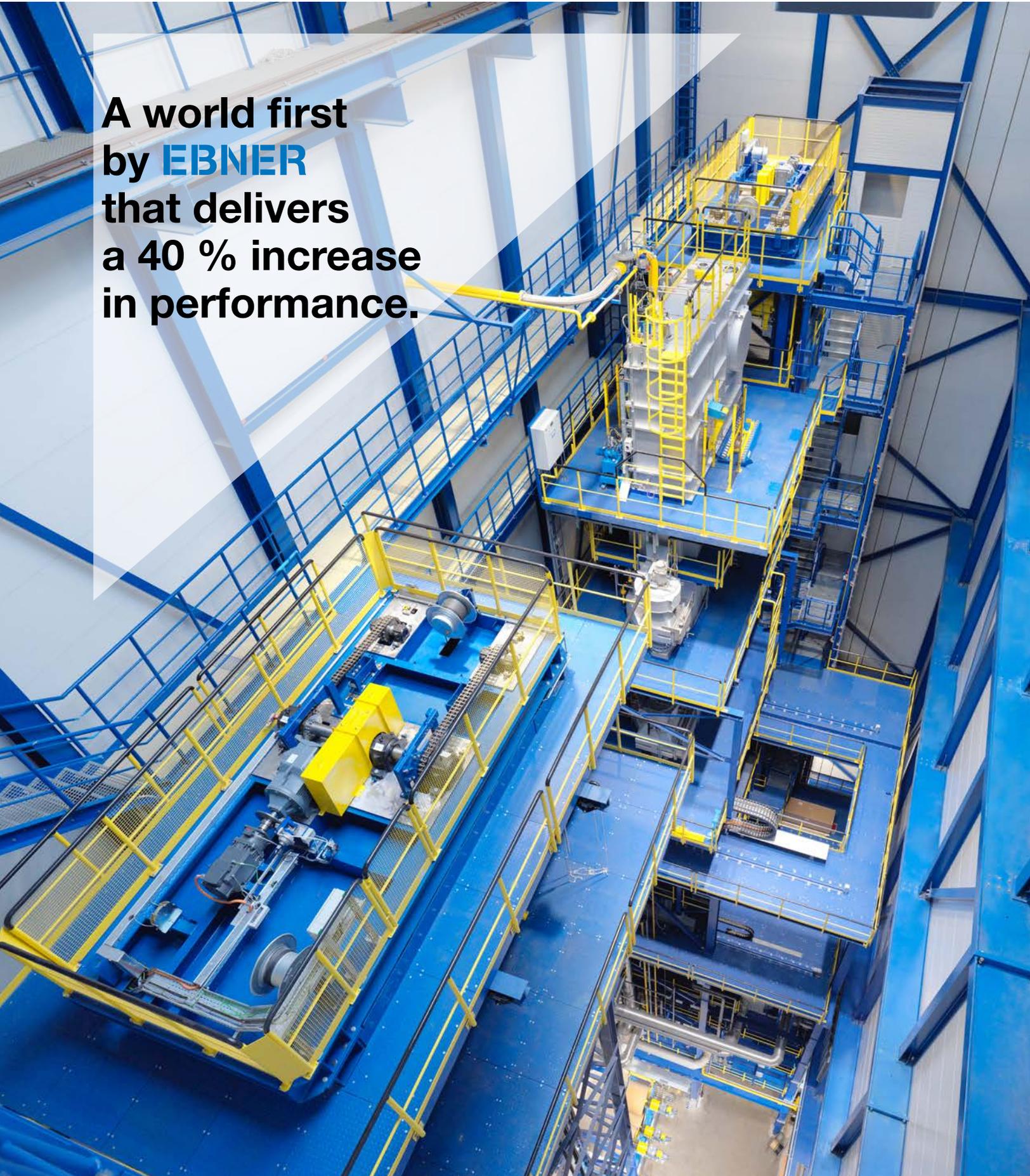


HICON®

EBNER Journal for Progress in Industrial Furnace Technology

**A world first
by EBNER
that delivers
a 40 % increase
in performance.**





EBNER

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



In order to continue to be able to respond to the high specifications of our customers with the expectations of a world market leader, changes and ongoing developments are permanently required.

I am therefore pleased to announce that in June 2019 the **EBNER** Group acquired a majority stake in GNA alutech inc. in order to further expand our product portfolio and move an important step closer to fulfilling our strategy of becoming a full solution provider.

GNA is a small Canadian company that specializes in the manufacturing of melting and holding furnaces as well as heat treatment facilities and cathode systems for the primary aluminum industry.

The **EBNER** Group now has the competence to supply its customers worldwide with complete aluminum casthouses for the manufacturing of slabs, billets and ingots from a single source.

In addition to expanding our product portfolio through acquisitions, we continue to consistently invest in research and development.

A casting technology center is currently being built in Ranshofen, Upper Austria, in which pilot plants for vertical and horizontal casting will be started up at the end of 2019.

News and information about the Casthouse Revolution Center will soon be available on the website www.c-r-c.info.

In addition to research and development, **EBNER** is committed to a clear digitalization strategy designed to create customer benefits and make us even faster and more efficient in handling projects of all kinds.

Lean management also plays an important role in terms of efficiency. Read more about how **EBNER** is driving these two topics forward in this issue.

The **EBNER** Group will continue to feature in future issues of the **HICON®** Journal with articles covering products and technology. In this issue we report on a successful cooperation between HPI & Gautschi.

Enjoy!

Yours, Robert Ebner
CEO

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The courage to succeed.

One of our customers is employing a new heat treatment concept to produce special strip from Ni/Fe-based alloys.



KARL WOHLFART
EBNER news
from Germany



SASCHA EPPENSTEINER
EBNER news
from Germany

VDM Metals, headquartered in Werdohl, Germany, has been numbered among the world's leading producers of semi-finished products for many years. These semi-finished products are manufactured from both Fe-based and Ni-based alloys.

The materials produced at VDM are extremely resistant to corrosion and heat, and have applications in the electronics and electrical industries (conductive and resistant strip, magnetic components, electromagnetic shielding), the chemical and petrochemical industries (welded piping, heat exchangers, industrial furnaces, vessels and tanks), welding technology (strip electrodes, deposition welding) and the automotive industry (fuel cells, etc.).

These applications require a manufacturing process that is technologically advanced and extremely energy efficient, even as it provides the highest possible material temperatures. To be able to meet these high requirements, EBNER supplied and commissioned the first of a newly-conceived and innovative facility design. The new vertical bright annealing line utilizes a double muffle design, which builds upon and advances the proven concept of a vertical muffle furnace.

THE GENERAL CONTRACTOR

VDM metals chose EBNER to be the general contractor for this turn-key project.

The scope of supply included the following:

- » The complete heat treatment section
- » A strip pre-cleaning section (degreaser)
- » The complete strip handling section
- » All automation and process technology systems

During this project, the new strip cleaning system developed by EBNER was installed for the first time. The details of this system will be presented in the next edition of the HICON® Journal.

THE CHALLENGE: 1230 °C



Over 50 vertical bright annealing lines (vertical strand annealers) to process stainless steel strip with muffle technology have been successfully installed by EBNER, and these facilities are today's state-of-the-art. They are typically operated at temperatures ranging from 1130 °C to 1150 °C. The requested 80 °C – 100 °C increase in processing temperature, to 1230 °C, meant a quantum leap in the demands placed on the materials used and the furnace design. At a temperature of 1230 °C, even the best muffle materials become extremely soft and have only the lowest creep strengths.



Transition from high-temperature furnace no. 2 to the HICON/H₂ jet cooling zone

The challenge was thus to ensure that this furnace component, the one exposed to the highest thermal stresses, would have a long service life at high production rates.

TECHNICAL SPECIFICATIONS

materials	cold rolled Ni-based alloys (alloy 602 CA, alloy 625, alloy 601, etc.) cold rolled Fe-based alloys (Aluchrom Y Hf, Aluchrom W, Crofer 22 H, etc.)
strip width	max. 830 mm
strip thickness (typical)	0.4 - 4.0 mm
line speed:	max. 20 m/min
heating type	natural gas
operating temperature	max. 1230 °C
process atmosphere	100 % hydrogen, argon or nitrogen
dewpoint	≤ -60 °C

THE DESIGNS: A COMPARISON

In conventional horizontal furnace designs, the length of muffles is severely limited. Beyond a certain muffle length / strip width, the muffles - which are arranged in a row-

need only a few months to deform to such a degree that they need to be replaced. Each replacement requires an extended stop in production. Support rolls are also required to transport the strip between the muffles, which means that there is a significant risk of surface damage to the strip.

In contrast, a vertical double muffle design allows muffle lengths to be increased significantly. Not only that, but the muffles retain their shape much better and have a significantly longer service life - even as they provide higher production rates. In a double muffle design the heated muffle length is split between two muffles, which are arranged sequentially. The lower muffle (no. 1) is operated in a "normal" temperature range (1150 °C – 1170 °C), and can be designed to be almost any desired length. The upper muffle (no. 2) is the "high-temperature muffle", and operates at temperatures up to 1230 °C. This muffle is shorter, and so can be fabricated to suit the special requirements of its application.

Vertical coolers are installed downstream, meaning that the strip passes through both the heating section and the cooling section of the facility without coming into contact with any component. During the VDM project, the customer provided the starting material required to fabricate both muffles out of their own production.

A FACILITY WITH THE HIGHEST POSSIBLE ENERGY AND UTILITY EFFICIENCY, PAIRED WITH THE LOWEST POSSIBLE EXHAUST EMISSIONS

To ensure that production costs would be kept as low as possible, while also ensuring that the facility would operate extremely efficiently and have low levels of emis-

sions, a wide variety of systems were installed. These included:

- » A combustion system equipped with **EBNER ECO-BURN** FL burners, designed for flameless operation (NOx levels below 50 % of the TA-Luft limit) and with high combustion air preheating (up to 500 °C).
- » A hydrogen regeneration unit to recycle hydrogen (savings of 50 % - 70 %).
- » Special sealing system at the inlet and outlet locks of the heat treatment section.
- » Use of waste heat from the annealing furnace to heat the cleaning baths and strip dryer at the strip cleaning unit.

These features mean that the facility emits about 1800 t/y less CO₂ than a conventional facility design.

A SUCCESSFUL START

The facility went into operation in the second quarter of 2019. At the beginning of July, 2019 the facility was inaugurated in the presence of leading political figures and members of the business community. At this event in Werdohl, VDM's Olaf Kazmierski and **EBNER's** CTO Dr. Alfred Heinz both spoke and underlined the fact that the new annealing line was achieving not the expected 30 % increase in performance, but rather an astounding 40 % increase. The highly-efficient thermal energy recovery systems make this **EBNER** facility unique. It is a milestone in the quest for efficiency and resource utilization.

Many thanks to the entire project team at VDM Metals for their partnership while working together on the implementation of this project.

www.vdm-metals.com

EBNER strip cleaning unit with strip transfer from the rinsing zones to the dryer





Over 102 production years of experience.

The success story of EBNER HICON® floatation furnace facilities, since 1997.



**CARL-AUGUST
PREIMESBERGER**

EBNER news
from around the world

As the use of hardenable aluminum alloys in the automotive and aerospace industries has increased, so has the demand for continuous hardening and tempering lines.

With 25 HICON® floatation furnace facilities sold, EBNER has established itself as the world market leader. For over 1224 months, seventeen of these facilities have been producing aluminum strip for use in automobiles and aircraft.

In 1996, EBNER was invited by AMAG to bid for a new floatation furnace facility project to heat treat sheet for the aerospace industry and patterned plate.

The decision made by management to quote for this project and develop a new type of furnace was not only due to the scale of the furnace that was requested, but also due to the fact that both AMAG and the handling equipment supplier (then known as VÖEST Alpine Industrieofenbau, and now known as Primetals) were located near EBNER's works in Leonding, Austria.

When the order for the project was placed in 1997, a floatation furnace section that included a water/air quench was set up in the EBNER lab. Here, tests needed to develop the strip floating system and optimize the quench were carried out.

In March of 1999 the facility, the first HICON® floatation furnace manufactured by EBNER, successfully started production.

The next step was delivery of the first HICON® floatation furnace facility for automotive strip to Aleris Aluminium of Duffel, Belgium. This facility started production in April, 2002.

At both of these early facilities, the strip flotation system was designed in such a way that the strip was centered by taking advantage of the crossbow effect. Since then, the flotation system has been redesigned so that the strip is centered by a sine wave.

The first facility that was equipped with this new jet nozzle system was a floatation furnace facility for aircraft sheet installed at Southwest Aluminium, China.

When the USA's Ford Motor Company decided to build the bodies of their model F150 trucks entirely from aluminum, it created a demand for combined heat treatment facilities that included a chemical section, usually called "Cash lines" for short. However, continuous heat treatment lines with or without separate chemical sections are ever more in demand, due the constant effort made by the automotive industry to reduce vehicle weights.

EBNER had the perfect equipment for these lines in the form of HICON® floatation furnaces, and in 2011 orders were placed for three more facilities by customers in the USA.

The first EBNER floatation furnace facility, at AMAG



From this point on, one or more orders for **HICON®** floater furnace facilities to heat treat sheet for the automotive or aerospace industries have been placed every year, and have been placed by every well-known aluminum supplier: Novelis, Arconic, Constellium, Nanshan, Zhongwang, CSAC, KUMZ and many more.

In filling these orders, we have worked alongside a number of partners for handling systems, such as Tenova, Andritz, etc. The equipment has been delivered with suppliers working together in a wide variety of combinations: combinations that have seen **EBNER** acting as consortium leader and primary contractor, as a consortium partner, and as a supplier delivering a defined supply share directly to the customer.

At every one of the facilities a wide range of customer requirements has had to be met, such as:

- » conformance with the AMS standards for the aerospace industry or the CQI-9 standards for the automotive industry,
- » throughputs of up to 150,000 tons per year,
- » strip widths of up to 2800 mm,
- » strip thicknesses ranging from 0.3 mm to 6.36 mm.

With the experience gained from existing **HICON®** floater furnace facilities, continuous development of heat treatment and quenching technologies, and the development of new alloys, we are continuously improving our facilities. Improvements have included:

- » height-adjustable upper nozzle headers.
- » furnace zones that can be used for either heating or cooling.

- » development of a quench design (**Smartquench®**) that provides cooling rates ranging from 500 °C/s to 10 °C/s.
- » development of a quench design allowing spiking to be carried out downstream of the water/air cooling section.
- » integration of an **EBNER** reheat furnace into the line, which is designed to ensure that - despite speed differences upstream of the take-up reel - temperature differences in the wound strip are kept within the permissible tolerance range; this minimizes scrap.

With every facility that has been commissioned, a new set of customer requirements has led to additional developments and improvements. Currently, seventeen **EBNER HICON®** floater furnace facilities are in operation. Eight more are in the design, fabrication, installation or commissioning phases.

The high number of **HICON®** floater furnaces means that 71 % of the facilities installed worldwide over the last 20 years were ordered from **EBNER**. There is no doubt that we are the world market leader for these types of facilities.

NEW!

SPIKING

"Spiking" means reheating a material to 250 °C within a very short time, after cooling has been completed. Final cooling in air to below 80 °C then follows. Depending on the type of alloy, this process improves technological properties.

HICON® floater furnace facility to harden and temper/anneal aluminum and aluminum alloy strip





Heavyweight meets lightweight.

Experience gathered at a HICON® floater furnace facility supplying material for lightweight designs.



CARL-AUGUST PREIMESBERGER

EBNER news from France

"Lightweighting" is currently one of the hot topics in the automotive industry. A constant effort is being made to lighten auto body parts, for which reason aluminum is often being used in preference to steel. Globally, the demand for aluminum products that can meet the high standards of the automotive industry is increasing. To meet these demands, heat treatment equipment must provide precise temperature control and undamaged strip surfaces. These are exactly the strengths of an EBNER HICON® floater furnace facility.

To find out more about the first HICON® floater furnace facility installed at Constellium's French works, we interviewed Mr. Uwe Hirling, CAPEX (capital expenditure) Procurement Manager at Constellium.

HICON® Journal: Mr. Hirling, we appreciate your taking the time to speak to us. Could you give us a brief overview of Constellium's product range?

Mr. Hirling: Constellium is a globally-active company that produces rolled and extruded aluminum products, as well as a wide variety of components based on a num-

ber of innovative alloys (from beverage cans to plate for aircraft wings and auto body parts).

Constellium primarily supplies the automotive and aerospace industries, as well the packaging industry. Major customers include well-known names like Mercedes-Benz, Audi, BMW, Fiat Chrysler Automotive, Ford, Airbus, Boeing and Bombardier. Furnace technology plays a decisive role when working with innovative alloys. We rely on EBNER as a strong partner with extensive know-how and decades of experience.

HICON® Journal: Constellium and EBNER have cooperated on more than just this order. Could you tell us about previous projects with EBNER and the experiences you had during them?

Mr. Hirling: Since December, 2015 an EBNER HICON® floater furnace facility has been operating at our plant in Bowling Green, Kentucky (USA). This modern facility uses state-of-the-art technology, and is an important milestone in our strategy for becoming the leading supplier in the USA's growing market for auto body sheet.

This facility has a capacity of over 100,000 tons, and guarantees Constellium the highest production efficiency, highest product quality and highest level of safety against workplace accidents. With this facility, EBNER made significant contributions to the heat treatment of aluminum strip - in particular, by further developing the Smartquench®.

Novelis floater furnace facility in Oswego, USA; View towards furnace from the quench.



At almost the same time, in response to increasing demand in the automotive sector, we were looking to increase capacity in Europe. It was decided that the location would be Neuf Brisach, in France. This planned facility, which would share many components with the US facility and have a capacity of over 100,000 tpy, made it clear that the company would take a leading role in the automotive market. This was another important step in implementing our global strategy for growth in the automotive sector.

The decision to install a heat treatment furnace from **EBNER** at this plant was made easier by the fact that other **EBNER** facilities were already in operation at Neuf Brisach, and that our colleagues there had had good experiences with the **EBNER** equipment.

Along with the floater furnace facility, we also have a **HICON**® single-coil overhead furnace for aluminum coils and three **HICON**® pusher furnace facilities for aluminum rolling ingots in operation at Neuf Brisach, all of course from **EBNER**.

HICON® Journal: What contributed to the final decision to install another **EBNER** facility in France?

Mr. Hirling: In a prior process, we evaluated a number of locations and alternatives. In the end, the location in France was selected. The new **EBNER** facility, which has an overall length of 240 m, started production in April, 2016. It is distinguished by its high-tech heat treatment process with precise temperature control, a highly-efficient quenching process, and high flexibility in terms of the thickness of the alloys that are processed. A significant contribution is made by the **EBNER TREATperfect** calculation program, which minimizes scrap when recipes are changed.

EBNER's multi-faceted and innovative technologies enable Constellium to produce high-quality products for



Top view of quench and blowers, which circulate cooling air in the quench.

its customers in the automotive industry.

HICON® Journal: Should we expect further increases to capacity and projects with **EBNER**?

Mr. Hirling: In the future, we will continue to rely on products from **EBNER**. I think that, alongside new projects, the "after sales" area will increase in importance. In this area we need to develop even more innovative concepts that not only make facilities even more efficient but also minimize the storage of spare parts at Constellium.

We are looking forward to working together with **EBNER** in this very interesting area.

HICON® Journal: We would like to thank you for the interview, and are also looking forward to working together with Constellium on yet more interesting and successful projects!

www.constellium.com



TREATperfect:

TREATperfect optimizes processing times for the heat treatment of aluminum. This system was developed by **EBNER**, and is integrated into the **VISUALFURNACES®6** Process Control System (PCS). This mathematical model is active during two processing phases. In the first phase, the setpoints required for the material being processed are determined. In the second, the process temperatures during heat treatment are supervised and adjusted if necessary.

Smartquench®

Smartquench® is the quench design installed at floater furnace facilities, and provides a continuous cooling range between 500 °C/s and 10 °C/s. This is achieved through straight water cooling, combined water/air cooling or straight air cooling.



The metals processing industry in China.

EBNER leads the Chinese market.

EBNER location
Taicang, China



JIASHENG WANG
EBNER news
from China

There have been huge developments in the Chinese steel industry since the beginning of the new century.

CHINESE MARKET VOLUME

In 2014, the total annual output of crude steel was 820 million tons. In 2018 it hit a historical high of 928 million tons which accounted for 51.3 % of global production. In the same year, Chinese steel products achieved the highest production in history – 1.1 billion tons.

The aluminum processing industry has also experienced great growth. The production of aluminum products reached 45.5 million tons in 2018, accounting for 54.8 % of total global output. The production facilities are well equipped, taking the leading position in the world.

In the copper industry, the production of copper products was 17 million tons for the year of 2018 which was 56 % of total global production.

The growth in the automobile industry is slowing down after experiencing a huge annual expansion of 14 % in 2016. Nevertheless, production still reached 27.8 million vehicles in 2018 which is approximately 30 % of global output. Of all the production, 23.5 million vehicles were passenger cars.

The metal processing industry and automobile industry which relates to **EBNER** business have a huge volume in China.

EBNER OPERATIONS IN CHINA

As the global leading equipment manufacturer in thermal processing, **EBNER** has supplied more than 800 bell annealers to China's steel industry, in particular for the heat treatment of cold rolled strip and wire.

EBNER HICON/H₂® bell annealers enjoy a great reputation and considerable market share in China. In aluminum processing, **HICON**® pusher furnaces for

slabs, roller-hearth furnaces & quenching facilities for plates, floater furnaces and aging furnaces for strip or plate are widely used in China's top aluminum processing enterprises producing high quality traffic and aviation aluminum.

Up to the end of 2018, **EBNER** has supplied to China 30 pusher-type furnaces (excluding another 7 facilities under construction); 6 roller-hearth furnaces (plus another 2 under construction); 7 aging furnaces for plates; 5 floater furnaces for strip (and another 6 under construction).

In automobile industry, **EBNER** has supplied 4 press hardening furnaces for steel blanks in China, with another facility currently under construction.

All the business is operated by **EBNER Industrial Furnaces (Taicang) Co. Ltd.**, located in Taicang, which has around 300 employees and is China's largest foreign-owned company for industrial furnaces manufacturing.

GLOBAL TRADE FRICTION IMPACT ON THE CHINESE METALS INDUSTRY

Trade frictions between the US and China have been existing for several years. The trade war started on June 15, 2018 when the US Trade Representative Office (USTR) announced that they were going to impose a 25 % tariff on a list of \$50 billion of goods imported from China.

On July 10, 2018 USTR announced a 10 % tariff on \$200 billion goods imported from China.

On August 1, 2018, the tariff was increased to 25 %. In return, China announced similar countermeasures. Since then, the US-China trade war and US-China trade negotiations have remained in the headlines of global media.

In 2018, China's export of steel to the US was 0.7 million tons, just 1 % of China's total export volume.



The impact of US-China trade frictions on China's steel export to US is rather limited.

As a matter of fact, China's total steel export decreased from over 100 million tons in 2016 to 69 million tons in 2018.

This resulted from a range of factors: restraining overcapacity in steel production; enforcement in environmental protection; increase in domestic demand and a decline in international competitiveness of low-end products.

The US-China trade war has almost no effect on China's aluminum export which reached 5.2 million tons in 2018 increasing more than 23 % compared with 2017.

Copper export for 2018 was only a small amount of 0.5 million tons because copper production is mainly for the domestic market. China's automobile industry is in a similar situation with exports accounting for less than 1 % of total production.

Trade frictions exist not only between China and the US, but also between China and European & Southeast Asian countries.

The trade war may not have great impact on China's metal processing industry and automobile industry, but could affect the world trade pattern and cause the prevalence of isolationism and unilateralism.

The trade frictions and the change in trade patterns will not be over soon, which will push the Chinese government to try even harder to solve the problem of overcapacity.

Economic de-globalization and insulation among economies will encourage China to promote independent R&D in key technology areas to ensure the independence of their industrial technology.

THE IMPACT OF GLOBAL TRADE FRICTION ON EBNER'S BUSINESS IN CHINA

The US-China trade war may have a limited impact on China's metal exports, but the changes in world trade patterns will increase uncertainty for investment in China's main metal processing industry so that enterprises will have to rely more on the domestic market.

EBNER has a positive outlook that even in this situation, the total market volume of the steel, aluminum, copper and automobile industries related to our business is still huge.

Our success depends completely on whether we can adapt to the change and development of this market. We have realized that customers give more emphasis to the performance/cost of heat treatment facilities; energy saving & green production, automation technology; labor reduction; improvement on equipment intelligence.

What should be especially noticed is that China's demand in automotive aluminum, aviation aluminum, high strength steel and high-end copper is still very strong.

In these aspects, neither the traditional competitors from foreign countries nor the new local competitors from China can compete against us effectively in the short term.

EBNER still has the brand advantage. Since **EBNER** has been represented in Europe, USA and China for many decades with its own large manufacturing plants and

engineering & service competence, we are able to offer our customers first-class service and create local added value, even in difficult times like these.

EBNER continues to champion the Chinese market. In the near future there will be several investment projects in aluminum for the automotive and aerospace industries and in more segmented markets for high strength steel and special steels.

KEY DATA FOR THE CHINESE MARKET

Crude steel production 2018	928 million tonnes
Global share of steel production	51.3 %
Aluminum production 2018	45.5 million tonnes
Global share of aluminum production	54.8 %
Copper production 2018	17 million tonnes
Global share of copper production	56 %

10 years of RECOTEB®.

Time for a review and preview.



EMANUEL DIETRICHSTEINER
EBNER technical article

EBNER's first cooperative project with BISSON took place in 2008, during a rebuild of a hot-dip galvanizing facility (FZA 2) located at our customer Arcelor Mittal's works in Eisenhüttenstadt, Germany. BISSON IMPIANTI INDUSTRIALI, an ISO 9001 certified company, has over 45 years of experience in the manufacture of radiant tubes and in working with materials with high heat resistance.

Over the course of the project, 52 additional double-P radiant tubes fabricated by BISSON, along with 52 EBNER burners, were installed in a furnace module designed by EBNER (so far, none of the burner/radiant tube units have needed to be changed). During the numerous meetings and discussions that are needed for such an extensive revamp project, the pos-

sibility of future cooperation between EBNER Industrieofenbau and BISSON IMPIANTI was also recognized - the heating systems installed in hot-dip galvanizing lines (CGLs) and continuous annealing lines (CALs) are extremely complex, and until that time burners and radiant tubes had been regarded as separate component groups. This led to an agreement being signed.

As a result of that agreement, the companies began to develop the RECOTEB® (Recuperative Combustion Technology by EBNER and BISSON) system in 2009.

The development program had the goal of developing a burner/radiant tube package in which all components were optimally integrated with one another.



Furnace section

Within the framework of this cooperation, EBNER's experience with facility engineering and burner technology was able to be combined with BISSON IMPIANTI's experience fabricating components out of heat-resistant nickel-based alloys.

Together, the companies could offer customers not only a burner/radiant tube package in which all components are perfectly tuned to work together, but also implement completely new concepts for heating systems at CGLs and CALs.

The first major cooperative RECOTEB® project took place in 2010. A furnace section built in 1985 by Stein Heurtey was rebuilt, with all 203 W-type radiant tubes replaced with double-P designs.

At the same time, the entire exhaust gas system had to be rebuilt from a "pull" layout to a "push/pull" one, and the electrical systems had to be upgraded to support the new situation.

Heating system



The entire installation phase had to be completed within 4 weeks, and only 2 additional weeks were planned for commissioning before production was scheduled to start. This project, however, is an excellent example of the flexibility of the RECOTEB® system. The customer requested and received burners that could be fired not only with natural gas, but also with coke oven gas and mixed gas.

Combustion efficiencies of over 76 % for natural gas and over 74 % for coke oven gas were achieved. Since then, the burner/radiant tube package has been constantly developed. Currently, we are working on a project that will significantly increase the service life of the radiant tube unit.

The cornerstones of the current RECOTEB® project are:

- » Modular control of the burner in output range 30 % - 100 %
 - Lower thermal load on the radiant tube due to reduced temperature peaks
 - Lowered cyclical thermal stress
 - Combustion efficiency > 75 %
- » A number of radiant tube designs may be used
 - Highest possible flexibility when taking measurements
- » Highly-efficient burners with extremely low NOx

With the experience gained in the field of burner/radiant tube packages during both previous projects and current development, EBNER Customer Service can offer complete solutions to rebuild your hot-dip galvanizing line (CGL) or continuous annealing line (CAL). We would be happy to respond to any questions you may have regarding revamping your CGL or CAL.

www.recoteb.com

Heating system



Heat treatment facilities for the future.

EBNER HICON® heat treatment furnace facilities for grain-oriented and non-grain-oriented electrical strip.



MARIUS KREUZEDER
EBNER technical article

Electrical steel strip is a market with a tremendous potential for future growth. This is due not only to the increasing prominence of electrical vehicles, but also to the continuous increase in the global demand for energy and the extension of power grids. These factors mean that the average annual growth in the electrical strip market has been predicted to be about 6.2 % between 2018 and 2026.

Electrical strip is a material used in large quantities in electrical applications, as it is used to manufacture so-called "magnetic cores" for electrical machinery. The advantageous magnetic properties of electrical strip enable energy to be efficiently transferred in the machine. Electrical strip can be divided into two types:

- » Non-grain-oriented (NGO) strip for generators and electric motors
- » Grain-oriented (GO) strip for energy transmission in transformers

NON-GRAIN-ORIENTED ELECTRICAL STRIP (NGO)

Non-grain-oriented electrical strip (NGO) has very similar magnetic properties across both the width and length of the strip, as distribution of the grains is almost random. This property means the material is isotropic. This property means NGO materials are particularly well suited for use in rotating applications with magnetic fluxes in undefined spatial directions, such as electric motors and generators.

Production of NGO electrical strip requires, depending on the magnetic characteristics that are desired, a one-

stage or two-stage heat treatment process (see *Production workflow for NGO*). Here, a distinction is generally made between fully-processed and non-fully-processed electrical strip, though fully-processed strip makes up the majority of global demand with an 85 - 90 % share of the market.

The following EBNER® heat treatment facilities may be used for NGO:

» HICON/H₂® bell annealer facility (BAF)

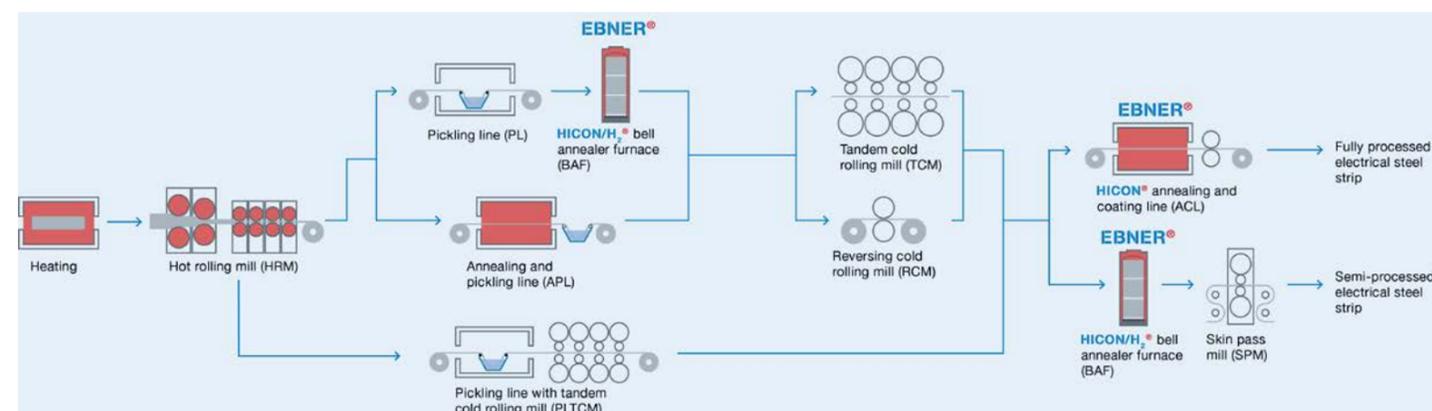
Electrical steel strip, which may be hot-rolled or cold-rolled, is heat treated at temperatures ranging from 650 - 900 °C. To improve the magnetic properties of the electrical strip, hot-rolled strip is heat treated at a temperature between 750 and 900 °C to control the texture (crystalline orientation).

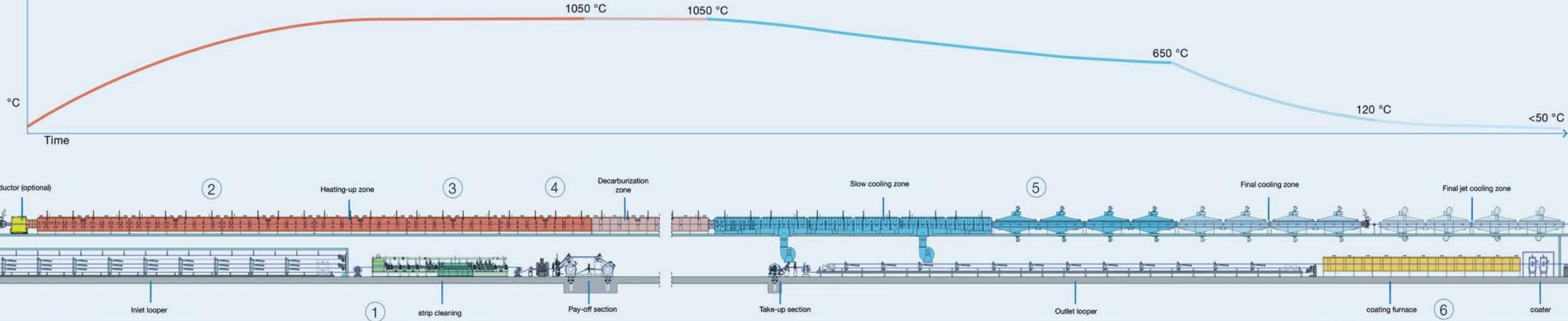
For non-fully-processed electrical strip, cold-rolled material is recrystallized at temperatures between 650 and 750 °C. This is followed by a skin pass of the non-fully-processed strip, which activates the material prior to the final anneal at the punching shop or motor manufacturer.

» HICON/H₂® annealing and coating line (ACL)

After cold rolling, the highly worked non-grain-oriented electrical steel strip is recrystallized in process atmosphere using a horizontal continuous furnace, and the grain size is adjusted using secondary recrystallization. A thin layer of insulating lacquer is then applied in-line using a roller coater, in order to reduce eddy current losses in the electrical motor and counteract corrosion.

Production workflow of non-grain-oriented electrical steel strip





Schematic representation of a **HICON/H₂** annealing and coating line (ACL)

GRAIN-ORIENTED ELECTRICAL STRIP (GO)

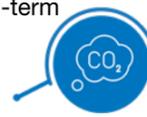
Grain-oriented (GO) electrical steel strip has excellent magnetic properties in the direction of rolling, due to a preferential orientation of the grains. The strict orientation of the easily-magnetizable Goss-oriented grains makes the magnetization processes in the direction of rolling very favorable in terms of energy. These materials are therefore particularly well-suited for static applications with magnetic fluxes in defined directions, such as power and distribution transformers.

Compared to NGO electrical steel strip, the production of GO electrical steel requires a highly complex, multi-stage heat treatment process. It is very important that the individual heat treatment steps are perfectly matched with the alloying system in order to achieve the best magnetic properties. **EBNER**® offers the following facilities for this application:

» **HICON/H₂**® decarburizing and coating line (DCL)

After cold rolling, grain-oriented electrical steel strip is heat treated in a continuous furnace to decarburize and recrystallize it. In **EBNER HICON/H₂**® decarburizing lines, this process takes place in a finely-tuned and precisely-maintained furnace atmosphere.

The highly-efficient and consistent decarburization process inhibits magnetic aging, and ensures the long-term efficiency of a transformer.



» **HITT high-temperature bell annealer facility (HBAF)**

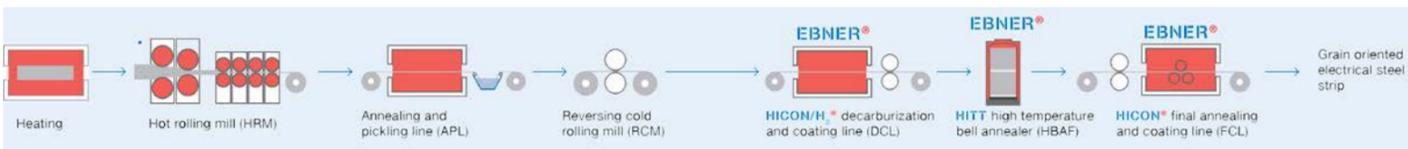
EBNER has developed the HITT (High Temperature & Tight) line of bell annealers for high-temperature anneals (HTA). The high-temperature anneal uses secondary recrystallization to form grains with the magnetically advantageous Goss texture. The high processing temperatures (above 1150 °C) and straight hydrogen atmospheres also remove sulfur and nitrogen from the material. The MgO coating applied during the upstream process inhibits the formation of stickers in the wraps at high workload space temperatures.

» **HICON**® final annealing and coating line (FCL)

The **HICON**® final annealing and coating line is the last production step in terms of heat treatment. The material is coated with an inorganic and surfactant insulating coating, and is then dried and sintered in a catenary furnace.

This is followed by thermal leveling (thermo-stretching) in a continuous furnace, which takes place in atmosphere to improve flatness without affecting the magnetic characteristics.

Production workflow of grain-oriented electrical steel strip



GROWTH OF THE NGO ELECTRICAL STEEL STRIP MARKET AND THE INFLUENCE OF ELECTRIC VEHICLES

From today's perspective, the trend toward electric vehicles can no longer be stopped. Alternative drive concepts such as electric and hybrid vehicles will replace a large

proportion of internal combustion vehicles in the medium to long term. Between 2020 and 2025, it is predicted that the number of electric vehicles that are built (HEV - Hybrid Electric Vehicles and EV - Electric Vehicles) will grow by an average of 15 - 20 % per year. China is currently dominating this market, followed by Europe. Highly-efficient electric motors are needed to power these vehicles. As

one of the main components, thin NGO electrical steel strip with a thickness ranging from 0.20 to 0.35 mm and a silicon content over 2.5 % is used.

When covering the demand for this product, one of the most important elements in the manufacturing chain is the annealing and coating line (ACL). The schematic diagram shown above shows the complexity of a modern ACL, along with the curve from a typical practice.

Before the strip enters the continuous furnace, it is electrolytically cleaned to prevent the transport of contaminants. The strip is then heat treated in the continuous furnace, which is heated by a radiant tube or electric heating system. Heat treatment takes place in process atmosphere with the highest possible hydrogen content and lowest possible dewpoint, at temperatures up to 1100 °C (see *Horizontal radiant tube-heated continuous furnace*).

After this, it is extremely important for both the magnetic and geometric characteristics of the strip that it be cooled very slowly and evenly along its length and across its width. Finally, the strip is coated with an insulating

coating and dried in a floater furnace. **EBNER** offers these types of facilities in cooperation with selected strip handling partners.

The strengths of an **EBNER** facility, compared to standard designs, provide significant advantages to our customers and include the following:

- » **Lowest dewpoints** due to an excellent furnace sealing concept and up to 100 % hydrogen process atmosphere; this avoids surface oxidation, especially for the highest quality electrical steel grades (> 2.5 % Si) at annealing temperatures above 1000 °C.
- » **Homogeneous slow cooling** over the width of the strip in the cooling zone, for optimum flatness and the best possible magnetic properties.
- » **Up to 50 % savings in hydrogen consumption** using the hydrogen regeneration system
- » **Process simulation before heat treatment** makes it possible to identify suitable annealing programs to achieve the specified magnetic and mechanical properties.
- » **Hearth roller replacement** possible during operation, even with atmospheres up to 100 % H₂.

Horizontal radiant tube-heated continuous furnace, hydrogen atmosphere





HPI – Casthouse Revolution Center Ranshofen.

A project that follows the research and development strategy of the EBNER Group.



ROBERT SCHMIDT

Gautschi news
from Switzerland



RAINER EDTMEIER

HPI news
from Austria

For the past several months, at HPI's headquarters in Ranshofen, work has been carried out at a rapid pace on a unique casting technology center for HPI and Gautschi.

The structural work for both the 1000 m² shop for the planned experimental casthouse and the multi-story office building has been completed, and facilities are currently being installed.

These include:

- » A 7.5 t melting and casting furnace manufactured by Gautschi; gas-fired; throughput 1 t/h
- » A 1.5 t melting and casting furnace; electrical resistance heating system
- » A vertical continuous casting unit manufactured by Gautschi, for rolling ingots and billets
- » A horizontal continuous casting unit manufactured by HPI, for all high-quality continuously cast materials
- » State-of-the-art casting equipment providing features like in-line degassing, filters, grain refinement and automation

These kinds of testing facilities are virtually impossible to find anywhere in the world, meaning that the casting technology center in Ranshofen will offer unique opportunities to our customers. The installation of both vertical and horizontal high-performance casting lines in one location will mean that every technologically-relevant field is covered. The facilities are equipped with industrial molds in production-ready designs, and thus perform exactly like those found in a plant.

However, emphasis has not just been placed on technology; all equipment and fixtures needed for operator

Gautschi Engineering GmbH, Berg TG, Switzerland



Casthouse center in Ranshofen - 3D view

training and the education of customer personnel has been readied. Development and training plans have been created, seminar rooms for customers have been made ready, and work centers have been set up right alongside the facilities.

Areas of emphasis will include the development of forging billet casting technology using the HPI system, the development of rolling ingot casting with the new Gautschi large-scale mold, the advancement of automation in continuous casting systems and further development of VAREGA burner technology for recycling scrap in hearth furnaces. However, the main goal of the testing center will be, alongside increasing facility performance, to step forward as the full solution provider for all continuous light metal (aluminum, magnesium) casting processes

The casthouse center will start trials at the end of December, 2019.

www.hpi.at
www.gautschi.cc

HPI High Performance Industrietechnik GmbH, Braunau, Austria



The full solution provider for complete casthouses.

Expanding capacity at Neuman Aluminium Austria GmbH.



ROBERT SCHMIDT

Gautschi news
from Switzerland



RAINER EDTMEIER

HPI news
from Austria

In 2006, Neuman Aluminium Austria GmbH made the decision to build a new casthouse, and at that time HPI was selected to provide the casting and heat treatment facilities.

The primary reason for construction of the new casthouse was to reprocess scrap from the company's own pressing plant, as cost-effectively as possible. To achieve this end, a continuous production process was selected: melting, casting, heat treatment and ultrasonic testing of extrusion billets and forging stock.

This line has been in operation since January, 2008. In the intervening years, production has been optimized and throughput has constantly been increased. However, due to growing demand for cast starting material for forged applications, a decision was made to expand capacity once again. The available melting capacity formed the production bottleneck in the line.

That is, before the new expansion, molten aluminum had been supplied to the line by a single-chamber melting/casting furnace manufactured in Italy.

Neuman Aluminium Austria recognized that the capacity

of the line could be increased by adding a second melting/casting furnace.

Alongside the new equipment, it was also decided to invest in a new charger, a new filter unit for all furnaces, a preparation unit for fines and a variety of infrastructure improvements.

Neuman Aluminium evaluated the designs offered by number of manufacturers, and when they reviewed the bid submitted by Gautschi they recognized that Gautschi's technical expertise, response to the particular circumstances at Neuman Aluminium Austria's works and, of course, overall approach to financing, were decisive

The fact that both HPI and Gautschi are members of one family of companies also had a positive effect on the decision to award the contract.

"HPI knew our existing facility quite well, and over the years had become a trusted partner who - together with Gautschi - we could trust to implement our vision," explains Oliver Glitzner, the Managing Director of Neuman Aluminium Austria GmbH.

Charging machine, loaded with scrap



The furnace supplied by Gautschi had to be specially modified to fit in the space available in the existing shop. Limitations were placed on the depth of the furnace, as well as the overall height of the facility. The exterior dimensions of the furnace were trimmed down to the minimum, though of course it still delivered full performance. A special requirement of Neuman Aluminium Austria GmbH was to melt fines, which are returned as scrap from the company's own machining processes. The furnace was equipped with a special "fines box", which included an efficient intake system. With this system, losses could be lowered to virtually nothing. Intake is carried out fully automatically.



As lightly-coated scrap is also processed at Neuman Aluminium Austria GmbH, another special system was also installed at the furnace: an oxygen burner is used to flare off gas collecting in the workload space, making a significant contribution to lowering the facility's environmental impact. The burner system is state-of-the-art, to be fully compliant with ever-stricter emissions regulations.



HPI's supply share consisted of the scrap charging machine. Due to the layout of the shop at Neuman, along with the new concept for scrap processing, the charging machine had to be able to rotate 180°. This was a very challenging problem, but one that HPI was well-equipped to face.

Four additional wheel units, which can be raised, lowered and turned, were integrated into the machine to allow the 55-ton colossus to pivot on its own axis. Along with this capability, the machine is equipped with a stack gas retention hood, which docks with the eductor hood of the Gautschi furnace when the furnace door is opened. This prevents stack gas from escaping into the shop during charging.

The loading position, as well as the furnace that is to be filled, can be selected from either of two control stations. In automatic mode, the charging machine travels either to a loading position or to one of the two furnaces. Charging the furnace with scrap is carried out automatically.

"In the second half of 2019, we will optimize function of the new equipment and the overall facility. We are excited about the new possibilities that have opened up to us through our investments and the facilities supplied by Gautschi and HPI," says Glitzner.

With this investment, Neuman is now on the way to having a completely continuous production process.

This project once again shows that the team of Gautschi and HPI, as a "Full Solution Provider for Complete Cast-houses", can implement optimized, tailor-made solutions for customers.

www.neuman.at

Charging machine, loaded with scrap



TECHNICAL DATA, ALUMINUM MELTING FURNACE	
Nominal capacity, molten aluminum	35 t
Melting rate	7 t/h
Loading capacity, charging machine	5 t

Lean production management.

6σ

LEAN

EBNER continues to develop its production system into a global manufacturing network.



CHRISTIAN RAUSCHER
EBNER technical article

Since the middle of 2019, EBNER has advanced the development of the Lean Production Management (LPM) system at its headquarters in Leonding, Austria, as well as at EBNER Furnaces Inc. in Wadsworth, USA and EBNER Industrial Furnaces in Taicang, China.

Through the coordinated, simultaneous development of the production system at all three manufacturing locations, it is being ensured that EBNER fulfills all the criteria for modern, lean industrial furnace manufacture everywhere in the world. Furthermore, with the help of its global production and manufacturing network, EBNER can react even more flexibly to individual customer requests, even in what can be very volatile markets.

EBNER makes it a priority to track the following key performance indicators:

- » Flexibility and order turnaround time
- » Reliability of delivery
- » Adherence to stipulated product quality and
- » Adherence to stipulated product costs

To be able to consistently achieve the targets for these criteria that have been agreed upon in-house, our lean production experts are developing a package of appropriate methods and tools suited to the particular requirements of each location and the manufacturing techniques in use there.

A group of "success factors" - 5S, pull logistics, Total Productive Maintenance (TPM), First Time Quality (FTQ), visual management, teamwork, one-piece/one-set flow and OEE (Overall Equipment Efficiency) - can be used here to represent the lean methods that are used.

However, the EBNER production system does not just consist of a collection of tools and methods for waste-free production and logistics.

Our ambition to constantly improve is a part of the EBNER strategy, and a crucial prerequisite for the fulfillment of our vision: to be the most innovative and competitive full solution provider in thermal processing.



PETER GOSCH
EBNER technical article

The service we provide offers even more than just our technical services on site at our customers plants. We are convinced that expert handling, routine maintenance and the necessary know-how will significantly extend the service life of your plant.

The EBNER Group has successfully provided customer specific training courses in the past. Our 70 years of experience in the field of heat treatment make us specialists when it comes to the metallurgical optimization of processes and equipment.

A considerable proportion of turnover is invested annually in research and development in order to continue advancing important areas such as digitalization and energy efficiency.

We use the knowledge gained in this way to support our customers in solving current challenges and will continue to offer demand-specific training courses in the future as well. In doing so, we will focus on the respective needs of our customers. Our products will range from classroom training to one-on-one instruction.

In order to make it even easier for our customers to access our training courses, we will set up a new training



The EBNER full service concept

concept and develop a new customer portal by the end of 2019.

On the customer portal, our customers will find all the information about our training courses, book them online and download training content that is made available digitally after the training course. Depending on the topic, training will take place in your own company, at a neutral venue or at EBNER headquarters in Leonding.

As the world market leader in heat treatment, we want to share our knowledge and are convinced that the mutual exchange of knowledge leads to success on both sides.





Using digitalization correctly.



EBNER's digitalization strategy to benefit customers, become even more efficient and respond even faster.



ERICH STELZHAMMER
EBNER technical article

A new era has begun - we already find ourselves in the digital age. This digital shift has affected companies of every size and in every market. EBNER is one of those that sees great potential in digitalization, and is implementing a clear, well-thought-out strategy in which customer needs are paramount.

At EBNER, innovation and development are the cornerstones of our decades of success. This has meant that the issue of digitalization is one that has been actively pursued within the company. Central to EBNER's digitalization strategy is the targeted collection and analysis of data.

TARGETED ANALYSIS

As part of our constant quest to improve the quality, availability and throughput of our facilities, we are car-



PETER GOSCH
EBNER technical article

rying out more and more data-based analyses. These analyses allow us to test or examine issues such as the optimal charging of a facility, the efficient use of energy, predictive and preventative maintenance, and the ability to achieve or exceed the quality requirements for the product that is heat treated.

As part of this process, the VISUAL FURNACES®6 Process Control System (PCS) can be equipped with a newly-developed software service that automatically and anonymously sends EBNER cyclical machine data collected at the heat treatment facility.

The evaluation of the data, which remains the property of our customer, and the results are of course fully confidential. This is a win-win situation for both our customers and ourselves - our customers can use our results to improve the performance of their facilities, and as a

furnace manufacturer we are able to use the results to support future developments.

When considering the collection and processing of data, the interconnectivity of today's world cannot be ignored. For this reason, a location-independent software platform has always been a fundamental component of the EBNER digitalization project.

LOCATION-INDEPENDENT SOFTWARE PLATFORM

EBNER is currently developing a cloud-based platform which can host customer-specific software applications. These will include on the one hand EBNER applications, but on the other hand the platform will also be open for hosting applications supplied by third parties. A standardized interface (API) will also be made available, enabling the data supplied by the facilities to be used and evaluated. For the first time our globally-active customers, as users of the platform, will be able to evaluate and display facility data from multiple locations in a single application.

Significant customer service features will also be integrated into the platform, and can be processed using a modern service portal.

SERVICE PORTAL

One part of the software platform will be dedicated to our new service portal, myEBNER. This portal will provide a variety of modules that ensure efficient interaction between our customers and EBNER service departments. The portal will incorporate a new service ticketing system, electronic spare part management, remote support, training modules and other developments in the area of SMART services. The service portal is yet another step toward providing Full Service Support to our customers, and is a springboard for providing even more efficient support to ensure the trouble-free operation of heat treatment facilities from EBNER - or from other companies operating in the market.

Whenever the issue of digitalization is raised, the term "digital twin" comes up - but what is really meant by this term?

DIGITAL TWIN

A "digital twin" is a virtual image of a real product, and is able to accurately simulate its characteristics. This makes it possible to increase efficiency, optimize sequences and

eliminate sources of error. It is one of the building blocks of Industry 4.0.

Currently, we are working on creating digital images of our real, physically-existing facilities. While we already have thermal models that simulate heating processes, in the future we will also be able to model mechanical sequences based on our 3D design drawings. When doing so, the principle of "software in the loop" is followed: the entire periphery, as well as all bus-capable PLC devices, are modeled in the software. This makes it possible to simulate the complete operating sequence at the facility, without a "real" environment. The sequence can be optimized and changes can be made.

The mechanical movements are animated in what is known as a "physics engine", where equipment is assigned characteristics like power, inertia, and so on. The value of a digital twin starts with a reduction of commissioning time, and extends all the way up to the possibility of analyzing problems offline - away from the actual facility.

Also affected by EBNER's digitalization strategy is our VISUAL FURNACES®6 Process Control System (PCS).

VISUAL FURNACES X - NEW VERSION

As part of our effort to exploit the features of modern software technologies, the user interface of our VISUAL FURNACES®6 Process Control System (PCS) will be updated for use on mobile devices. The updated version, as with other modern applications, will be web-capable and self-scaling to provide the appropriate display resolution for the device used. Furthermore, it will be available as an application on all common platforms. The app is capable of sending messages to call attention to itself, keeping customers informed about special conditions at the facility.

EBNER is continuously new implementing new approaches and ideas for digitalization that will benefit our customers. In particular, we are focusing on the issues of energy efficiency, environmental impact (reduction of CO₂ emissions), operating cost optimization and continuous improvement and development. During this process, the information and feedback provided by our customers is of great assistance.

Feel free to enter into a dialog with us, and together we will make virtual reality our actual reality.





GNA alutech inc.

From Cap-de-la-Madeleine, Quebec to Leonding, Austria and beyond - from now on, GNA and **EBNER** will share the same path.



UDO WEILERSCHIEDT
EBNER news
from Austria



TED PHENIX
EBNER news
from Canada

For the past several decades, **EBNER** has been following its vision "to be the most innovative and competitive full solution provider in thermal processing." Alongside intensive work on research and development projects, investment in and acquisition of other companies have played a significant role - both in progress toward our goal and in the ability to provide customers throughout the world with individual solutions from a single source.

GNA alutech inc., based in Montreal, Canada, was one such company that was sought out. The first contacts were made in June, 2018, and in March, 2019

an announcement was made at the TMS in San Antonio, Texas (USA) that a share of the company would be acquired. After 12 months of intensive discussions, contracts for the acquisition of a majority share were signed on June 13, 2019.

Together with Gautschi Engineering GmbH and HPI High Performance Industrietechnik GmbH, which already belong to the **EBNER** Group, this acquisition gives the **EBNER** Group a strong worldwide presence with the competence to supply the full range of facilities for aluminum casthouses, whether to manufacture slabs, billets or ingots from a single source. Starting with melt-

ing and holding furnaces (including designs for contaminated scrap), moving on to vertical and horizontal casting facilities, and continuing all the way up to suitable heat treatment facilities, the **EBNER** Group has a wide range of products available. The product range is rounded out with cathode and anode systems from GNA, the clear market leader in this field.

The three companies will continue to make significant investments in R&D. GNA will also be involved with the pilot casting facility installed in the new R&D center in Ranshofen, Austria. Vertical and horizontal casting machines will go into operation in the fourth quarter of 2019.

The worldwide service network, with service centers in China, Switzerland, Austria, the USA, Canada and India is founded on extensive expertise with both facilities and processes. Services also include operator training and casting trials at the Ranshofen R&D center.

In parallel with the contract negotiations, a search was being made for a new team member to strengthen the company. In the middle term, this new man or woman would replace Ted Phenix, GNA's Managing Director, who was ready to leave the company due to his age. In the end, the Group was able to win Mr. Kaleb Wright to fill the position, whose previous employer has been one of GNA's customers for many years. Wright had been working at Hydro, located in Commerce, Texas, since 2002. His latest position was that of Production Maintenance Manager.

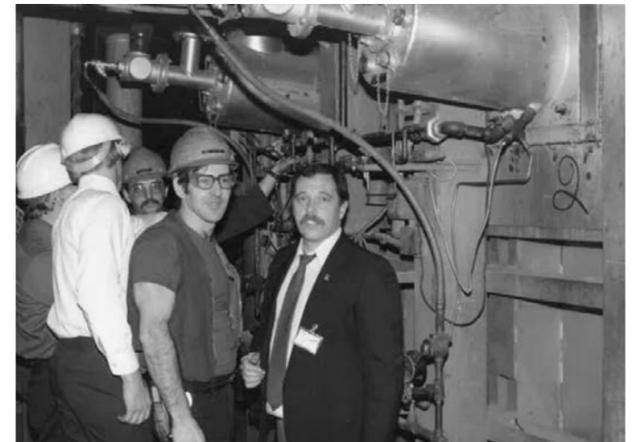
In the future, alongside a role as Chief Technology Officer (CTO) at GNA, he will also act as Sales Manager North America for both Gautschi and HPI. This will mean that customers need only a single contact to access the complete range of aluminum casthouse products from the **EBNER** Group.

The entire **EBNER** Group would like to extend a warm welcome to GNA, and wish both Ted and Kaleb all the best for the future.

For this edition of the **HICON**® Journal, we asked Ted Phenix, the founder of GNA, if he could provide us with an overview of GNA's history and its development over the past few decades.

"The origins of GNA date back to July 30th, 1983 when I founded the company. After seeing my first bath of molten aluminum at a Reynolds Aluminum recycling plant in Cap-de-la-Madeleine - Québec, something told me that I had not seen my last casthouse.

The fascination of seeing aluminum in a liquid state after only ever seeing it in a solid form left a strong impression on me. My career path had just been established, and I recognized it instantly.



Natural gas conversion at Reynolds Aluminum in Cap-de-la-Madeleine, Québec. Year 1982

The project at the Reynolds recycling plant was to convert their melting and holding furnaces from oil-fired burner systems to natural gas as the gas pipeline was expanding eastwards along the Saint Lawrence river. We were the successful bidder having bested 5 competitors and came away with the first major industrial contract related to the gas pipeline expansion. Construction, testing, commissioning and performance testing was accomplished without issue and the project delivered on time and on budget.

This was my first project in the aluminum industry, and it pointed the way for my career till this day. Shortly after completing this project, there was an announcement for the construction of three new aluminum smelters to be built in the Province of Québec in the coming years. Good news!

COMPANY TAKEOVER

At just about the same time, I learned that the Company owners I was working for were emptying the bank account because they needed the cash to pay back loans for work-related activities connected to their other company that was going bankrupt. Bad news!

I approached the senior owner and let him know that I was aware of what they were doing and that instead of letting their actions end up in closing down the division I represented, I was interested in taking it over and buying from them.

Then, I made them an offer...one dollar, for everything. We settled into our first office some 4 months later and started to build the organization. Business opportunities were abundant and based on the success of our project at Reynolds, we won several fuel conversion contracts for other clients including a cement plant, a lime plant, two steam plants and some Alcan installations in the Saguenay region of Québec where they operated several smelters and casthouses. This work kept us busy for 2 to 3 years and provided opportunities to build some heat treatment furnaces for a local steel forge and steel strip mill.

THE COLLABORATION WITH GAUTSCHI

In 1989, the Alouette Smelter project was launched and based on the strength of two new furnace contracts recently completed for local Alcan plants, we were included on the bidder's list.

The casthouse client was based on VAW technology as they were one of the five partners making up the smelter ownership consortium. One day, I received a phone call from the project director of purchasing asking me to get in contact with Gautschi to form an alliance and present a "value-added" offer combining our holding furnaces and launder systems with the Gautschi casting machines. He even provided me with the name of a person to call as well as a phone number in Switzerland. It was his way of telling me that the Gautschi furnaces were too expensive. When I first called Gautschi and explained who I was and the purpose of my call, the response was indeed very short, and the call terminated immediately. I was informed by the person on the other end of the line that "We also manufacture holding furnaces. Good day!"

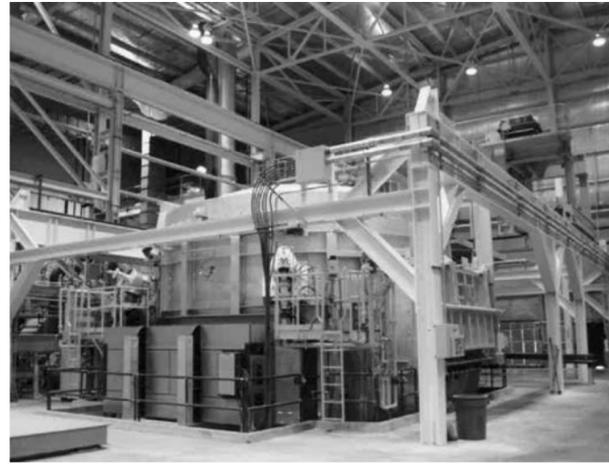
I reported the results of the call to the project purchasing director and he asked me to stand by the phone for a call. In a matter of minutes, the phone rang, and it was the gentleman from Gautschi calling me back and advising that they would be pleased to have the opportunity of working together with us in presenting a combined offer for the Alouette Smelter Casthouse project. I learned that we would be working with Emil Geus and Horst Roehl, respectively the MD and Sales Manager for Gautschi. Both managers were soon to be on a one-day stopover in Montreal while en route between two meetings. At that point, the friendship with Gautschi went from the trial stage to becoming good friends and we closed out the discussions with a commitment to provide an offer to the client and perhaps even look at the possibility of making the temporary arrangement between us a more long-lasting one.

In the end, GNA was awarded a contract for three holding furnaces and launder systems and Gautschi won the contract for two ingot casting and strapping lines. We both came out winners as this had provided the platform to work together and eventually establish GNA as the North American agent for Gautschi. We immediately stepped into the role and assisted Gautschi in closing out 2 projects for different Alcan operations in the US; DC6 in Oswego and the new batch annealing furnace project for the Terre Haute works in Indiana.

The agency agreement with Gautschi led to the change of our official Company name to GNA Industrial Furnaces which subsequently became GNA alutech inc. Our arrangement with Gautschi lasted more than 10 years.

GNA is a small company but we have a global footprint with clients in Australia, Taiwan, China, India, three countries in the Middle East, Europe, Russia, Canada, the US, Mexico and Brazil.

Even though our association with Gautschi ended in 2001, the relationship and friendships endured.



First TRTC melting furnace with side-mounted stirrer from ABB. Client – Kaiser Sierra Micro Mills in Sparks, Nevada. 1996

GNA AND EBNER FIND EACH OTHER

The friendships survived over the years and at the 2017 TMS Exhibition, our COO, Chantal Coupal and I had the opportunity to meet Robert Schmidt (Head of Sales Gautschi). We found an hour or so to chat at the end of the exhibition hours on the last day of the show. After providing Robert with a brief overview of our relationship with Gautschi, he explained their current situation as an EBNER Group Member company and even gave us a quick rundown of their current activities. He seemed to show interest in GNA, and we parted ways with the feeling of having found a new friend at Gautschi.

A year later, I received a phone call from a German M&A company followed by an email asking if there was any interest in a potential 'partnership' with a European company. I confirmed and said I would like to know more. About 2 weeks later, I received a phone call from a Mr. Udo Weilerscheidt from EBNER to discuss the subject. We also exchanged emails over a period of several days covering the topic.

I informed Udo that I was going to be in Germany near the end of June 2018 to attend a Rolling Stones concert in Stuttgart with one of my daughters and our planned arrival date could allow a meeting. Udo made the trip to the Stuttgart airport to meet us and the discussions lasted several hours. That meeting was followed by more emails and the agreement to meet at the GNA offices in Montreal last August. At that meeting, I got to meet Alfred Heinz (EBNER CTO) and Herbert Gabriel (Managing Director, EBNER Furnaces, USA). We shared a little more than 2 days together and covered a range of topics to review and determine our compatibility from a 'chemistry' point of view as well as to showcase our technical achievements to Alfred and Herbert. Udo indicated that he thought the chemistry was OK but that the most important person to judge that was Robert Ebner and therefore, a meeting in Austria would be in order. Our technical ability was never in doubt.

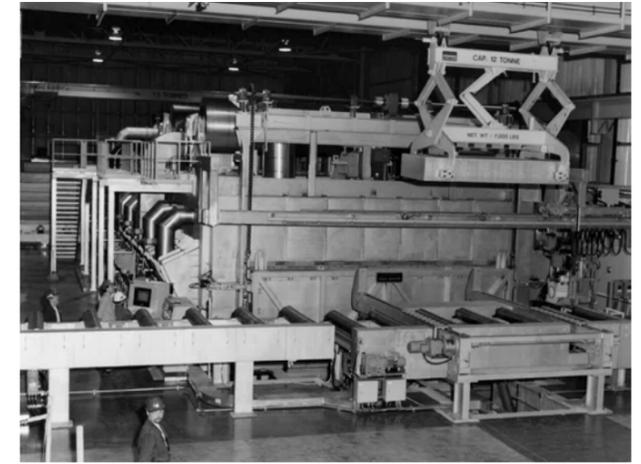
During the discussions here last August, Udo showed us what he thought were important synergies between EBNER and GNA and what could be important assets for

GNA moving forward. Such assets included the financial strength and stability of EBNER and how that could be of benefit to us. There were also discussions about exchanging employees between Europe and Canada in the future to help in attracting new talent as finding new employees is proving to be a major task in recent years.

In September of 2018, I made the trip to Europe and visited the EBNER facility where I met Robert. I was given the complete tour of the workshops, the R&D-facilities, the Future Lab, offices and even the EBNER Museum. During my visit there, I also got to meet Peter Robert Ebner. In the next two days, we traveled to Braunau to visit HPI and then on to Berg and discussions with Gautschi where I met Tom Jumelet (Managing Director Gautschi) and Robert Schmidt. We spent a solid 9 hours around the conference room table discussing technologies and business strategies and the future of our industry and what we could combine to accomplish.

A partnership with EBNER would allow us to reconnect with Gautschi and to join forces with HPI. The combining of the talents, experience and resources of the three companies creates a strong capability in the industry that can provide the market with un-rivaled equipment supply from a single source.

GNA having worked in the US and Canadian markets in both the primary and secondary aluminum industries since the late 1980's, we gained substantial knowledge and experience in the recovery and recycling of clean and contaminated aluminum scrap. Having this experience will allow us to support Gautschi in their market quest to offer modern scrap melting equipment, technology and expertise as the industry looks more and more at lower cost raw material streams to improve their bottom line.



Gauschi pusher-type furnace project for Reycon, Canada jointly managed by Gautschi and GNA. Year 2000

LOOKING TOWARD THE FUTURE...

As the market dynamics change, so do we. GNA recognised that operator safety and comfort come at the top of the list. In order to confirm our position as technology leaders in casthouse safety, performance and leading equipment and systems design, Gautschi, HPI and GNA will work as a team to continue to innovate and develop reliable technologies and sustainable operating practices.

The voyage that began so many years ago in Cap-de-la-Madeleine, Québec has now taken me all the way to Austria." (Ted Phenix)

Ted Phenix



NEWS

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Trade fairs. Conventions. 2019 & 2020

12. - 13.09.2019	ALUMINUM USA	Nashville	USA	Booth No. 820
18. - 20.09.2019	WIRE SOUTHEAST ASIA	Bangkok	THA	Booth No. WKO
01. - 02.10.2019	WIRE SOUTH AMERICA 2019	San Paolo	BRA	Booth No. TBA
17. - 18.10.2019	THERMAL TECHNOLOGY	Osaka	JP	Booth No. TBA
05. - 08.11.2019	BLECH EXPO	Stuttgart	DE	Booth No. TBA
12.11.2019	METAL EXPO 2019	Moscow	RU	Booth No. GERTNER
15. - 17.01.2020	AUTOMOTIVE LIGHTWEIGHT TECHNOLOGY EXPO IN TOKYO 2020	Tokyo	JP	Booth No. TBA
30.03. - 03.04.2020	TUBE 2020 DÜSSELDORF	Düsseldorf	DE	Booth No. TBA
30.03. - 03.04.2020	WIRE 2020 DÜSSELDORF	Düsseldorf	DE	Booth No. TBA
04. - 07.05.2020	AISTECH	Cleveland	USA	Booth No. 2570
06. - 08.10.2020	ALUMINIUM 2020 DÜSSELDORF	Düsseldorf	DE	Booth No. 10E30

We look forward to seeing you there!

New orders.

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