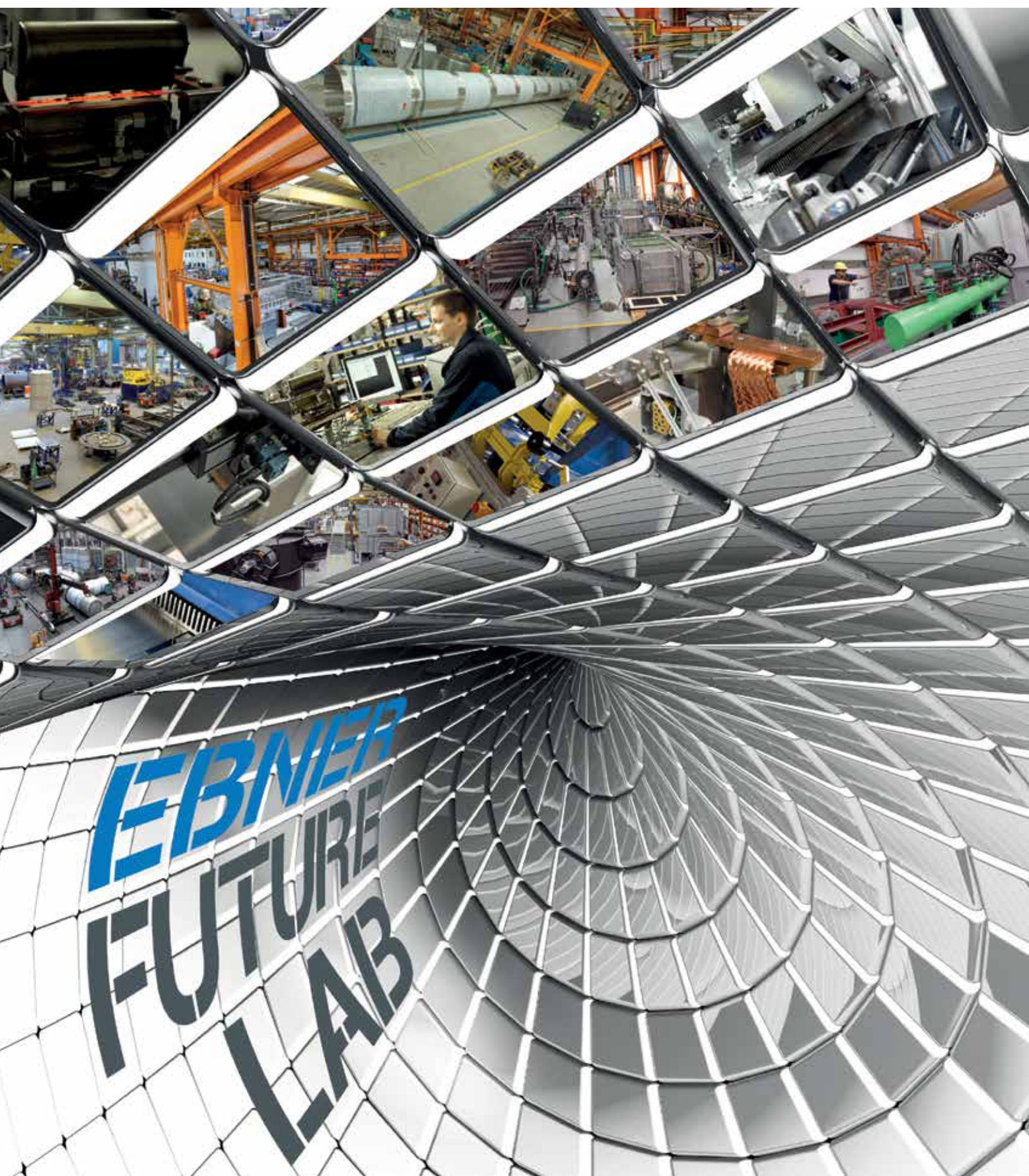
Volume 26. Issue 02. / September 2017. www.ebner.cc

HICON®

EBNER Journal for Progress in Industrial Furnace Technology.



EBNER.

Dear HICON® Readers, dear Business Partners, Ladies and Gentlemen.

FUTURE SUCCESS STARTS IN THE PAST

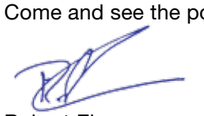
When potential or existing customers visit their suppliers, either at the headquarters or branch offices, I believe it is time well spent. A well-designed brochure can create a first impression, but a visit in person will tell you whether the promised values are really being lived out day-to-day.

Ladies and Gentlemen, my team and I have already been able to meet many of you at our headquarters in Leonding. A fixture of every visit is our Research and Development Department, where one can get an up-close-and-personal impression of how much we value the partnership with our customers, facing new challenges together. Naturally, a tour of our manufacturing workshop is also a highlight; many customers are surprised by the depth of our manufacturing processes and the amount of fabrication know-how we have at EBNER. If time allows, a visit to the EBNER museum clearly illustrates the continuity within our family-owned company.

During your next visit, we would recommend making just a little bit more time for us – our “Future Lab” has just been completed. This is where we can show our customers new EBNER products that will be launched in the next three years. Some of the products may seem visionary, but that was also the case 40 years ago - when we invented annealing in 100 % hydrogen atmosphere. At that time, we heard competitors say “if it even works, it will only work in a lab.” Today, you can see photos of these early tests in our museum, while the seventh generation of the facilities is in our lab workshop. The Future Lab shows us what heat treatment will look like in coming years.

The future starts in the past - or does it? I think it does. But in our fast paced times, in which market conditions change so rapidly, the future is much more important.

Come and see the possibilities for yourself - I look forward to your visit!



Robert Ebner

PS: Next year, EBNER Industrieofenbau celebrates 70 years of history. For more information about this milestone and the events and celebrations, visit the "70 Years" page of our website at www.ebner.cc/en/70.

INTERNET: These HICON® Journal articles can also be found on our website at www.ebner.cc. Click News & Press / HICON® Journal to download this and past issues of the magazine.

IMPRINT: HICON® **Journal:** The EBNER Customer Journal, Volume 26, Issue 2, September 2017 / **Copyright:** EBNER Industrieofenbau GmbH, Ebner-Platz 1, 4060 Leonding, Austria / **Tel.:** (+43) 732 68 68-0 / Fax: (+43) 732 68 68-1000 / **E-Mail:** 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. **Design:** YATTSU GmbH. www.yattsu.com / **Translation:** Steve Rossa, Irina Lomovtseva, Chen Lin / **Editing:** Sabine Schuster / Published twice yearly

Service 4.0

Customer Services in the digital age

PETER GOSCH
EBNER
Customer Services

EBNER is known for innovation. Heat treatment facilities are being increasingly automated, and the data they generate is evaluated to increase efficiency.

But it's not just heat treatment facilities: EBNER Customer Services is combining the best of digital solutions with the indispensable element of personal customer contact.

HICON® DIGITAL SERVICES

EBNER HDS® offers multiple levels of digital service solutions, from HDS® Field to HDS® Customer, to those who have chosen our Customer Services. After careful selection and optimization of both equipment and processes, the HDS® system is now available to our customers to simplify their service requests.

The first use cases at our customer's facilities have confirmed that this is the way of the future: increasing the digitalization and networking of our products and services. This allows EBNER Customer Services to serve our customers better. We would be happy to discuss the possibilities of EBNER HDS® at your facility!

EXTENDED RELATIONSHIP MANAGEMENT

In order to optimally orient our services to a customer's needs from our first contact with them onwards, EBNER is introducing the new xRM (Extended Relationship Management) system. The xRM will provide a service ticketing system optimized for plant engineering, as well as a Customer Services web portal.

This will put us in a position to ensure a flawless, transparent process from initial contact to the time a service is successfully concluded. Together with our HDS® solutions, we have created a highly-efficient, unbroken process chain linking the customer, the facility, the service technician and EBNER.

THE FUTURE: SPARE PARTS FROM OUR WEB SHOP

Today's technology demands that we adapt and modernize our processes. The entire EBNER spare parts process is being digitalized, making it simpler and quicker to respond to our customers.

Furthermore we are working on a spare parts web shop as well as on a Customer Service web portal. Here too, our goal is to make our know-how more accessible and so - together with our customers - ensure the most efficient process possible.

For more information on EBNER HDS® please feel free to contact us at service@ebner.cc.

A new age for hardened and tempered steel strip

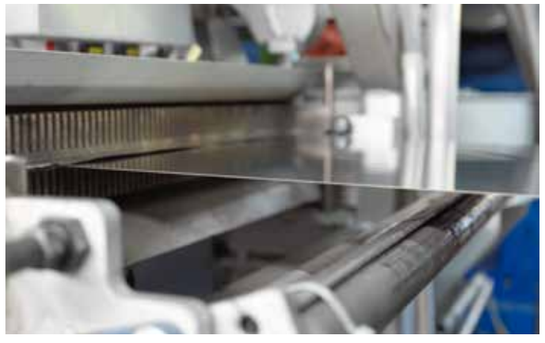
"XL" HICON/H_2Q® technology

SASCHA EPPENSTEINER
EBNER news
from Switzerland

In Reinach, in the Swiss canton of Aargau, KALTBAND AG has been producing challenging grades of cold-rolled and tempered steel strip, along with bimetal strip for the automotive and tool and saw industries for over half a century.

Shortly before the company's 50th anniversary, a future-oriented decision was made to invest in a new, high-performance hardening and tempering line for strip.

The design of the facility was considered from all angles in the planning phase. One major question was whether a traditional molten-metal quench or state-of-the-art hydrogen quenching technology would be the best fit at KALTBAND AG. True to the company motto "technological excellence and innovation", a decision was made to go with H_2 technology. KALTBAND's motto is a perfect fit for **EBNER** as well: as the market and technology leader, **EBNER** has supplied over 74 hardening and tempering lines as of our deadline.



Flatness after the **FlexFlat®**

NEW CHALLENGES FOR THE QUENCH

The challenge at this facility was to harden and temper carbon steel strips with widths up to 650 mm (26") and thicknesses up to 3.2 mm (0.13") both reliably and with perfect flatness, as well as to ensure consistent metallurgical properties.

Previously, strips of these dimensions had to be processed using molten metal quenches. Due to constant innovation in hydrogen quenching for carbon steels, which **EBNER** introduced onto the market over 12 years ago, a new age for this technology has dawned.

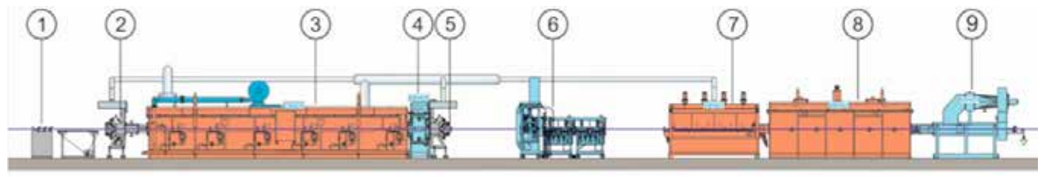
ADVANTAGES OF HICON/H_2Q® HYDROGEN QUENCHING

In comparison to traditional molten-metal quenching, **HICON/H_2Q®** hydrogen quench technology offers significant advantages:

- Reduced operating costs, as far fewer wear parts (e.g. wipers, deflectors, etc.) are required; their disposal is also not necessary.
- Increased throughput due to the short reaction time of the quench system when parameters are changed.
- Improved flatness due to horizontal travel through the quench, combined with the **FlexFlat®** martensite cooling system.
- Improved hardening and tempering of "difficult" materials (e.g. low carbon content) due to the short length of the quenching system (distance between the outlet of the austenitizing furnace and the martensite cooling section).
- Perfect surface quality due to preservation of the cold-rolled surface finish (no wipers or deflectors in quench).
- Complete elimination of some process steps, e.g. polishing for use in food industry applications.

Overview of the facility

FACILITY DESIGN



1. **Strip tension stand** to regulate the strip tension in the austenitizing furnace
2. **Inlet seal** with integrated safety system
3. Energy-efficient **austenitizing furnace** with recuperator to preheat the combustion air (reducing natural gas consumption) and **EBNER ECOBURN-FL®** burner technology with flameless oxidation (reducing NOx emissions)
4. High-performance **HICON/H_2Q® hydrogen quenching system**, with dual recirculation system to achieve high quenching rates with low utility consumption
5. **Outlet seal** with integrated safety system
6. **FlexFlat® martensite cooling section**, to directly influence strip geometry during martensite transformation
7. **Leveling furnace** with precision-adjustable clamping mechanism to optimize the flatness of thin strip, as well as a directly-heated leveling plate to improve temperature uniformity
8. **HICON® jet tempering furnace** with special nozzle system for rapid and uniform heating of the strip, paired with a short design length and straightforward maintenance
9. **HICON® final atmosphere cooler** with automated plunge cooling system, for rapid and precise parameter changes in the tempering section
10. Electrical equipment, including a state-of-the-art **VISUALFURNACES®6** process control system.

KALTBAND AG has a high regard for the clean, lead-free design of H_2 technology and the excellent strip geometries it produces, particularly with grades that are difficult to process, as well as the facility's excellent energy efficiency.

www.kaltband.ch

TECHNICAL DATA	
materials:	non-alloyed and low-alloy carbon steels
strip width:	max. 650 mm (26")
strip thickness:	0.5 – 3.2 mm (0.02 - 0.13")
throughput capacity:	max. 1550 kg/h (3400 lb /h)
quenching system:	hydrogen

Precision and quality are no accident

BILSTEIN CEE a.s. counts on EBNER technology for the best product quality.

BERNHARD ENNSBRUNNER
EBNER news
from the Czech Republic

The constant improvement of production, products, product quality and service is the most important goal for BILSTEIN CEE a.s., the Czech subsidiary of the BILSTEIN GROUP. EBNER Industrieofenbau is contributing to this goal with a new HICON/H_2® bell annealer facility.

The HICON/H_2® facility at work

The annealing workshop

The Czech cold rolling mill BILSTEIN CEE has been the eastern European branch of the BILSTEIN GROUP since 2005, enjoying an excellent reputation as a supplier of steel strip.

The company manufactures a wide range of products including all the classic grades of cold-rolled strip, soft iron grades, microalloyed grades and carbon steel grades. The company constantly invests in production, employee training, and machinery modernization to ensure the highest possible productivity and manufacturing quality. BILSTEIN CEE's goal is to become one of Europe's most modern cold rolling mills.

A PARTNERSHIP STRETCHING ACROSS HALF A CENTURY

BILSTEIN CEE and EBNER Industrieofenbau have maintained an excellent relationship for more than 50 years. An EBNER roller-hearth furnace installed in the 1980s was slated to be replaced by a modern, environmentally efficient bell annealer facility.

EBNER's proven technology, the excellent value for money and geographical proximity were the main factors in BILSTEIN CEE's decision to work with EBNER on this project.

An order was placed for a total of seven workbases, three heating bells and four cooling bells, built in two phases over 2015 and 2017. The existing shop structure and foundation of the rolling mill were taken into account in the design, and provisions were made for a future expansion to up to twelve workbases.

Cooling bells

THE ADVANTAGES OF HYDROGEN FOR BILSTEIN CEE

With their new HICON/H_2® bell annealer facility, BILSTEIN CEE can carry out anneals in 100 % hydrogen atmosphere for the first time. The uniform temperature distribution and high convection supplied by the hydrogen ensure that a bright strip surface and uniform mechanical properties are achieved, economically and reproducibly. Installation of this bell annealer facility was only one of the steps taken to modernize the plant. With EBNER's VISUALFURNACES®6 process control system, featuring TREATperfect© and OPERATEperfect© software modules, BILSTEIN CEE is one step ahead of the competition.

EBNER supplied all required equipment and facility components, along with turn-key installation. We are looking forward to the next project.

www.bilstein-cee.cz

BILSTEIN ON EBNER

"Since 2015, BILSTEIN CEE has been using state-of-the-art, semi-automated annealing technology in the form of a high-convection hydrogen annealing plant from EBNER with seven bases. The annealer achieves uniform temperature distribution with only minimal deviations across the coil volume.

We guarantee the cleanest strip with tight tolerances of mechanical and technological properties, free of oxidation, and uniform technological values. Bright, residue-free surfaces with no edge oxidation are ensured. A variety of annealing programs allow a broad spectrum of different qualities to be produced with high flexibility.

The round-the-clock annealing process with batches of 60 to 80 tons is automatically regulated, monitored and logged, for a high level of assurance that the required mechanical/technological values and microstructures are being achieved."

It all begins in Linz

A decades-long partnership moves into the next stage.

Heating bell with large recuperator to pre-heat combustion air

KARL WOHLFART
EBNER news
from Austria

In 2012, voestalpine Stahl presented its "Strategy 2020". This plan includes ambitious goals for growth and extensive investments in high technology and quality. As part of this project, an order was placed with EBNER for the supply, installation and commissioning of a next-generation HICON/H$_2$® bell annealer facility.

AN INNOVATIVE RELATIONSHIP

EBNER's cooperation with voestalpine Stahl in Linz goes back to the 1980s. The spirit of innovation shared by both companies, as well as their close proximity, have meant that **EBNER**'s new developments have often found their first industrial application at voestalpine.

1985: Commissioning of the world's first HICON/H$_2$® bell annealer facility for wide strip coils in 100 % hydrogen atmosphere
1994: First industrial installation of the **EBNER** developed ECOBURN© all-metal two-stage burners with low NOx combustion
1998: Commissioning of a test workbase with integrated internal atmosphere cooler (**EBNER** patent) as an alternative to air/water charge cooling systems
2007: A 24 workbase bell annealer battery with internal atmosphere cooling technology starts production

THE LATEST ORDER

At the beginning of 2017, a further HICON/H$_2$® bell annealer facility to heat treat steel strip coils successfully started production.

The order included 16 HICON/H$_2$® workbases accepting charges up to 100 t (110 USt) in weight, eight heating and six cooling bells with state-of-the-art technology and partial modernization of existing equipment. The new HICON/H$_2$® workbases are designed for continuous operation at a maximum operating temperature of 900 °C (1650 °F). **EBNER**'s years of experience and expertise in operating at these temperatures ensure not only a high level of operational safety but an excellent service life of the facility components.

EFFICIENT AND ENVIRONMENTALLY-FRIENDLY

Of course, both economy and environmental impact were taken into account. Large recuperators preheat the combustion air to temperatures up to 560 °C (1040 °F). Flameless ECOBURN© burner techology (another new development from the **EBNER** R&D lab) is also part of the design. This lowers fuel gas consumption by about 6 - 7 %, compared to existing facilities, and the NOx level is reduced to under 150 mg per m³ of exhaust gas.

FULL AUTOMATION IS ON THE WAY

The new facility, along with the existing bell annealer battery, was readied for a future upgrade to fully-automatic operation. Automatic plug-in connectors for all utilities were installed, as were suitable assemblies for lifting the heating/cooling bells and inner covers.

A REBUILD OF THE COOLING WATER SUPPLY

Previously, water was taken directly from the Danube river for cooling. To ensure the long-term reliability of the system and to extend the service life of components, the customer installed an intermediate cooling water circuit upstream of the furnace facility.

High-performance cooling bell

EBNER was tasked with electrical integration of the cooling system, as well as with making the required changes to the furnace facility.

MORE TO COME

Shortly before our deadline, **EBNER** received an order for an additional expansion phase for the bell annealer shop at voestalpine's Linz works. This facility will go into operation in the summer of 2018.

www.voestalpine.com

Overview of the bell annealer facility

Bowling Greenfield

EBNER supplies modern facility for aluminum strip for the automotive industry.

CARL-AUGUST PREIMESBERGER

EBNER news from the USA

For its greenfield project in Bowling Green, Kentucky (USA), Constellium-UACJ Auto Body Sheet insisted on a state-of-the-art facility to process aluminum strip for the automotive industry. EBNER was the clear choice.

Constellium-UACJ Auto Body Sheet is a joint venture company formed by two giants of the aluminum sector: Constellium, a global downstream aluminum leader with European roots (and a longtime **EBNER** customer), and UACJ, another global, leading aluminum manufacturer of Japanese origin. The main focus of the JV is a new plant, centrally located for supplying key automakers with best-in-class aluminum auto body sheet. Coils supplied by other Constellium and UACJ locations in the USA will be processed here with final heat treatment and surface finishing steps before being delivered to the OEMs.

A GOOD RELATIONSHIP PAYS OFF AGAIN

Constellium and **EBNER** recently successfully worked together on a series of pusher furnace and single coil furnaces in Neuf Brisach, France. Add **EBNER**'s floater furnace references at Arconic, Novelis and China Steel Aluminium, and the decision was easy. Constellium-UACJ ABS placed an order with **EBNER** for a latest generation **HICON®** floater-type furnace facility including **SmartQuench®**, water system and reheater. Andritz was selected as the strip handling equipment supplier.

After an on-schedule installation period, the furnace was commissioned, producing its first hot coil on April 1, 2016. Ever since, it has been heat treating 5xxx and 6xxx series aluminum strip for body in white applications for the largest auto manufacturers.

IMPROVED STABILITY, IMPROVED THROUGHPUT

EBNER debuted new technology in this facility, too. Height-adjustable nozzles were installed in the furnace section for the first time. This allows the air flow in the furnace to be controlled even more precisely, resulting in a more stable journey through the furnace. An increase in throughput of 8% was the result, earning this innovation a spot in standard equipment list for **HICON®** floater-type furnace facilities.

Side view of the furnace section

The **SmartQuench®** follows the furnace and compensates for fluctuating ambient air temperature, guaranteeing constant, steady production with uniformly high quality - perfect for the Just in Time strategy of the auto industry. To give the customer even more flexibility, the last two furnace zones are fitted with special dampers and a cooling blower, allowing for controlled pre-cooling.

EBNER would certainly be ready to work on the next project with Constellium-UACJ ABS LLC.

www.uacj.co.jp
www.constellium.com

Furnace inlet with strip handling gear

A revolutionary heat treatment facility for new, high-strength automotive steels: the HICON/H_2Q® CAL

PETER SEEMANN
EBNER Research
and Development

MATTHIAS BRENNINGER
EBNER Research
and Development

In order to meet the automotive industry's demand for lightweight designs, an intensive effort is being made to develop new types of steel. In turn, this development demands increasingly complex methods of heat treatment to achieve the required mechanical properties with appropriate alloy concepts.

The "wish list" for a suitable heat treatment facility is long: high annealing temperatures, high cooling rates that still provide excellent uniformity across the length and width of a strip, good strip geometry combined with the possibility of reheating and isothermal transformation, and the best atmosphere for the application.

EBNER Industrieofenbau has made use of its decades of experience with technologically-challenging hardening and tempering lines to create a facility for wide steel strip, in which the complex temperature profiles necessary for transformation can be achieved: the **HICON/H_2Q®** CAL.

METALLURGY AND TEMPERATURE CYCLES

To achieve the desired high strengths, alloying elements are added to create multiple phases in the steel. In this process, it is necessary to bring the strip to temperatures in the intercritical region between Ac1 and Ac3, and usually above this into austenite. This can mean a PMT (Peak Metal Temperature) of 930 °C (1710 °F) or more, particularly in the case of carbide-forming alloying elements, to make carbon diffusion and solution possible.

Slow cooling before quenching creates local carbon enrichment and eases various phase formations from the austenite, which has been stabilized by this process. Quenching, at high cooling rates over 200 °C/sec (360 °F) (paired with the possibility of a sudden yet exact stabilization of the temperature) enables the formation of any desired phase of bainite up to and including partial or full transformation into martensite.

If martensite is only partially formed by halting the drop in temperature, the retained austenite can be partially stabilized. During reheating, the desired phase formation is achieved and the martensite tempered, resulting in very high strength and good ductility.

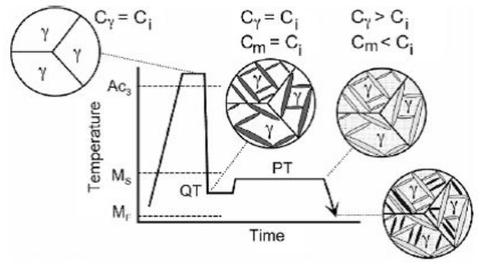


Figure 1: Schematic of heat treating, quenching and partitioning steel

The great advantage of quenching in process atmosphere (figure 2) compared to water quenching is that the temperature distribution lies above the quenching range. There is no Leidenfrost effect, in which bubbles of vapor alter local cooling rates to the detriment of strip geometry (figure 3).

Figure 2: Jet cooled strip

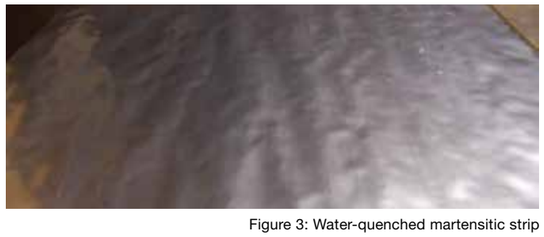


Figure 3: Water-quenched martensitic strip

Figure 5: Furnace with gas-fired radiant tubes

THE HICON/H_2Q® CAL AT HYCAL CORPORATION, GIBRALTAR/MICHIGAN, USA

The facility has a throughput 18 t/h (20 USt/h), processing strips up to 1220 mm (48") wide and 0.5 – 2.3 mm thick (0.02 - 0.09"). The line produces DP steel, martensitic grades and Q&P. **EBNER** supplied the heat treatment section. The strip handling gear, including the mandrels, shears, welding machine, looper and degreaser were supplied by the customer.

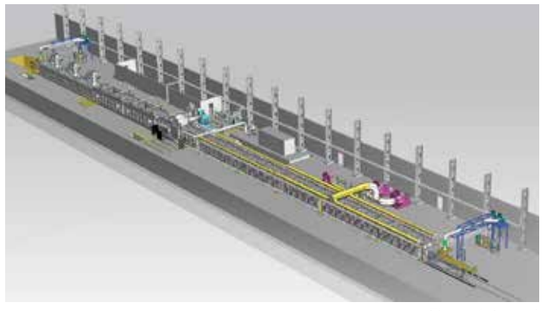


Figure 4: Layout

The length of the facility, from inlet seal to outlet seal, is 122 m (400 ft). The strip passes over driven sealing rolls and through a nitrogen curtain to enter the furnace. The furnace is heated by gas-fired SiSiC radiant tubes, reaching a max. temperature of 980 °C (1800 °F). The strip is moved across driven brush rollers (figure 5).

The advantage of ceramic radiant tubes is that they are highly resistant to changes in temperature. Rapid setpoint changes, as well as constant heating up and cooling down, does not affect their service life. The disadvantage, the limited ductility of ceramic, is counteracted by brackets above the tubes to protect them should a strip break occur. These brackets also serve to detect strip breaks. A slow cooling zone, with both radiant tubes and cooling tubes, can either be used as a fully-operational heating section to extend the furnace or for slow cooling (figure 6).

Figure 6: Slow cooling zone

Figure 8: acceptance trials in the **EBNER** lab

The **HICON/H$_2$®** cooler (figure 7) is very flexible: the blower motors are equipped with frequency converters, the distance between the nozzles and the strip can be freely selected from within a wide range of settings, and the temperature of the strip can be precisely controlled after quenching. Many tests and an acceptance trial in the **EBNER** R&D lab confirmed the high cooling performance (figure 8).

Figure 7: **HICON/H$_2$Q®** cooler

During production, fresh hydrogen is fed into the **HICON/H$_2$®** cooler, consuming 8 - 11 m³/t (257 - 353 ft³/USt). The high volume of recirculated gas is recooled by heat exchangers. A concentration of at least 85 % is set. Customers value **EBNER**'s decades of experience in the safe handling of hydrogen. Purging systems, pressure control systems and the nitrogen curtain are redundantly designed.

After rapid cooling, a leveling unit optimizes the flatness of the strip. Adjustable driven rolls guide the strip as transformation starts. This section is equipped with a heating system, cooling system and high convection fans (figure 9), and can center the strip if necessary. The transformation zones (figure 10) are also equipped with heating systems, cooling systems and powerful recirculation fans for high convection. Temperature cycles for the precise final cooling required by DP steel and martensite, as well as isothermal transformation for CP steel and reheating for Q&P grades are possible. The maximum temperature in these zones is 550 °C (1022 °F).

Figure 9: leveler

Ahead of the outlet seal, three powerful final coolers use convection to cool the strip below the oxidation threshold and to below 80 °C (176 °F) (figure 11).

SIMCAL

During development and design of the facility, a simulator for continuous annealing cycles was developed.

Figure 10: transformation zones

Figure 11: final cooler

This can be used to test the cycles for many interesting new grades of steel. The electric heated SimCAL (figure 12) can precisely recreate production cycles in tensile test sample sized strip. This small testing rig has a big advantage: far less scrap during commissioning.

The following grades have already been successfully produced in the facility, without a prior trial:

- Dual-phase steels (DP) 590, 780, 980 MPa (figure 13)
- Martensite (MS) 1300, 1500 MPa

Figure 12: simulator for continuous annealing cycles (SimCAL)

Figure 13: DP 980 MPa

SUMMARY

The **HICON/H$_2$Q®** CAL synthesizes **EBNER**'s years of experience with hardening and tempering lines and fluid dynamics, along with its expertise in the safe handling of hydrogen as a process atmosphere. This new type of facility to produce wide strip for the automotive industry processes high-strength steels with high ductilities in suitable alloys is already in operation for one innovative customer. New materials produced in this facility are available as coils, and are already being evaluated by well-known suppliers and OEMs.

Overview of the **HICON/H$_2$Q®** CAL

Germany invests

A booming economy encourages investment

Facility at Max W. Claas

KARL WOHLFART

EBNER news
from Germany

With its population of about 82 million and around 100 customers, Germany has been one of EBNER's most important markets for years. The current boom in the German economy is reflected not only in sinking unemployment rates, but also in the fact that it has encouraged many companies make future-safe investments.

Lately, **EBNER** has practically been snowed under with inquiries from Germany. Many companies active in the cold rolling and drawn wire sectors have chosen to order new heat treatment facilities, expansions to existing facilities or upgrades from **EBNER**.

Of course, every order is interesting in its own way, but to provide readers with as much news as possible, this article summarizes some of the larger **HICON/H_2®** bell annealer facilities that have been successfully commissioned over the past few years.

MAX W. CLAAS / HERMANN KLINCKE IN ALTENA

Like **EBNER**, the wire manufacturers Max W. Claas and H. Klincke are family owned and operated. The Altena works produce cold heading wire, bearing wire, spring wire and carbon wire with diameters ranging from 0.5 mm to 50 mm (0.02 - 1.97"). Every step in production is done in house, from pickling to final heat treatment. In the spring of 2017, a new **HICON/H_2®** bell annealer facility went into operation at Max W. Claas. This expansion of an existing **EBNER** facility comprised two additional workbases, one heating bell and one cooling bell.

To ensure that heat is used as efficiently as possible, **EBNER** supplied and installed a thermal energy recycling system for the entire facility.

The thermal energy from the stack gas heats water from about 80 °C to 95 - 100 °C (176 - 212 °F), which is then used to heat the pickling baths. This system generates peak outputs of up to 500 kW. Generating an average of up to 200 kW of heat results in a return on investment of 3-4 years for this type of system.

www.claas-draht.de

DIEDRICH HESSE, ALTENA

Diedrich Hesse is a historical and traditional family owned company in the Altena wire industry, in which cold heading wires for all metal forming applications are drawn. The company also produces galvanized wire, zinc-aluminum coated wire and re-drawn galvanized wire, as well as bar and bright wire.

In the summer of 2016, the existing **HICON/H_2®** bell annealer facility was expanded by an additional workbase and a heating bell. The challenge in this order was to ensure flexible operation with very different generations of furnace. This was achieved by replacing the S5 control system and upgrading to the newest process technology.

www.hesse-draht.de

Facility at Diedrich Hesse

SAAR-BANDSTAHL GMBH, VÖLKLINGEN

This member of the Saarstahl Group has specialized in the production of cold-rolled strip for decades. In recent years, the extensive product portfolio of cold rolled steel strip for the automotive and electrical industries has been expanded to include toll annealing of wire.

Saar-Bandstahl has been one of our customers for over 30 years. During this time, Saar's conventional furnace facilities have been modernized or replaced by state-of-the-art **EBNER HICON/H$_2$®** high-convection bell annealers in a total of five phases.

The newest **EBNER** bell annealer facility went into operation about a year ago.

TECHNICAL DATA:	
Clear inside diameter	2100 mm (83")
Atmosphere	100 % hydrogen
Cooling system	High-performance charge cooling with integrated atmosphere cooling technology, combined with forced air cooling
Automation	Automatic media couplings to minimize manual intervention in the fully-automatic program sequence

www.saar-bandstahl.de

Facility at Saar-Bandstahl

GIEBEL KALTWALZWERK, ISERLOHN

This specialist for cold-rolling and strip processing has been a member of the Knauf Interferr Group for over ten years, and has decades of experience in the production of cold-rolled strip, finished strip and special finish strip.

Since 1992, three generations of furnaces have been operating at Giebel Kaltwalzwerk's works: a total of fourteen **HICON/H$_2$®** workbases with diameters of 2000 mm (79"), along with two additional workbases with diameters of 3200 mm (126") for multi-stack processing.

The two newest bases, along with the associated heating and air cooling bells, went into operation at the Iserlohn works in the summer of 2015.

Along with a modern **VISUALFURNACES®6** process control system for the entire **EBNER** bell annealer facility, the scope of supply included an upgrade of the existing stack gas exhaust system to recycle thermal energy from waste heat. Further expansion of the bell annealer facility was taken into account in the layout.

www.knauf-interfer.de/standorte/giebel-kaltwalzwerk-iserlohn/

Facility at Brockhaus

BROCKHAUS STAHL, PLETTENBERG

In the cold rolling mill in Plettenberg, cold-rolled strip and modified slitted strip is produced, mainly for use in the automotive supply industry.

In 2008, **EBNER** delivered the first two **HICON/H$_2$®** bell annealer facilities to Brockhaus, after the existing bases without high-convection were not able to keep up with demand. Continually-increasing production, paired with ever-higher quality requirements, made an expansion of this bell annealer facility necessary. This final (for now) expansion phase with two workbases began operation in 2016.

As usual in the German cold rolling industry, the workbases have a clear inside diameter of 2000 mm (79") and a clear inside height of 3200 mm (126"). The workbases support a maximum net charge of about 50 t (56 USt).

www.brockhaus.com

MORE ORDERS IN BRIEF

In addition to these successfully completed projects, several more **HICON/H$_2$®** bell annealer facilities are currently being installed for the following loyal **EBNER** customers.

- C.D. Wälzholz at the Hagen-Nord plant
- MUBEA at the main works in Attendorn
- Risse + Wilke at the Iserlohn plant

THANK YOU TO ALL OUR CUSTOMERS

We would like to thank every one of our customers for the decades of trust and cooperation, and we look forward to continuing our partnerships in the future.

Large-scale orders

A sneak-peak at three new orders for large heat treatment lines.

C.D. WÄLZHOLZ OF HAGEN, GERMANY ORDERS A HIGH-CAPACITY HARDENING AND TEMPERING LINE FOR CARBON STEEL STRIP

For many years, C.D. Wälzholz has been one of EBNER Industrieofenbau's most important partners in the sector of heat treatment of carbon steel strip, particularly in the mid-sized strip sector.

At the beginning of 2017, Wälzholz placed an order with **EBNER** for a state-of-the-art hardening and tempering line to martemper carbon steel strip, which will be installed at Wälzholz's Hagen works.

The facility is designed to process one to three strands at a time, with a maximum strip width of 750 mm (30"). Also included in **EBNER**'s scope of supply is the entire strip handling section, which includes an automatic welder, and the complete automation and drive systems. Turnkey installation and commissioning of the facility will take place in the second half of 2018.

www.waelzholz.com

HICON® hardening and tempering line

VDM METALS OF WERDOHL, GERMANY PLACES AN ORDER FOR A NEW HICON/H_2® VERTICAL BRIGHT ANNEALING LINE

VDM Metals in Germany is one of the world's leading producers of specialized materials, manufacturing all types of semi-finished products.

At the beginning of 2017, VDM placed an order with **EBNER** Industrieofenbau in Linz/Leonding for a complete **HICON/H_2®** vertical bright annealing line. This line is designed to heat treat cold rolled CrNi and Ni-alloyed steel strip, along with special grades, in straight hydrogen atmosphere.

FACILITY DATA:

GAS-FIRED DOUBLE-MUFFLE FURNACE	
Workload space temperatures:	up to 1230 °C (2246 °F)
Max. strip width:	830 mm (33")
Strip thickness:	0.4 - 4.0 mm (0.016 - 0.16")
Max. throughput capacity:	5.2 t/h (5.7 USt/h)
Project implementation:	turn-key installation

The facility will be installed at the Werdohl plant and will start production at the beginning of 2019.

www.vdm-metals.com

ARINOX S. P. A. INVESTS IN MODERN HICON/H_2® BRIGHT ANNEALING TECHNOLOGY

ARINOX S. p. A., a member of the ARVEDI Group, specializes in the production of ultra-thin precision steel strip. At their works in Sestri Levante, Italy, the company uses advanced technologies to produce cold-rolled special grades ranging from various stainless steels to titanium.

EBNER is the technology leader in heat treatment and was therefore the first choice to design a bright annealing line to process the widest precision strip worldwide.

At the beginning of 2017, ARINOX S.p.A. placed an order with **EBNER** for a **HICON/H_2®** vertical bright annealing line for ultra-thin wide strip.

FACILITY DATA:

GAS-FIRED MUFFLE FURNACE	
Processing temperatures	up to 1150 °C (2100 °F)
Max. strip width:	1575 mm (62")
Min. strip thickness:	0.075 mm (0.003")
Throughput capacity:	about 7.8 t/h (8.6 USt/h)

The facility will start production at the beginning of 2019.

www.arvedi.it/arinox/

HICON/H_2® vertical bright annealing line for steel strip

HICON/H_2® vertical bright annealing line for steel strip

Volume 26. Issue 02. / September 2017. www.ebner.cc

UNBW 10014592
NLAG 10014593

NEWS

HICON® Journal is also available by email!

Trade fairs. Conventions.

5. - 7.10.2017	**ALUEXPO TURKEY**	Istanbul	**TR**	Booth No.	**H10 A220**
25. - 26.10.2017	**ALUMINUM USA**	Nashville	**US**	Booth No.	**301**
09.11.2017	**JAHRESTAGUNG STAHL**	Düsseldorf	**DE**	Booth No.	**F08**
14. - 16.11.2017	**BURSA AUTOMOTIVE**	Bursa	**TR**	Booth No.	**tba**
14. - 17.11.2017	**METAL EXPO**	Moscow	**RU**	Booth No.	**2D 11**
17. – 19.1.2018	**AUTOMOTIVE LIGHTWEIGHT TECHNOLOGY EXPO**	Tokyo	**JA**	Booth No.	**tba**
16. - 20.4.2018	**WIRE**	Düsseldorf	**DE**	Booth No.	**tba**
7. - 10.5.2018	**AISTECH**	Philadelphia	**US**	Booth No.	**2631**

We look forward to seeing you there!

SAVE THE DATE
70 YEARS OF EBNER IN MOTION
11. – 13.9.2018
www.ebner.cc/en/70

New orders.

NACIONAL DE COBRE S.A. DE C.V.	**MX**	HICON/H_2® bell annealer facility for copper base metal strip coils
ARINOX S.P.A.	**IT**	HICON/H_2® vertical bright annealing line for CrNi steel strip
ISL INTERNATIONAL STEELS LIMITED	**PK**	HICON/H_2® bell annealer facility for steel strip coils
BRASMETAL WAELZHOLZ S.A.	**BR**	HICON/H_2® bell annealer facility for steel strip coils
AVON ISPAT & POWER LIMITED	**IN**	HICON/H_2® bell annealer facility for steel strip coils
C.D. WÄLZHOLZ GMBH	**DE**	HICON/H_2® bell annealer facility for steel strip coils
GAZI METAL MAMÜLLERI	**TR**	HICON/H_2® bell annealer facility for steel strip coils
O.R.I. MARTIN S.P.A.	**IT**	HICON/H_2® bell annealer facility for steel wire coils
VOESTALPINE STAHL GMBH	**AT**	HICON/H_2® bell annealer facility for steel strip coils
KOBELCO KOBE STEEL, LTD	**JP**	HICON® floater-type furnace facility for aluminum strip
MUBEA TAILOR ROLLED BLANKS, LLC	**US**	HICON/H_2® bell annealer facility for steel strip coils
AMAG ROLLING GMBH	**AT**	Roller-hearth furnace facility for aluminum sheet
RISSE + WILKE KALTBAND GMBH & CO KG	**DE**	HICON/H_2® bell annealer facility for steel strip coils
NUCOR STEEL	**US**	HICON/H_2® bell annealer facility for steel strip coils
OUTOKUMPU NIROSTA GMBH	**DE**	Hydrogen regeneration unit
FONTANA LUIGI S.P.A.	**IT**	HICON/H_2® bell annealer facility for steel wire coils
SHANGHAI SUPERIOR DIE TECHNOLOGY (WUHAN) CO., LTD.	**CN**	HOTPHASE® roller-hearth furnace facility for steel press hardening blanks

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