systems such as an MES, ERP, data management

system or maintenance and tool management system, our customers will be able to benefit from a wide variety of improvements. Our experience has shown that the following use cases are most affected:

- **ANALYSIS OF PROCESSES AND RECIPES (HEAT TREATMENT PRACTICES)**
Discover how variables such as equipment, material, process and recipe affect outputs and product qualities
- **MAINTENANCE**
Using data-driven insights, optimize the operating time of your equipment and minimize both planned and unplanned downtimes
- **COMPARE EQUIPMENT AND PLANTS**
Measure performance benchmarks across multiple sites and at multiple facilities; share best practices internally
- **SIMULATE PROCESSING TECHNOLOGY**
Use historical data and models to accelerate and improve the industrial introduction of new products, processes, and equipment; this enables the virtual commissioning of new production lines
- **SUSTAINABILITY**
Reduce energy consumption and costs by comparing inputs and outputs under different quality parameters; automatically track CO₂ emissions
- **PATTERN RECOGNITION**
In 2024, artificial intelligence and machine learning systems can analyze patterns of data to deliver unexpected insights - particularly when data is linked to other sources such as other equipment or systems

Here at **EBNER**, we continuously strive to advance green, sustainable technologies. These include digital solutions like the SECBox, a “plug & play” device that quickly and safely supplies our customers with valuable data that can be used to optimize their existing facilities.

If you would like to give your existing facility a decisive advantage over the competition, please feel free to contact us. We would be happy to discuss the challenges you are currently facing and the advantages that an **EBNER** SECBox can bring.

**KARL WOHLFART**Senior Sales Manager
EBNER**SASCHA EPPENSTEINER**VP Product Management
EBNER

The market for battery technology is expanding rapidly, playing a pivotal role in modern energy supply. Key drivers of this growth include the surging demand for battery electric vehicles (BEVs), portable electronic devices, and stationary energy storage systems for renewable energy. Lithium-ion batteries (LIBs) have emerged as the dominant technology, available in cylindrical, prismatic, or pouch cell formats.

Leading BEV manufacturers favor cylindrical LIB cells due to their high energy density, long lifespan, numerous charge-discharge cycles, stable performance and the ease with which temperature can be managed within the battery pack. Technological advancements and improved production methods are fueling market growth, even as breakthroughs in materials science and optimized high-volume manufacturing processes are both enhancing performance and reducing costs. The proliferation of battery gigafactories currently under construction or in the planning stage underscores this trend.

Asia dominates the cell manufacturing market, but plans exist that will expand Asia's production capacity to approximately 2700 GWh/y by 2030. Europe and North America are also experiencing significant growth in this sector, with European manufacturers planning to expand their capacity to around 900 GWh/y and North American manufacturers planning to expand to 1550 GWh/y by 2030.

MANUFACTURING BATTERY CELL HOUSINGS

For the production of cell housings, low-carbon steels with a small amount of alloying elements and a very high degree of purity are used; these steels must also have particular deep-drawing properties.

After hot-rolled steel strip is pickled and cold rolled, it is cleaned and coated. The coating is generally of nickel, applied in an electrolytic process, though depending on the application additional elements may also be used. This coating provides special corrosion resistance.

Coating is followed by heat treatment, which provides the desired material properties. The goal is creation of a fine, isotropic grain structure that is free of oxides and exhibits excellent formability along the length and across the width of the strip; this prevents earing during deep drawing. Diffusion ensures that there is an excellent bond between the nickel coating and the steel substrate.

Depending on the thickness of the strip, the desired mechanical properties, the thickness of the diffusion layer and the final application, the strip may follow a number of process paths during production. The special heat treatment process that is employed can be carried out in a continuous process at a continuous annealing line or, with certain limitations, in one of EBNER's proven HICON/H₂® bell annealer facilities for steel coil.

The strip then moves to a finishing mill for fine adjustment of the properties and the surface finish, after which battery housings are manufactured in a deep drawing process. The housings can then be packed with anodes, cathodes and electrolytes.

The demands the future will bring, in particular those created by e-mobility, are challenging. Every company must design more sustainable processes while simultaneously remaining competitive. With this need in mind, EBNER has developed a new design for a horizontal continuous annealing line: the GREENCAL®. This type of facility focuses on energy efficiency, reducing emissions and maximizing throughput. At the same time, the line is capable of every continuous heat treatment technology employed to produce nickel-coated steel strip including normalizing, diffusion annealing and short-cycle annealing.

The combination of high convection and a highly pure process atmosphere ensures extremely precise temperature distribution across the width of the strip, paired with extremely high throughputs and reproducible material properties. The preferred method of heating is a fully electric system, creating no local carbon or NO_x emissions.



GREENCAL®

Innovative continuous annealing lines
for battery production.

Compared to vertical multi-pass furnaces, a horizontal **GREENCAL**® is characterized by the following special features:

- High furnace temperatures, which achieve desired microstructures at high outputs (in contrast to the typical maximum temperature of 900 °C in vertical furnaces, temperatures up to 1020 °C are employed)
- Low strip tensions (~ 3 MPa compared to the 6 - 8 MPa of vertical furnaces)
- Low dewpoints due to the gas-tight furnace design (~ -40 °C compared to the ~ -20 to -30 °C in vertical furnaces)
- Thin strip only contacts small furnace rolls in a straight line, with no large contact surface; this reduces the risk of surface damage, roll pickups, heat buckles and strip breaks
- Heat treatment without deflections - multiple 180° deflections at high strip temperatures are eliminated, preventing strip damage due to flow lines and heat buckles
- Heating elements are protected from contact with the strip and damage in the event of a strip break
- Switching between different annealing cycles can be carried out without manual intervention
- High facility availability and low downtimes ensure maximum productivity

TECHNICAL DATA OF A TYPICAL GREENCAL®	
Strip widths	max. 800 mm / 1000 mm / 1220 mm
Strip thicknesses	0.1 to 1.0 mm
Process speeds	up to 100 m/min
Annealing temperature	up to 1020 °C
Throughput	up to 120,000 t/a

ADVANTAGES OF THE GREENCAL® DESIGN

FLEXIBLE FACILITY DESIGN WITH HIGH THROUGH-PUT

- Different annealing technologies can be employed in a single line
- A variety of heating system types can be combined in one line
- Modular facility design allows capacity to be expanded at a later date
- Flexible heating and cooling rates, as dictated by the technological requirements

SUSTAINABLE HEATING METHODS

- Emission-free electric heating system with **HICON**®

high-convection atmosphere circulation for high energy input over a short length of strip in the heating-up section

- Emission-free electric heating with radiant tubes, particularly suitable for soaking zones
- Emission-free induction heating with longitudinal and/or transverse field inductors (depending on the dimensions of the strip and target temperatures, limitations in the temperature uniformity and a higher specific energy consumption must be accounted for)
- Low emission gas-fired combustion system with highly efficient recuperative radiant tubes

The highest efficiency, i.e. the lowest specific energy consumption (kWh/t), is achieved using a high-convection electric heating system.

FLEXIBLE STRIP TEMPERATURE CONTROL

- Extremely precise temperature control and temperature distribution
- Variable heating and cooling gradients
- Flexible soaking times

GAS-TIGHT FURNACE DESIGN

- Special seal designs at the furnace inlet and outlet, as well as at leadthroughs for rollers
- Precise atmosphere control and furnace pressure control systems
- Extremely low dewpoints

LOWEST ENERGY AND UTILITY CONSUMPTION

- Extremely efficient heating system design
- Special lightweight fiber module lining
- Process atmosphere recycling with recycling rates up to 80 %
- Thermal energy can be recovered during the process

DAMAGE-FREE STRIP TRANSPORT

- Driven seal rolls at the furnace inlet and outlet seals
- Special furnace roll designs
- Individual rolls powered by precise servo drives
- Prevention of deposits on rolls / long furnace roll service life

USER-FRIENDLY FACILITY DESIGNED FOR EASE OF MAINTENANCE

- Simple roll removal (without overhead crane)
- Strip break detection with protective devices for components inside the furnace
- New strip can be easily threaded
- Furnace facility can be quickly heated up and cooled when changing processing modes

BRINGING IT ALL TOGETHER

EBNER's development of a high-performance annealing line for battery steels, with its sharp focus on increasing energy efficiency, reducing emissions and providing high throughputs, is a major step forward in providing sustainable production methods to the metals industry and increasing e-mobility.

The first **GREENCAL**® facilities have already been successfully put into operation, with additional lines currently under construction.



EBNER

EFFICIENCY UPGRADES

In the aluminum industry, sustainability and energy savings start with **EBNER** case studies.



MICHAEL SCHIESSER

VP Customer Service
EBNER

At a time when the pressure on industries to reduce CO₂ emissions and improve energy efficiency is constantly increasing, innovative approaches to sustainable heat treatment processes are in more demand than ever. Heat treatment facilities play a central role in the aluminum industry's value-added chain. However, they also consume significant amounts of energy and emit significant amounts of CO₂. Given the increasing need to reduce greenhouse gases and increase energy efficiency, this means that our customers are constantly searching for ways to optimize their existing facilities. Our most recent feasibility studies show that the implementation of tailored measures can reduce energy consumption by up to 20 %. Such studies thus form an extremely promising method of optimizing heat treatment processes and reducing energy consumption at existing heat treatment facilities.

Recently, as part of a webinar titled “EBNER Efficiency Upgrades for the Aluminum Industry”, held on-line from March 20-21, 2024, EBNER's Manoj Kumar (Senior Expert Product Development) and Helmut Schumergruber (Senior Expert Automation) - both aluminum experts in EBNER's Research and Development Department - discussed current strategies and technologies that employ EBNER upgrades to provide significant energy savings. They placed particular emphasis on focused feasibility studies and retrofit solutions, which can be tailored to meet the specific needs and challenges created by individual customer requirements.

The close cooperation between our customers, our Customer Service Department and our Research and Development Department allows the development of solutions that are not only technically efficient, but also economically viable. Engaging in a dialogue with our customers is crucial for understanding their specific needs and developing precisely-tailored solutions.

THE IMPORTANCE OF ENERGY EFFICIENCY IN THE ALUMINUM INDUSTRY

The aluminum industry is known for its energy-intensive production processes, which constitute a significant portion of operating costs. At the same time, the industry is under increasing pressure to reduce its environmental impact - pressure that may be exerted by regulatory requirements, rising energy costs or the increased expectations of customers and investors that products are sustainable. Optimizing energy consumption is thus becoming increasingly important.

THE WEBINAR: CONTENT AND GOALS

“EBNER Efficiency Upgrades for the Aluminum Industry” sought to provide participants with practical insights into retrofit options that provide energy savings. Various examples of aluminum heat treatment facilities were presented, including pusher furnaces, floater (air cushion) furnaces, batch-type furnaces and roller-hearth furnaces. The key message was that significant savings can be realized through targeted, customer-specific solutions.

FROM THEORY TO SUCCESSFUL PRACTICE

■ CUSTOMER-SPECIFIC ENERGY STUDIES

One of the central topics raised by the case studies was that of focused energy studies, which are tailored to the individual requirements and situations of our customers. Our experts repeatedly emphasized that heat treatment facilities employed by the aluminum industry present different challenges and opportunities, which is why generalized solutions are often inadequate. A thorough analysis of existing systems and processes is the first step in identifying specific areas in which potential savings can be found.

■ TECHNOLOGICAL INNOVATIONS

A variety of technologies that enable energy efficiency to be optimized were presented within the framework of the feasibility studies. Among other solutions, they included advanced carbon-neutral heating systems, waste heat recovery and optimized, energy-efficient cooling processes. Implementing such technologies can significantly reduce energy consumption without impacting production capacity.

■ PROCESS OPTIMIZATION

Alongside technological solutions, the optimization of existing processes can play a central role in improving efficiency. Significant savings can be achieved by fine-tuning production parameters and introducing energy-efficient practices. Examples include optimizing the process chain to minimize energy losses and using digital tools to monitor and control energy consumption in real time.

■ **REAL-LIFE SUCCESS STORIES**

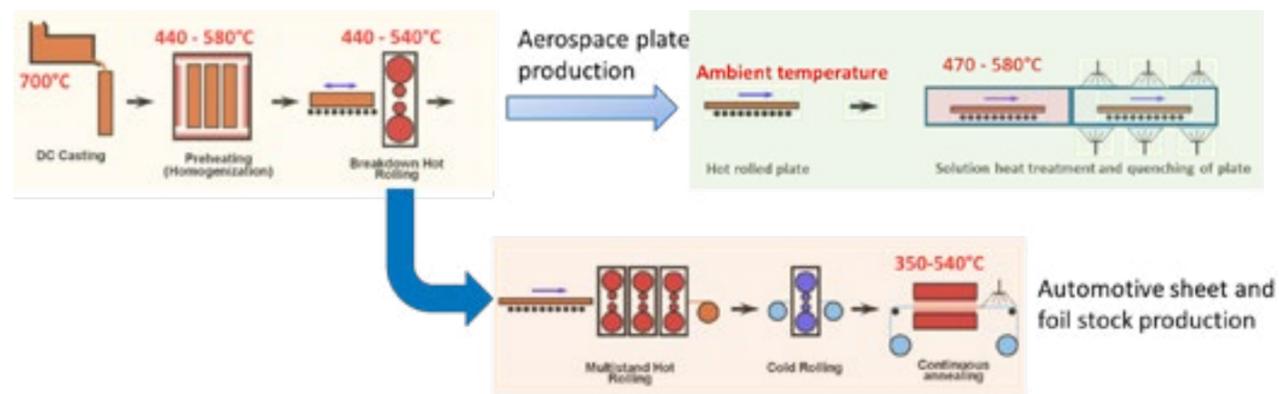
Another important component of the webinar was the presentation of case studies illustrating the successful implementation of energy-saving measures in the aluminum industry. These examples demonstrated the ways in which **EBNER** customers achieved significant savings using customized approaches. For instance, one case study showed how an **EBNER** customer reduced energy consumption by 18 % by installing a mathematical calculation program and optimizing their production processes.

Over the long term, aluminum producers that proactively focus on energy savings and sustainability will be more competitive and better prepared to meet future market demands and future regulatory requirements.

In conclusion, it can be seen that feasibility studies are an effective tool that the aluminum industry can use to modernize heat treatment facilities and sustainably reduce energy consumption. The results of our case studies demonstrate that energy savings of up to 20 % are both realistic and achievable. Companies that draw upon this potential will not only be able to reduce operating costs, but will also make a valuable contribution to decarbonizing the aluminum industry.

THE PATH INTO A SUSTAINABLE FUTURE

New technological developments and our approaches to optimizing processes highlight the fact that the aluminum industry is on the right path for improving its energy efficiency and sustainability. The approaches that were presented demonstrated that significant savings can be achieved, for example by conducting customized studies and employing innovative technologies. These do not only contribute to reducing operating costs, but also significantly reduce the environmental impacts created by our customers.



NEWS

HICON®
Journal is
also available
by email!

Trade fairs. Conventions. 2024/2025

OCTOBER 08-10, 2024	ALUMINUM DÜSSELDORF 2024	Düsseldorf	DE	Booth no.	6H20
NOVEMBER 13, 2024	GLOBAL LAUNCH GREENBAF_x EVENT	Leonding	AUT		
FEBRUARY 11-13, 2025	WIRE MEXICO	Monterrey	MX	Booth no.	TBA
MAY 05-08, 2025	AISTECH 2025	Nashville	USA	Booth no.	TBA
MAY 28-29, 2025	ALUMINUM USA 2025	Nashville	USA	Booth no.	TBA

We look forward to seeing you there!



EBNER Industrieofenbau GmbH
T: (+43) 732 6968, E: sales@ebner.cc
EEMCO GmbH
T: (+43) 732 6968, E: office@eemco.at
FAMETEC GmbH
T: (+43) 732 6968, E: info@famotec.cc
SiGreate GmbH
T: (+43) 732 6968-0, E: info@sigreate.cc

EBner-Platz 1
4060 Leonding
AUSTRIA



EBNER Furnaces, Inc.
T: (+1) 330 335 1600
E: sales@ebnerfurnaces.com
Gautschi North America LLC
T: (+1) 330 335 1660, E: info@gautschi.cc
HPI LLC
T: (+1) 330 335 1600, E: hpi@hpi.at

224 Quadral Drive, Wadsworth, Ohio 44291
USA



EBNER Industrial Furnaces (Taicang) Co., Ltd.
T: (+86) 512 5367 6668, E: sales@ebner.cc
Gautschi Industrial Equipment (Suzhou) Co., Ltd.
T: +86 512 5383 8642-801
E: info@gautschi.com.cn
EED Furnaces (Taicang) Co., Ltd.
T: (+86) 512 / 5320 8898
E: eed-sales@eedfurnaces.com
Hazellett Trading (Taicang)
T: +86-512-5395-0211, E: ht@hazellett.com
Beijing East Road 82, 215400 Taicang, Jiangsu
CHINA



Gautschi Engineering GmbH
T: (+43) 720 569 100, E: info@gautschi.cc
HPI High Performance Industrietechnik GmbH
T: (+43) 7722 68420, E: hpi@hpi.at
C-It-C Casthouse (REvolution Center)
T: (+43) 720 569 150, E: sales@orc.info

Schoßstraße 32, 5282 Ranshofen
AUSTRIA



GNA alumtec Inc.
T: (+1) 514 956 1776, E: info@gna.cc

9455 Trans-Canada Hwy
Saint-Laurent, Quebec, H5S 1V3
CANADA



EBNER Vision India Pvt. Ltd.
T: (+91) 22 6130 3333
E: office-eb@ebner.cc

L&T Seawoods, Unit No.: C-402
Level 4 / C wing / Tower 1 / Plot P-5
Sector 40 / Seawoods Railway Station
New Mumbai / Navi Mumbai- 400706
INDIA



EBNER R&D Labor, Leonding



Casthouse (REvolution Center, Ranshofen)



Hazellett Strip-Casting Corporation
T: (+1) 802 863-6378
E: hazellett@hazellett.com

PO Box 600
135 West Lakeshore Drive
Colchester, Vermont 05448
USA



Hazellett R&D Labor, Kingston