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EBNER Journal for Progress in Industrial Furnace Technology





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 The EBNER Group will continue to feature in future isprimary 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.

sues 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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INC. I article GUNG	

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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.

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HICON/H2

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KARL WOHLFART

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

NEW!

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 **THE DESIGNS: A COMPARISON** 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 In conventional horizontal furnace designs, the length of 1230 °C, even the best muffle materials become extremely muffles is severely limited. Beyond a certain muffle length / strip width, the muffles - which are arranged in a rowsoft and have only the lowest creep strengths.



SASCHA EPPENSTEINER

EBNER news from Germany





Transition from high-temperature furnace no. 2 to the HICON/H.[®] 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

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 **A SUCCESSFUL START** special requirements of its application.

Vertical coolers are installed downstream, meaning that 2019. At the beginning of July, 2019 the facility was inauthe 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 EBNER's CTO Dr. Alfred Heinz both spoke and underboth muffles out of their own production.

A FACILITY WITH THE HIGHEST POSSIBLE ENERGY AND UTILITY EFFICIENCY. PAIRED WITH THE LOW-**EST 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 emissions, 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.

The facility went into operation in the second quarter of gurated in the presence of leading political figures and members of the business community.

At this event in Werdohl, VDM's Olaf Kazmierski and lined 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.

ww.vdm-metals.com

C0,

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







EBNER. WORLDWIDE

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



CARL-AUGUST PREIMESBERGER

EBNER news from around the world

The next step was delivery of the first HICON® floater As the use of hardenable aluminum alloys in the autofurnace facility for automotive strip to Aleris Aluminium of Duffel, Belgium. This facility started production in April, motive and aerospace industries has increased, so has the demand for continuous hardening and tem-2002. pering lines.

With 25 HICON® floater 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 floater 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 floater furnace section that included a water/air quench EBNER had the perfect equipment for these lines in the was set up in the EBNER lab. Here, tests needed to form of HICON® floater furnaces, and in 2011 orders were develop the strip floating system and optimize the quench placed for three more facilities by customers in the USA. were carried out.



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

- 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 floater 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.

The first EBNER floater 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.



"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



EBNER. WORLDWIDE





CONSTELLIUM. FRANCE



CARL-AUGUST PREIMESBERGER

EBNER news from France

"Lightweighting" is currently one of the hot topics in Airbus, Boeing and Bombardier. Furnace technology the automotive industry. A constant effort is being plays a decisive role when working with innovative alloys. made to lighten auto body parts, for which reason We rely on **EBNER** as a strong partner with extensive aluminum is often being used in preference to steel. know-how and decades of experience. Globally, the demand for aluminum products that can meet the high standards of the automotive industry is HICON[®] Journal: Constellium and EBNER have cooperated on more than just this order. Could you tell us about increasing. To meet these demands, heat treatment equipment must provide precise temperature control previous projects with EBNER and the experiences you had during them? and undamaged strip surfaces. These are exactly the strengths of an EBNER HICON® floater furnace facil-Mr. Hirling: Since December, 2015 an EBNER HICON®

ity. floater furnace facility has been operating at our plant To find out more about the first HICON® floater furnace in Bowling Green, Kentucky (USA). This modern facility facility installed at Constellium's French works, we interuses state-of-the-art technology, and is an important viewed Mr. Uwe Hirling, CAPEX (capital expenditure) Promilestone in our strategy for becoming the leading supplier in the USA's growing market for auto body sheet. curement Manager at Constellium.

HICON[®] Journal: Mr. Hirling, we appreciate your taking This facility has a capacity of over 100,000 tons, and the time to speak to us. Could you give us a brief overguarantees Constellium the highest production effiview of Constellium's product range? ciency, highest product quality and highest level of safety against workplace accidents. With this facility, EBNER Mr. Hirling: Constellium is a globally-active company made significant contributions to the heat treatment of that produces rolled and extruded aluminum products, aluminum strip - in particular, by further developing the as well as a wide variety of components based on a num-Smartquench[®].



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,

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 HICON[®] Journal: We would like to thank you for the interrecipes 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 guench.

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.

view, and are also looking forward to working together with Constellium on yet more interesting and successful projects!



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.



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processing industry in China.

EBNER leads the Chinese market.



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/H[®] 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 CHI-**NESE 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 The trade war may not have great impact on China's 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.

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 The US-China trade war may have a limited impact on total production.

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

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.

Copper export for 2018 was only a small amount of 0.5 THE IMPACT OF GLOBAL TRADE FRICTION ON **EBNER's BUSINESS IN CHINA**

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, engineering & service competence, we are able to offer the total market volume of the steel, aluminum, copper our customers first-class service and create local added and automobile industries related to our business is still value, even in difficult times like these. huge.

EBNER continues to champion the Chinese market. In Our success depends completely on whether we can the near future there will be several investment projects adapt to the change and development of this market. in aluminum for the automotive and aerospace industries We have realized that customers give more emphasis to and in more segmented markets for high strength steel the performance/cost of heat treatment facilities; energy and special steels. 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 strengt 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 shor 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

h				
h	KEY DATA FOR THE CHINESE MARKET			
	Crude steel production 2018	928 million tonnes		
n	Global share of steel production	51.3 %		
n rt	Aluminum production 2018	45.5 million tonnes		
	Global share of aluminum production	54.8 %		
S	Copper production 2018	17 million tonnes		
y d	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 With the experience gained in the field of burner/radiant place in 2010. A furnace section built in 1985 by Stein tube packages during both previous projects and current Heurtey was rebuilt, with all 203 W-type radiant tubes development, EBNER Customer Service can offer comreplaced with double-P designs. plete solutions to rebuild your hot-dip galvanizing line (CGL) or continuous annealing line (CAL). We would be At the same time, the entire exhaust gas system had to happy to respond to any questions you may have regardbe rebuilt from a "pull" layout to a "push/pull" one, and ing revamping your CGL or CAL.

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

www.recoteb.com

Heating system



Heat treatment facilities for the future.

EBNER. TECHNICAL ARTICL

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 stage or two-stage heat treatment process (see Producpotential for future growth. This is due not only to tion workflow for NGO). Here, a distinction is generally the increasing prominence of electrical vehicles, but made between fully-processed and non-fully-processed also to the continuous increase in the global demand electrical strip, though fully-processed strip makes up the majority of global demand with an 85 - 90 % share for energy and the extension of power grids. These factors mean that the average annual growth in the of the market. electrical strip market has been predicted to be about The following EBNER® heat treatment facilities may be 6.2 % between 2018 and 2026.

Electrical strip is a material used in large quantities in electrical applications, as it is used to manufacture » HICON/H,[®] bell annealer facility (BAF) so-called "magnetic cores" for electrical machinery. The Electrical steel strip, which may be hot-rolled or coldrolled, is heat treated at temperatures ranging from 650 advantageous magnetic properties of electrical strip enable energy to be efficiently transferred in the machine. 900 °C. To improve the magnetic properties of the electri-Electrical strip can be divided into two types: cal strip, hot-rolled strip is heat treated at a temperature between 750 and 900 °C to control the texture (crystalline orientation).

- » 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 turer. magnetic properties across both the width and length of the strip, as distribution of the grains is almost random. » HICON/H[®] annealing and coating line (ACL) This property means the material is isotropic. This prop-After cold rolling, the highly worked non-grain-oriented erty means NGO materials are particularly well suited electrical steel strip is recrystallized in process atmofor use in rotating applications with magnetic fluxes in sphere using a horizontal continuous furnace, and the undefined spatial directions, such as electric motors and grain size is adjusted using secondary recrystallization. generators. A thin layer of insulating lacquer is then applied in-line

using a roller coater, in order to reduce eddy current Production of NGO electrical strip requires, depending losses in the electrical motor and counteract corrosion. on the magnetic characteristics that are desired, a one-



used for NGO:

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 manufac-

Production workflow of non-grain-oriented electrical steel strip



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/H,[®] 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/H**₂[®] 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 VEHI-CLES

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. 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

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



Schematic representation of a HICON/H₀[®] annealing and coating line (ACL)

- 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,
- s even with atmospheres up to 100 % H₂.

Horizontal radiant tube-heated continuous furnace, hydrogen atmosphere



Revolution Center Ranshofen.

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





ROBERT SCHMIDT

Gautschi news from Switzerland

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

Areas of emphasis will include the development of forging billet casting technology using the HPI system, the These kinds of testing facilities are virtually impossible development of rolling ingot casting with the new Gautsto find anywhere in the world, meaning that the casting chi large-scale mold, the advancement of automation in technology center in Ranshofen will offer unique opporcontinuous casting systems and further development of tunities to our customers. The installation of both verti-VAREGA burner technology for recycling scrap in hearth cal and horizontal high-performance casting lines in one furnaces. However, the main goal of the testing center location will mean that every technologically-relevant will be, alongside increasing facility performance, to step field is covered. The facilities are equipped with industrial forward as the full solution provider for all continuous molds in production-ready designs, and thus perform light metal (aluminum, magnesium) casting processes 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





RAINER EDTMEIER

HPI news from Austria



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.

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

www.hpi.at www.gautschi.co

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

In 2006, Neuman Aluminium Austria GmbH made the of the line could be increased by adding a second meltdecision to build a new casthouse, and at that time ing/casting furnace. HPI was selected to provide the casting and heat treatment facilities. Alongside the new equipment, it was also decided to

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 of course, overall approach to financing, were decisive throughput has constantly been increased. However, due to growing demand for cast starting material for forged The fact that both HPI and Gautschi are members of one applications, a decision was made to expand capacity family of companies also had a positive effect on the once again. The available melting capacity formed the decision to award the contract. production bottleneck in the line.

"HPI knew our existing facility quite well, and over the That is, before the new expansion, molten aluminum had years had become a trusted partner who - together been supplied to the line by a single-chamber melting/ with Gautschi - we could trust to implement our vision," explains Oliver Glitzner, the Managing Director of Neucasting furnace manufactured in Italy. man Aluminium Austria GmbH.

Neuman Aluminium Austria recognized that the capacity



Gautschi Swiss Precision Close to You



BAINER EDTMEIER

HPI news from Austria

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,

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



(CO2

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 auto-

matically.

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 Casthouses", can implement optimized, tailor-made solutions for customers.

Charging machine, loaded with scrap

www.neuman.at





Nominal capacity, molten aluminum	35 t
Melting rate	7 t/h
Loading capacity, charging machine	5 t

LEAN Lean production management.

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 To be able to consistently achieve the targets for these 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

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 wastefree 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.

On the customer portal, our customers will find all the We use the knowledge gained in this way to support our information about our training courses, book them online customers in solving current challenges and will continue and download training content that is made available digto offer demand-specific training courses in the future as itally after the training course. Depending on the topic, well. In doing so, we will focus on the respective needs of training will take place in your own company, at a neutral our customers. Our products will range from classroom venue or at EBNER headquarters in Leonding. training to one-on-one instruction.

As the world market leader in heat treatment, we want to In order to make it even easier for our customers to share our knowledge and are convinced that the mutual access our training courses, we will set up a new training exchange of knowledge leads to success on both sides.





The **EBNER** full service concept

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

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 applicafacility, without a "real" environment. The sequence can tions. These will include on the one hand EBNER applibe optimized and changes can be made. cations, but on the other hand the platform will also be open for hosting applications supplied by third parties. A The mechanical movements are animated in what is standardized interface (API) will also be made available, known as a "physics engine", where equipment is enabling the data supplied by the facilities to be used assigned characteristics like power, inertia, and so on. and evaluated. For the first time our globally-active cus-The value of a digital twin starts with a reduction of comtomers, as users of the platform, will be able to evaluate missioning time, and extends all the way up to the possiand display facility data from multiple locations in a single bility of analyzing problems offline - away from the actual application. facility.

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

SERVICE PORTAL

As part of our effort to exploit the features of modern One part of the software platform will be dedicated to software technologies, the user interface of our VISUAL our new service portal, myEBNER. This portal will pro-FURNACES[®]6 Process Control System (PCS) will be vide a variety of modules that ensure efficient interacupdated for use on mobile devices. The updated version. tion between our customers and EBNER service departas with other modern applications, will be web-capable ments. The portal will incorporate a new service ticketing and self-scaling to provide the appropriate display resosystem, electronic spare part management, remote suplution for the device used. Furthermore, it will be available port, training modules and other developments in the as an application on all common platforms. The app is area of SMART services. The service portal is yet another capable of sending messages to call attention to itself, step toward providing Full Service Support to our cuskeeping customers informed about special conditions at tomers, and is a springboard for providing even more effithe facility. cient support to ensure the trouble-free operation of heat EBNER is continuously new implementing new approaches and ideas for digitalization that will bene-

treatment facilities from EBNER - or from other companies operating in the market. fit our customers. In particular, we are focusing on the Whenever the issue of digitalization is raised, the term issues of energy efficiency, environmental impact (reduc-"digital twin" comes up - but what is really meant by this tion of CO₂ emissions), operating cost optimization and term? continuous improvement and development. During this process, the information and feedback provided by our **DIGITAL TWIN** customers is of great assistance.

A "digital twin" is a virtual image of a real product, and is Feel free to enter into a dialog with us, and together we able to accurately simulate its characteristics. This makes will make virtual reality our actual reality. 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

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

VISUAL FURNACES X – NEW VERSION

JOURNAL

TRANSFORMATION



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 WEILERSCHEIDT EBNER news from Austria

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



TED PHENIX EBNER news from Canada

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 has 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 melting 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 The project at the Reynolds recycling plant was to conis founded on extensive expertise with both facilities and vert their melting and holding furnaces from oil-fired processes. Services also include operator training and burner systems to natural gas as the gas pipeline was casting trials at the Ranshofen R&D center. expanding eastwards along the Saint Lawrence river.

We were the successful bidder having bested 5 compet-In parallel with the contract negotiations, a search was itors and came away with the first major industrial conbeing made for a new team member to strengthen the tract related to the gas pipeline expansion. company. In the middle term, this new man or woman Construction, testing, commissioning and performance would replace Ted Phenix, GNA's Managing Director, testing was accomplished without issue and the project who was ready to leave the company due to his age. In delivered on time and on budget. the end, the Group was able to win Mr. Kaleb Wright to fill the position, whose previous employer has been one of This was my first project in the aluminum industry, and it GNA's customers for many years. Wright had been workpointed the way for my career till this day. ing at Hydro, located in Commerce, Texas, since 2002. Shortly after completing this project, there was an His latest position was that of Production Maintenance announcement for the construction of three new aluminum smelters to be built in the Province of Québec in the Manager. coming years. Good news!

In the future, alongside a role as Chief Technology Officer (CTO) at GNA, he will also act as Sales Manager North **COMPANY TAKEOVER** America for both Gautschi and HPI. This will mean that customers need only a single contact to access the com-At just about the same time, I learned that the Complete range of aluminum casthouse products from the pany owners I was working for were emptying the bank EBNER Group. account because they needed the cash to pay back loans for work-related activities connected to their other The entire **EBNER** Group would like to extend a warm company that was going bankrupt. Bad news!

welcome to GNA, and wish both Ted and Kaleb all the

best for the future. I approached the senior owner and let him know that I was aware of what they were doing and that instead of For this edition of the HICON[®] Journal, we asked Ted letting their actions end up in closing down the division I Phenix, the founder of GNA, if he could provide us with represented, I was interested in taking it over and buying an overview of GNA's history and its development over from them. the past few decades.

Then, I made them an offer...one dollar, for everything. "The origins of GNA date back to July 30th, 1983 when I We settled into our first office some 4 months later and founded the company. After seeing my first bath of molstarted to build the organization. ten aluminum at a Reynolds Aluminum recycling plant in Business opportunities were abundant and based on the Cap-de-la-Madeleine - Québec, something told me that I success of our project at Reynolds, we won several fuel had not seen my last casthouse. conversion contracts for other clients including a cement plant, a lime plant, two steam plants and some Alcan

The fascination of seeing aluminum in a liquid state after installations in the Saguenay region of Québec where only ever seeing it in a solid form left a strong impression they operated several smelters and casthouses. This on me. My career path had just been established, and I recognized it instantly.

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

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 guick 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 vear 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 As the market dynamics change, so do we. GNA recwith Gautschi and to join forces with HPI. The combinognised that operator safety and comfort come at the ing of the talents, experience and resources of the three top of the list. In order to confirm our position as techcompanies creates a strong capability in the industry that nology leaders in casthouse safety, performance and can provide the market with un-rivaled equipment supply leading equipment and systems design, Gautschi, HPI from a single source. and GNA will work as a team to continue to innovate and develop reliable technologies and sustainable operating GNA having worked in the US and Canadian markets practices.

in both the primary and secondary aluminum industries since the late 1980's, we gained substantial knowledge The voyage that began so many years ago in Cap-dela-Madeleine, Québec has now taken me all the way to and experience in the recovery and recycling of clean and contaminated aluminum scrap. Having this experience Austria." (Ted Phenix) will allow us to support Gautschi in their market quest to Jeel Phene 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.





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

LOOKING TOWARD THE FUTURE...

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01 02.10.2019	WIRE SOUTH AMERICA 2019	San Paolo	BRA	Booth No.	ТВА
17 18.10.2019	THERMAL TECHNOLOGY	Osaka	JP	Booth No.	ТВА
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