

HICON®

EBNER Group Journal for Progress in Industrial Furnace Technology



**Towards a green future
with **EBNER** technology**



EBNER

Ladies and Gentlemen,
Esteemed readers of the
HICON® Journal,
Dear friends and colleagues.

After the challenges posed by the coronavirus pandemic in 2020, 2021 was dedicated to many interesting projects and developments.

It became possible to meet with each other in person again, and as the year progressed it became easier and easier. The Executive Summit on the subject of mobility, held in cooperation with voestalpine in September of this year, was a liberating moment where attendees could personally exchange ideas and network.

The issue of sustainability is becoming more and more important, and the pressure to take action is becoming stronger and stronger - particularly as natural disasters become more frequent everywhere in the world.

Austria has tight cultural and economic ties to Germany, and we thus felt the catastrophic flooding that took place there very keenly. This flooding caused massive damage, not just to private property but to many companies and our customers as well. It was a matter of course for **EBNER** to immediately provide all the help we could, and I am particularly proud of the fact that in such an unexpected situation our team could provide customer specific solutions and assistance rapidly and without delay. More on this subject can be found in the article starting on page 8.

Of course, in this issue we also focus on the issue of sustainability at **EBNER**. Every **EBNER** facility can already be heated with an electric heating system. You can find



out more about our green plans and goals in the article starting on page 10.

This issue also includes reports on advancements and successes in the field of research and development. To name just one example, we were able to develop a new, individualized solution for a Chinese customer. Find out more on page 26.

An additional achievement that I would like to mention is that we won this year's Austrian Prize for Innovation in the "radical innovation" category. It was one of the very satisfying moments in our years of continuous research work.

I hope you enjoy reading this issue of the Journal, and am looking forward to working together with you to ensure a green future for us all.

Yours, Robert Ebner
CEO



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Exchanging ideas in the **EBNER** Future Lab

1st executive summit.

Cost efficient lightweighting - efficient applications for AHSS & UHSS.



CHRISTIAN KOVACS
EBNER Academy.

Under the motto “high class training specifically dedicated to high class technology”, **EBNER** supports both success and the development of competencies at its customers with modern, individually-tailored training concepts.

Due to the COVID-19 crisis, however, training and seminars

have generally been conducted remotely over the past year and a half - in the form of **EBNER** Academy webinars.

In the fall of this year, it was finally time to end the long dry spell and hold a comprehensive, high-level event fully in the spirit of the **EBNER** Academy. In collaboration with

voestalpine AG, a two-day summit was organized that would focus on cost-efficient lightweighting within the mobility sector.

This first **executive summit and networking event** was thus held on September 21 and 22, 2021, with “Cost-efficient lightweighting - efficient applications for AHSS & UHSS” as its theme.

The goal of the event was to be able to exchange ideas with **EBNER** customers and partners from the automotive sector in person, as well to enable the acquisition of new customers, promote the extension and strengthening of networks and present and demonstrate both products and expertise.

With all necessary safety precautions taken, the summit was held in two locations: the voestalpine Stahlwelt in Linz, Austria and **EBNER** Industrieofenbau in Leonding, Austria.

On the first day of the event, twenty-two internationally known keynote speakers made extremely interesting presentations covering five main subject areas:

- » OEM - needs, requirements and trends
- » New materials
- » Equipment and machinery
- » Technology and supporting processes
- » Parts & production

At this high-level event **EBNER** was represented by Peter Seemann (head of **EBNER** R&D), who spoke on two different topics.



Presentation at voestalpine

Both topics are presented in more detail below.

HIGHLY-FLEXIBLE HORIZONTAL CONTINUOUS ANNEALING LINES FOR AHSS AND UHSS

Technical progress creates a constant pressure to improve the mechanical/technological properties of materials. The need to increase passenger safety and reduce emissions has led to new types of steel such as AHSS, supporting the drive toward lighter vehicles.

In turn, these materials have created new challenges for heat treatment facilities, which must ensure that the desired mechanical properties are achieved. Higher annealing temperatures, faster cooling rates, improved strip geometries, increased overaging times, the highest possible temperature uniformity and rapid transitions





Presenting EBNER HotForm & ITL hot forming of aluminum blanks in the EBNER lab

between product types are all required. The requirements placed on a continuous facility - to produce the entire range of AHSS grades both economically and in an appropriate quality - thus pose a significant challenge.

Over the last few years, EBNER has developed a range of functionalities with the intent of making these goals achievable not only for small-scale hardening and tempering lines, but for OEMs and their tier 1 suppliers as well.

To meet customer requirements in terms of annealing, EBNER has developed HICON/H₂® quenching technology. This system is integrated into a flexible, horizontal CAL with an annual throughput of 110,000 t for dual-phase and martensitic grades.

This technology allows an improved design for a horizontal continuous reference line, with significantly improved production scenarios and increased technological flexibility to respond to the most demanding annealing cycles and alloys.

EBNER HOT STAMPING WITH TTP TECHNOLOGY

Due to ever-stronger calls for the active reduction of

emissions in automotive manufacturing, all industrial machinery suppliers have been called on to make a contribution.

EBNER PACC technology provides a cost-effective solution for the production of hot-formed components with individually-tailored properties. With EBNER's years of experience in the field of press hardening as a starting point, PACC technology has now been developed even further to make it capable of meeting the future requirements of the market.

The greatest potential for weight savings can be found in the manufacture of large sidewall components that are heat treated individually, as this reduces the overall number of parts. One of the most important steps during TTP hot forming process is the creation of a precisely defined temperature profile within the blank, which must be heated in a manner that will meet the crash behavior requirements specified by the customer. All requirements for rapid, even heating of the blank must be fulfilled, even as the PH facility provides both the greatest possible economy and the greatest possible throughput (t/h).

EBNER has proven its ability to offer solutions that implement individual customer requests, meet exact strength

specifications and provide flexible component designs.

A VISIT TO THE EBNER LAB

The second day of the event offered deeper technological insights at three different locations: voestalpine PHS, voestalpine Stahl and EBNER Industrieofenbau. Shuttles were provided to transport more than 60 participants between the locations.

At EBNER, two stations - one with steel and the other with aluminum as a theme - could be visited, at which the following simulations were presented:

- » EBNER HotForm & ITL hot forming of aluminum blanks
- » Pressing retrofits
- » TTP/PACC simulation PHS
- » Contact-free temperature measurement of metallic surfaces
- » 3MA measurement of steel parts
- » SimCAL test



Presenting SIMCAL testing in the EBNER lab

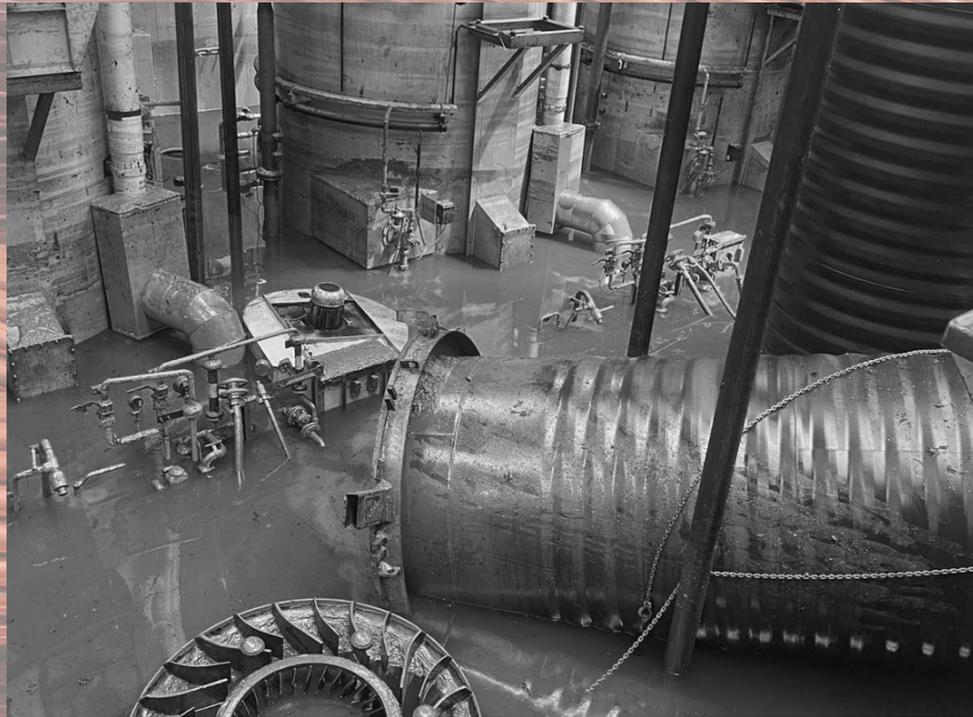
LESSONS LEARNED

The first executive summit was not just an excellent opportunity to network and reinforce partnerships. It also provided a venue at which the future of mobility could be discussed in terms of the opportunities and chances it offers, and at which the most innovative developments could be benchmarked.



Exceptional service.

During hard times, a strong sense of solidarity was found at the center of the German wire industry.



PETER GOSCH
EBNER Service

The historic flooding that took place in July, 2021 caused damage to an extent never before seen in the German state of North Rhine-Westphalia. Homes, streets, businesses, vehicles and critical infrastructure all fell victim to the storms. Particularly hard hit by the effects of the heavy rains was Altena, a small city in the Märkischer Kreis district of North Rhine-Westphalia that is widely regarded as the center of the German wire industry.

FLOODING SHUTS DOWN PLANTS

At several plants, production and manufacturing came to a complete stop. Many of the well-known manufacturers operating those plants have been EBNER customers for decades, and it was thus our highest priority and our duty to support the affected companies immediately, with every available resource.

Rapid on-site assistance was provided by the EBNER service team. Every available colleague from the Service, Installation and Electrical Engineering departments traveled to the flooded region, and assessment of the damage began immediately.

At several of our customers' works, a continuation of normal production was unthinkable. The components affected most severely were, of course, those in the electrical systems - almost every power panel stood in waist-deep water. Just as critical was the need to contain the threat posed by escaping hydrogen.

The customers affected by flooding could use all the help they could get, and the EBNER team left its core competencies far behind as it made itself available to support both the cleaning and the drying of the facilities.

Thanks to the high level of personal commitment and everyone's willingness to get their hands dirty, along with the feeling of solidarity that grew between our customers and the EBNER service team, emergency operation

could be started at almost every plant - allowing critical production to be started up again, at least in part.

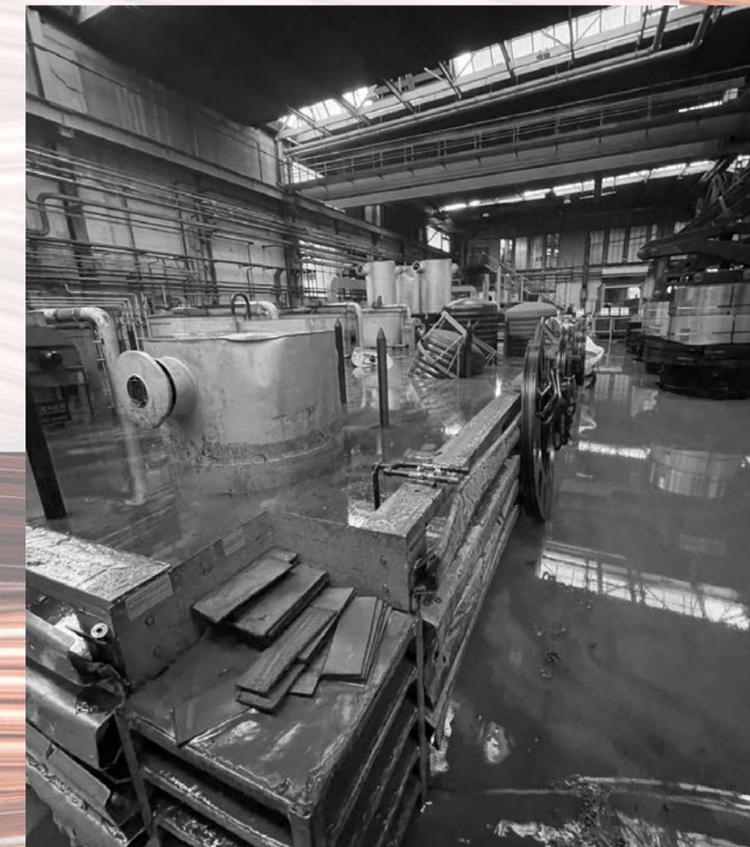
COMPETITORS BECOME PARTNERS

The powerful feeling of solidarity was also seen among the different companies in the region, most of which are family-owned. Particularly worth mentioning are those wire manufacturing plants that were not affected so dramatically by the catastrophe, but who provided rapid, unbureaucratic assistance to their competitors - e.g. by scheduling toll anneals to allow customer orders to be filled on time.

LOOKING POSITIVELY TOWARD THE FUTURE

Although it may still take some time, we are optimistic that production capacity can be fully restored at our customers' works.

The EBNER service team will continue to provide rapid, professional assistance, so that "center of the German wire industry" will be as strong as as it was before and ready to deliver products at full capacity.



E³ EBNER ENERGY EFFICIENCY

E³ - more than just green.

Those who think green place their trust in EBNER technology.



PETER GOSCH
EBNER sustainability

The pressure placed on companies is increasing from all sides, particularly on industrial concerns: regulatory agencies, investors and customers all demand verifiable sustainability. Failure to respond poses a business risk.

The EBNER Group takes environmental responsibility very seriously. To us, “economy” and “ecology” are not opposites. As a globally-active, owner-operated technology business, we constantly take an environmentally aware approach and set standards in environmentally-friendly production.

PRICE OF CARBON CREDITS RISING DRAMATICALLY.

Although an emissions certificate for a ton of CO₂ cost only 25 Euros in 2020, the price had risen to over 52 Euros by June of this year. Further price increases are to be expected, due to upcoming reforms and the stricter limits placed on CO₂ emissions that will go into effect in 2030. Europe’s major steel manufacturers already spend millions on certificates to cover the carbon they emit. Furthermore, due to the increasing scarcity of “free” certificates that companies are allocated, the number of certificates that must be purchased will increase from year to year. This money would be better spent on new technologies.

While governments seek to balance ecological and social needs through expensive carbon credits, EBNER sees the solution in eco-friendly technologies.

MISSION: REDUCED EMISSIONS

New strategies for environmentally-aware and energy-efficient approaches are required to demonstrably reduce the ecological footprint we make on our planet. Increasing numbers of EBNER customers ask how our facilities are manufactured, as well as how environmental benefits can be increased and processes made as climate-neutral as possible through the use of EBNER technologies. For these reasons, we take compliance with ecological and social principles into account when selecting our suppliers.

This may be a shared responsibility that must be met, but it is also a challenge that we face together. Solutions are needed that are not just green - they must also provide a competitive advantage.

The pressure that is being exerted is also creating oppor-



2016

EBNER works intensively on its go-green strategy. CO₂-neutral operation is already possible at every EBNER facility. EBNER begins development of flameless burner systems to further reduce NOx emissions.



2021

Depending on the application, new gas-fired facilities are equipped solely with flameless burner systems to further reduce NOx emissions. The development of H₂ burner systems is an additional step toward a reduction in CO₂.



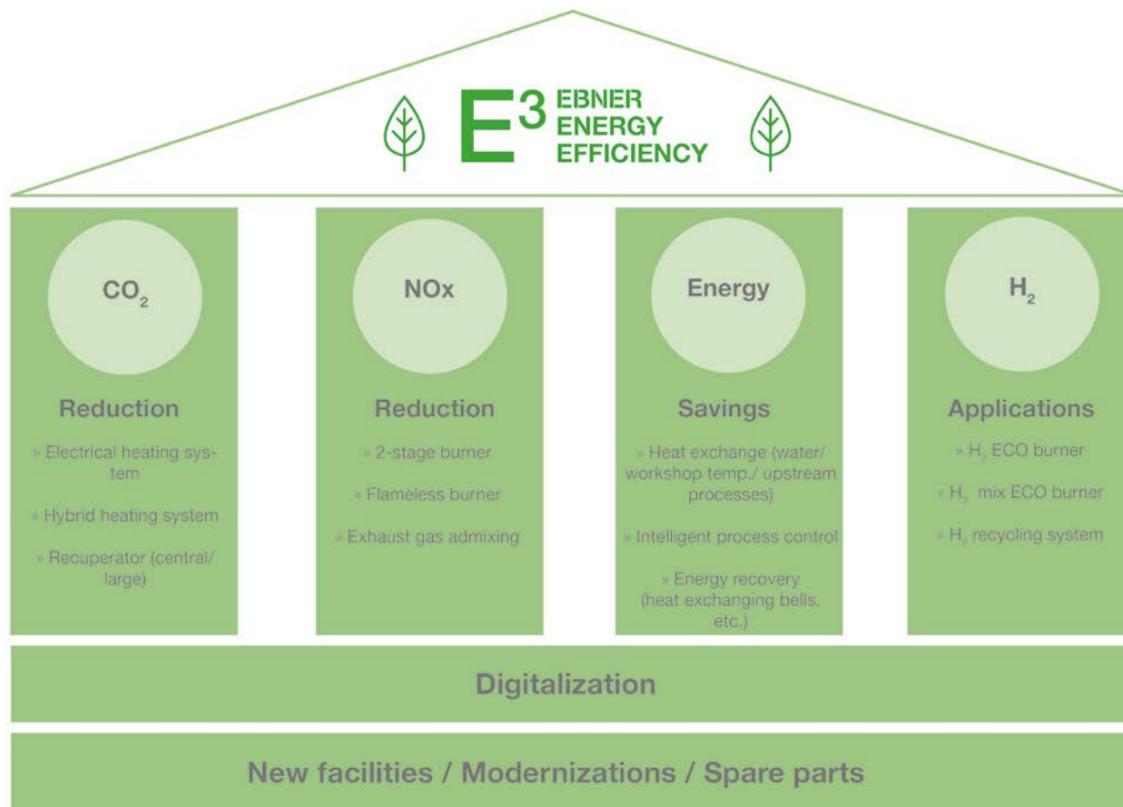
2030

By 2030, about 50 % of all new EBNER facilities should be delivered with CO₂-neutral heating systems. Our central premise is that the number of heat treatment facilities operated with natural gas will be reduced by the increased use of alternative fuels (H₂, bioethanol, etc.).



2040

We have set ourselves the ambitious goal of ensuring that our value chain is completely climate-neutral by 2040.



The 4 pillars of the EBNER E³ concept

tunities in many industries, as competition is fierce. Morality and monetization are fighting for the planet on which we all make our home. In this struggle, it is clear that the magic word “efficiency” is one that is paving the path to green prosperity and economic stability.

E³ – EBNER ENERGY EFFICIENCY

As a world leader in the manufacture of industrial facilities, EBNER does not only promote the development of sustainable technologies and their integration into our product line. We also promote the further development of individual technologies during every customer project and through projects carried out within our own company. By choosing EBNER and our E³ solutions, our customers are promoting not just the achievement of their company’s climate goals. They are also ensuring the sustainable success of their company. It is already possible to heat every one of our facility types using climate-neutral energy.

ECOLOGY MEETS ECONOMY

Calculation of the various measures needed to create savings, increase efficiency and meet sustainability targets is often not a simple task, and creates new challenges for many companies. We can provide meaningful input to simplify this process for our customers.

Through the use of new technologies such as energy recovery, lightweight designs for certain components

or combustion air preheating, EBNER has continuously improved the energy efficiency of its facilities.

Our E³ concept is based on the following four pillars, all of which have a positive effect on the environment:

- » CO₂ reduction
- » NO_x reduction
- » Energy savings
- » H₂ applications

Alongside this “4 pillars” model, we encourage both the digitalization of our projects and the modernization of existing facilities. These allow the climate goals established by our customers to be achieved even more quickly.

POTENTIAL CO₂ REDUCTION, BY FURNACE TYPE

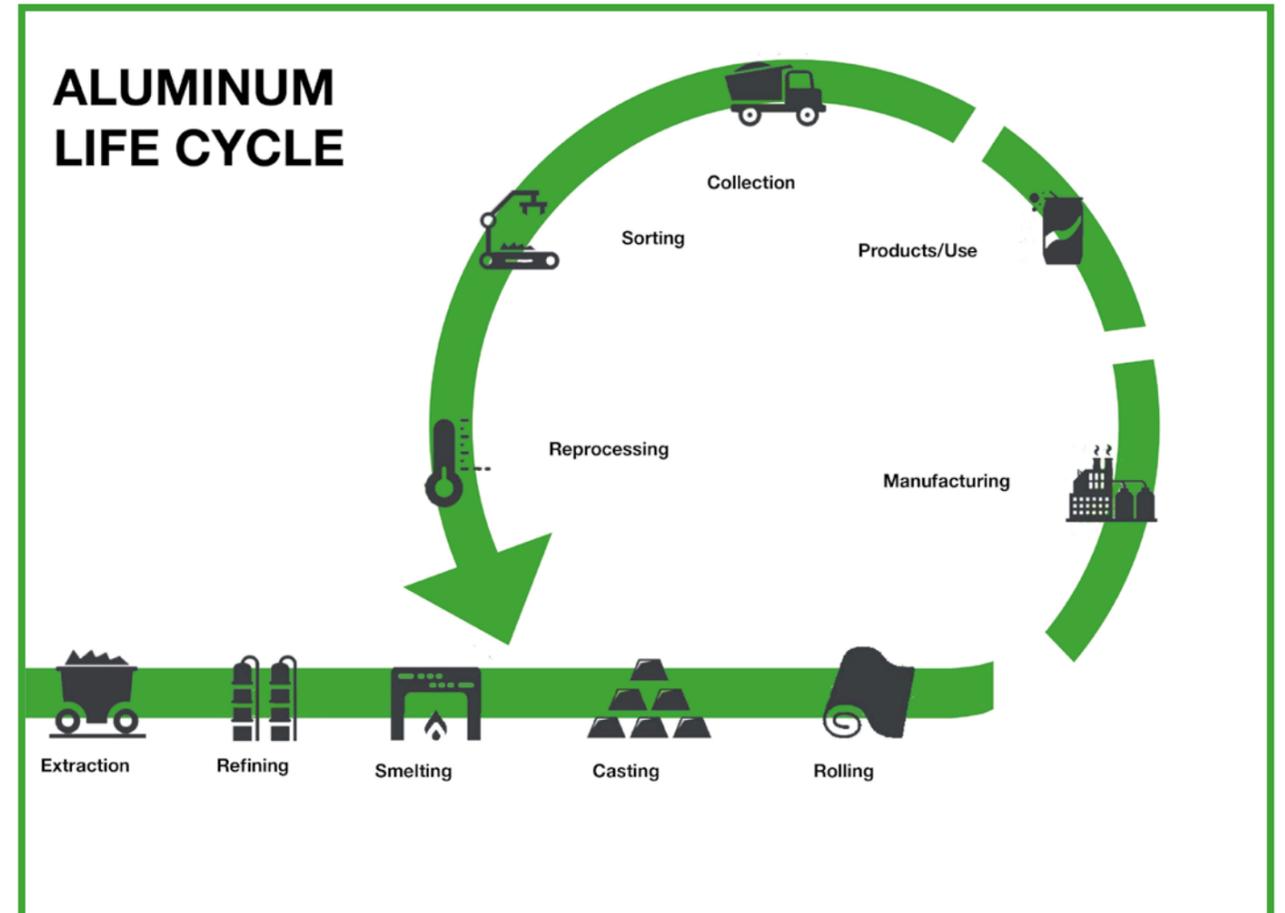
It is already possible for every EBNER facility to be heated with an electric heating system, which can make a significant contribution to the reduction and elimination of CO₂.

Depending on the alloy being processed, charge weight and cycle time, as well as the type of facility, significant savings can be achieved.

The table shown below shows potential savings in annual CO₂ emissions for three EBNER furnace types. Investment in an EBNER facility also has a positive effect

| REDUCTIONS IN ANNUAL CO ₂ EMISSIONS* | |
|---|-------------|
| FLOATER FURNACE | 8352 t/year |
| PUSHER FURNACE | 6431 t/year |
| ROLLER-HEARTH FURNACE | 1574 t/year |

* All listed examples refer to furnaces designed to process aluminum



Aluminum has an impressive ability to be recycled. Around 75 % of the aluminum that has ever been produced is still in use today. This means that the life cycle of this product is particularly environmentally-friendly. The cycle begins when raw mineral is extracted, but after only a few steps in the manufacturing chain the material begins to be continuously recycled. Aluminum can be reworked an infinite number of times without the loss of quality. EBNER facilities in which aluminum is heat treated to obtain required material properties also play a critical role in this product cycle. They ensure that this environmentally-friendly metal retains or even reduces its environmentally-friendly footprint.

on another calculation. With **EBNER**, customers become not just pros in climate protection - they also become TCO champions.

COST SAVINGS THAT NEVER END

Investment decisions are often made before adequate information becomes available on the long-term running costs created by continuous expenses. **EBNER** is quite aware of these long-term costs, for which reason a significant element in our strategy has been to make our customers TCO champions. Those willing to take a look at all the costs when investing in a facility may be surprised to see how quickly they, despite an initially-higher investment, reach the break-even point.

MASTERING THE ENERGY REVOLUTION TOGETHER

At **EBNER**, we are convinced that we can best meet the ecological and economical challenges of the future when we work together with our customers and business partners. It is for this reason that, one year ago in September, we started several global campaigns aimed at reducing energy consumption and emissions - as well as at improving OEE (Overall Equipment Effectiveness) values. With these campaigns we sought not just to inform our customers and business partners of our newest developments in these sectors. As customers and partners will be accompanying us long-term on this path, we also sought to begin a dialog with them and to work together toward a sustainable future.



THE FOLLOWING FEATURES MAKE YOU A TCO CHAMPION:

- » Short annealing times
- » Low energy consumption
- » High throughput capacity
- » Highest facility availability
- » Long service life
- » Continuous improvement
- » Extremely economical
- » World-wide service



MANUFACTURE SUSTAINABLY

INVEST SUSTAINABLY

THINK SUSTAINABLY



MARIUS KREUZEDER

EBNER technical article

The increasing customer demand for higher coil weights and improved temperature uniformity, combined with the need for the lowest possible operating costs when conducting high-temperature anneals of grain-oriented electrical strip, has led a well-known American customer to choose EBNER as the supplier of a new high-temperature bell annealer facility.

In contrast to other existing facility designs (multi-stack furnaces sealed with sand), our HITT (High Temperature & Tight) furnace provides a complete, gas-tight separation of the workload space and the combustion chamber.

This separation allows a precisely-controlled atmosphere to be achieved, with significantly lower hydrogen consumption. A special patented coil support enables radiant heat to uniformly and efficiently heat coils in the workload space, leading to a significant reduction in scrap.

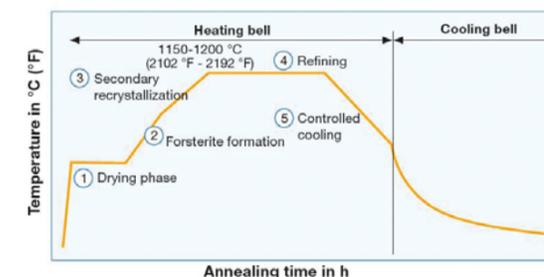
Paired with a cooling bell, this system ensures the shortest possible processing times. It provides the highest productivity, paired with the best possible quality and high throughput. The safety concept for processing in hydrogen has been adopted from HICON/H₂® bell annealers, and either an electric or a gas-fired heating system can be installed.

High-temperature anneals use secondary recrystallization to form grains with the magnetically advantageous Goss texture (3). The high processing temperatures (above 1150 °C) and straight hydrogen atmospheres also remove sulfur and nitrogen from the material (4). First, a drying phase (1) is used to dry the MgO coating applied during an upstream process, which inhibits the formation of stickers in the wraps at high workload space temperatures by forming a Forsterite layer (2). The processing steps (1 - 5) of the high-temperature anneal are depicted schematically in the following figure.

The following advantages contributed to the customer's decision to choose an EBNER HITT bell annealer over a multi-stack sand-sealed design:

Process

- ① Drying phase – residual moisture from MgO coating is removed
- ② Forsterite formation – glass-like insulating and separating layer is formed
- ③ Secondary recrystallization – Goss texture is formed
- ④ Refining – sulphur and nitrogen are removed
- ⑤ Controlled cooling – to avoid stress caused by contraction



- » Lower utility consumption (H₂, N₂), due to the gas-tight encapsulated workload space
- » Lower energy consumption (fuel gas)
- » Homogeneous temperature distribution within a coil, due to the patented coil supports and symmetrical heating; this ensures:
 - homogenous magnetic properties
 - reduced scrap due to reduced amount of strip edge damage
 - shorter annealing cycles (heating-up)
 - long inner cover service life
- » Cooling in 100 % H₂ atmosphere and use of a cooling bell provide:
 - significantly increased productivity
 - improved surface finish
 - prevention of further nitriding

Technical data of reference facility:

- » Diameter: 2000 mm
- » Charging height: 3000 mm
- » Max. net charge weight: 44 t (2 x 22 t)
- » Heating system type: gas-fired
- » 1 workbase / 1 heating bell / 1 cooling bell

An EBNER HIT(T).

EBNER delivers the first HITT bell annealer for high-temperature anneals of grain-oriented (GO) electrical strip.

Digital Product Management.

Model Predictive Control - MPC



PETER GOSCH

EBNER news
Digital product management

EBNER's digitalization strategy incorporates four thematic areas: digital models, digital facility operation, virtual commissioning and digital customer service. As a part of this approach, EBNER has placed a strong focus on the concept of TCO (Total Cost of Ownership). This raises the question of how EBNER facilities can be operated to provide even further optimization of processes and costs.

Experts in each individual field have been advancing digitalization and our four areas of focus for some time, so in 2021 it was finally time to gather these experts together in a high-powered team and allow them to continue moving forward as Digital Product Management.

In this article, we would like to take a closer look at the topic of digital models - in particular, at the advantages of Model Predictive Control (MPC).

MPC has increasingly established itself as an important component of modern automation solutions. It has a great deal of potential in the field of industrial furnaces, as well.

EBNER is working intensively on the development of mathematical models for wide variety of furnace types. Alongside classical functions like the calculation of charge or strip temperatures and the calculation of optimized recipes, Model Predictive Control (MPC) offers a wide range of useful, future-oriented possibilities.

Based on a mathematical model of the furnace, Model Predictive Control (MPC) can calculate future conditions and so depict the future course of dynamic processes in the furnace.

This will allow a wide variety of promising features to be implemented in the future, which we will briefly introduce below.

OPTIMIZATION OF TRANSITION PHASES

A classic example is the optimization of strip transition phases in continuous heat treatment facilities. Predictive adjustment of the furnace setpoints can significantly reduce the amount of scrap strip.

The minimum possible length of any required transition strips can be precisely calculated, increasing facility throughput. The exact calculation and recording of strip temperature, even during the transition phase, also allows the quality of the strip ends to be assessed.

OPTIMIZED FACILITY OPERATION BASED ON VARYING TARGET PARAMETERS

Model Predictive Control (MPC) also opens new possibilities for ways in which a facility may be operated. Alongside operational strategies that emphasize the maximization of throughput, minimize the stress placed on critical facility components or minimize scrap, strategies that optimize energy use are becoming increasingly important.

ROUTINES TO HANDLE MALFUNCTIONS

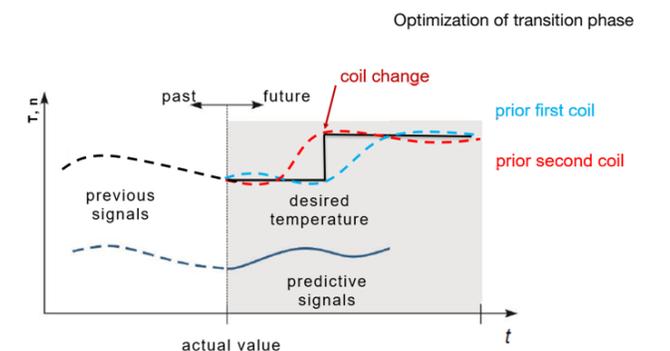
Malfunctions frequently require the recalculation of various furnace setpoints, such as the setpoint temperature or strip speed. To enable production to continue, Model Predictive Control (MPC) can calculate corrected annealing programs for every subsequent charge - all the way up until the malfunction is remedied.

SELF-OPTIMIZATION AND PREDICTIVE MAINTENANCE

The continuous evaluation of data collected in the past allow the system to optimize itself. The plausibility of the values collected by the array of sensors in the furnace is continuously calculated, allowing the early detection of measurement errors and defects that may develop in a variety of facility components.

THE NEW POSSIBILITIES OF VISUALIZATION

High-performance models allow the depiction and effective analysis of historical data and values. Data that is more current, along with the prognostic values calculated by Model Predictive Control (MPC), allow production to be optimally planned.





COMPANY EXPANSION 2021

BOWLING GREEN, KY

Groundbreaking at Bilstein.

The heat is on in Bowling Green, Kentucky.



HERBERT GABRIEL

EBNER news
from the USA

Bilstein, a German-based producer with a 110-year history of producing a wide range of high-quality precision steel products, has recently announced an expansion to their Bowling Green, KY facility.

As a privately owned, mid-sized company with roots in Europe, known for quality, innovation and tradition, Bilstein and **EBNER** have a common basis for doing business efficiently.

Bilstein has supplied products to US customers for well over 30 years, and founded Bilstein USA in 2009. A short few years later, they decided to build a cold rolling mill in Bowling Green, KY. Unfortunately, **EBNER** was not successful in supplying the hydrogen bell anneal equipment installed in this initial phase. But for the new expansion at their Bowling Green facility, slated to go into production in the spring of 2022, Bilstein selected **EBNER** to supply six **HICON/H₂**® annealing bases.

Nearly 1000 t will be “cooking” at any one time at these workbases, producing exacting metallurgical properties by precisely heating and cooling the coil stacks in 100 % hydrogen atmosphere.

The requirements of each coil are taken into consideration by advanced optimization and modeling software, guaranteeing precise and consistent quality for Bilstein’s

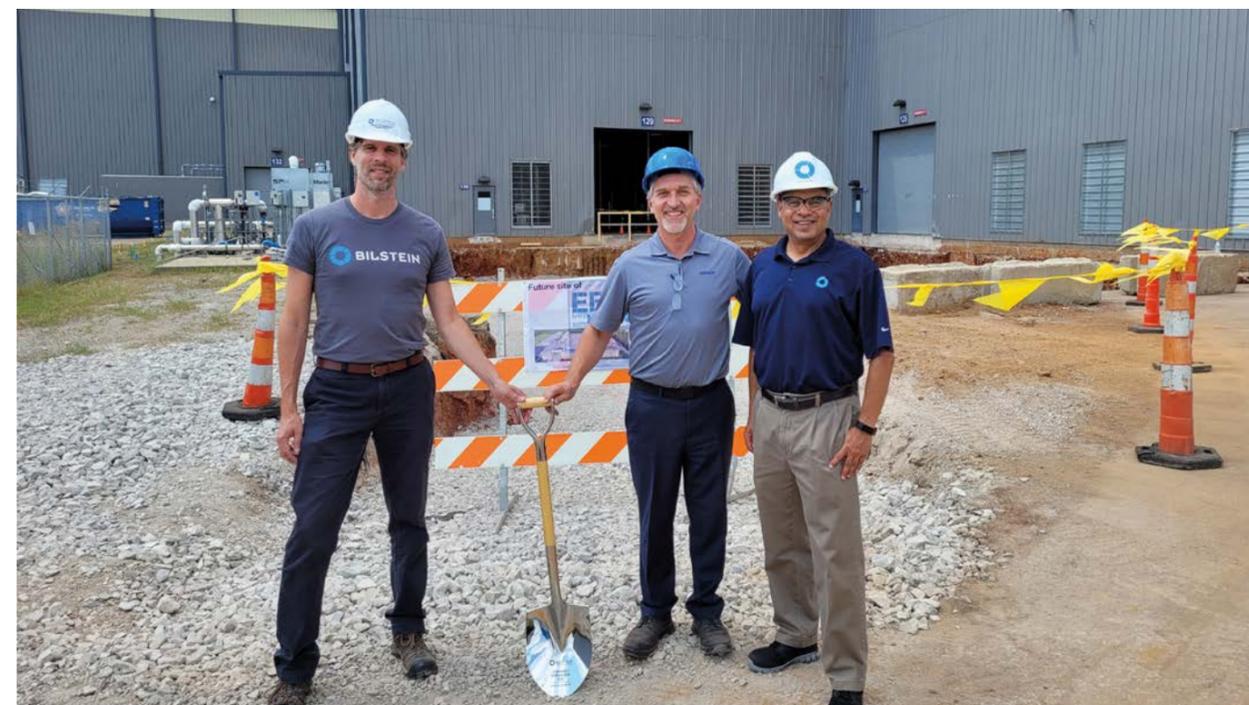
customers. This integrated system continuously monitors and automatically adjusts the process parameters as needed, ensuring the requirements of each coil are met.

EBNER has always been the first address for precision carbon steel processors throughout the world, as we recognize the level of precision it takes to make demanding products for the automotive and tool steel industry. In the future, this level of sophistication will also be rolled out for the older, non-**EBNER** batch anneal equipment.

I recently had the pleasure to join the Bilstein team during their groundbreaking ceremony, where their main partners for the expansion project were recognized. It is truly an honor for **EBNER** to be associated with the Bilstein Group again, especially here in the US. From **EBNER**’s subsidiary in Ohio, we look forward to accompanying BSCR, Inc into a successful future. We would like to thank the entire Bilstein team for their professionalism and for the trust they have placed in **EBNER**.

www.bilstein.com

From left to right: Brent Wilson (CEO BCRS), Herbert Gabriel, Francisco Ibarra (Project Manger, BCRS)





A continuing cycle of success.

State-of-the-art annealing technology to expand production at Speira Grevenbroich.



RAINER EHMANN

Gautschi news
from Germany

Speira is a globally-active aluminum manufacturing and recycling company, and its seven manufacturing centers make it the world's largest aluminum finishing enterprise.

Speira's cooperation with Gautschi began in 1985, when a large-scale order was placed for a total of 30 batch-type furnaces for foil and 10 single-chamber overhead furnaces, all of which successfully started production at that time.

Further expansions to production capacity at the Grevenbroich plant enabled Gautschi to supply an additional 8 annealing furnaces in the years that followed, and this very successful partnership has now been continued.

In 2021, Gautschi delivered an additional 4 annealing furnaces for foil to Speira's works in Grevenbroich, Germany. This added yet another chapter to this unparalleled story of success, as these furnaces are equipped with state-of-the-art components to support production and so make it possible for the high quality standards at Speira to be met. Over and above this, the Gautschi furnaces also support Speira's climate-friendly approach, in which the ecological footprint of products is minimized across their entire life cycle.

The latest Gautschi burner technology, combined with P-type radiant tubes and proven Gautschi airflow technology, ensure the best possible performance during production. The process circulation system draws evaporating hydrocarbons out of the furnace and through a catalyzer, eliminating pollutants and so fulfilling all requirements for environmental protection.



Control path on furnace roof

The air/air heat exchanger integrated into the furnace enables controlled cooling of the charge at the specified rates. A carbon monoxide measuring system in the exhaust gas ducting allows the combustion values of the furnaces to be supervised, ensuring that the gas-fired burners are always operating at optimal settings.

The installation phase was intensively planned and optimally implemented in close cooperation with the Speira team, although the coronavirus pandemic caused many significant challenges to appear along the way. One unique feature of the installation work was that the pre-assembled furnace modules were brought into the shop through the roof.

Planning and commissioning of the electrical systems was carried out in close consultation with the **EBNER** electrical and automation technology team based in Leonding, Austria, which once again underlined the excellent cooperation between the members of the **EBNER** Group.

www.speira.com

Row of furnaces for foil, with associated charger





A heated effort.

A recently-rebuilt EBNER facility is successfully recommissioned after a fire.



HERBERT GABRIEL

EBNER news
from the USA

On a Sunday night in late October 2020, Blue Blade made the local evening news for a very unexpected reason: a fire had destroyed a large portion of the plant roof!

Thankfully there were no injuries, but most of the production facilities had taken severe fire or water damage. Damaged equipment included the **EBNER** hardening and tempering line, the backbone of Blue Blade's production.

This was even more heartbreaking due to the fact that the line had recently been upgraded to lead-free operation by retrofitting a novel quenching process, where the steel strip is quenched in a high-speed hydrogen gas jet.

EBNER sprang into action and assisted in the initial fire investigation. Once the site was released by local investigators, a more thorough assessment revealed damage to just about all major process units of the line, such as the austenitizing furnace, quench, leveling furnace and tempering furnace.

Eventually, some these components were shipped to **EBNER** Furnaces in Wadsworth, OH where they were completely disassembled, cleaned and retrofitted with new devices. Notably, many of the piping systems and valve stands had been destroyed beyond repair and were completely rebuilt.

After sandblasting, painting, rewiring and thorough quality checks, the line components were returned to the site for installation. In the meantime, the site had undergone an impressive transformation, with new roofs, wiring, plumbing etc. Even more remarkable is that, in parallel, Blue Blade was able to install and recommission a pre-owned **EBNER** H/T line to maintain a certain level of production.

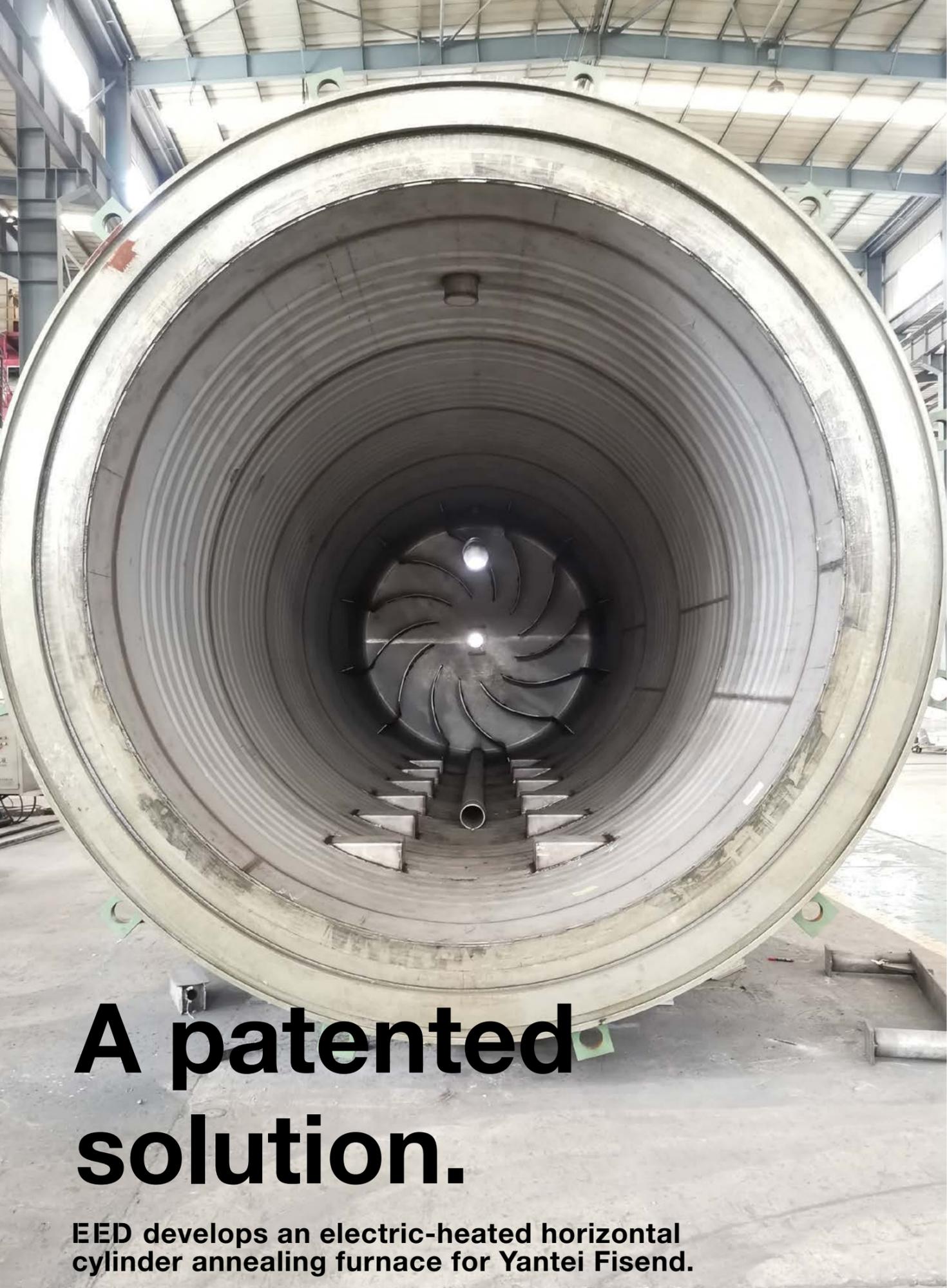
That this work could be executed in a relatively short time, during the height of COVID restrictions and the related supply chain issues, speaks to the commitment of the Blue Blade team and **EBNER** personnel.

Blue Blade and **EBNER** are happy to report that the **HICON**® line is again in operation. Blue Blade can again serve their customers without restrictions and at the high level of quality Blue Blade is known for in the industry.

EBNER would like to thank Blue Blade for the close cooperation during this challenging project. Find out more about the new facility and the technology behind it in the next issue of the **HICON**® Journal.

www.bluebladesteel.com





A patented solution.

EED develops an electric-heated horizontal cylinder annealing furnace for Yantai Fisend.



LIU NING
EED news
from China

Yantai Fisend Bimetal Co., Ltd. is a manufacturer of copper and aluminum composite materials, with their products mainly finding use in the power transmission industry.

Yantai Fisend recently began a search for additional annealing capacity, with strict performance specifications. After products are rolled, they require bright annealing at a temperature of 320 °C. The surface must remain free of damage and scratches, before the annealed product is removed at a temperature below 55 °C. Furnace capacity was specified as 6 t. Typical products such as wire and busbar material can be seen on the right.

In the search for solutions, we first considered a bell annealer. To increase the output of the furnace, we proposed that the charged copper coils be tilted and placed on the workbase with coil carriers. However, tilting loose copper coils does not guarantee that the surface of the strip will remain undamaged. Furthermore, if this charging method was adopted by the customer, the loading capacity would be very low. Much of the workload space would remain empty, preventing the requested throughput capacity from being met.

The next solution that was considered was a batch-type (chamber) furnace. There would be no need to tilt the copper strip, which could be charged directly into the furnace – and the throughput capacity would meet the customer's requirements. However, the batch furnace solution would use nitrogen as a process atmosphere. This would mean that the oxygen content in the furnace would not be less than 2000 ppm, and a bright surface on the annealed product could not be ensured. Furthermore, the cooling rate in such furnaces is low during the cooling phase, and it would have been impossible to achieve the outlet temperature of 55 °C or less that had been specified by the customer.

EED's designers thus turned to a new solution: they envisioned a "horizontal bell annealer" for bright annealing, combining the advantages of both a bell annealer and a batch-type/chamber furnace. This unique design has since been patented.



Typical products such as wire and material for busbars

After several rounds of discussion and adaptation, EED's horizontal cylinder annealing furnace finally took shape.

The furnace consists of the following main parts:

- » Heating cover: electric heating system, external connection to cooling blower
- » Furnace door with diffuser
- » Internal cover: circulation unit, heat exchanger and direct nitrogen cooling

In the cooling stage, nitrogen is drawn out of the furnace by the blower, cooled at the heat exchanger and then circulated back into the furnace.

Two views of the equipment, taken during assembly, can be seen below.

As of this writing, the furnace has been packed and is ready to be delivered to customer for installation and commissioning. We would like to thank Yantai Fisend Bimetal Co., Ltd. for the order, and for their support during development of this innovative solution.

www.fisend.com



NEWS

HICON®
Journal is
also available
by email!

Trade fairs. Conventions. 2022

| | | | | | |
|---------------------|------------------------|------------|----|-----------|------|
| MAY 9 - 13, 2022 | WIRE 2022 | Düsseldorf | DE | Booth No. | TBA |
| JULY 6 - 8, 2022 | ALUMINIUM CHINA | Shanghai | CN | Booth No. | 1H10 |
| SEPT. 27 - 29, 2022 | ALUMINIUM 2022 | Düsseldorf | DE | Booth No. | TBA |

We look forward to seeing you there!

Making plans to attend a trade fair has become difficult, due to the covid-19 crisis. It is for this reason that we have created the **EBNER ACADEMY**. Through live webinars and training sessions, the **EBNER ACADEMY** can keep you informed of new product developments and keep you up to date on **EBNER** technologies. Visit <https://academy.ebnergroupp.cc/live-webinare> to sign up now!

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