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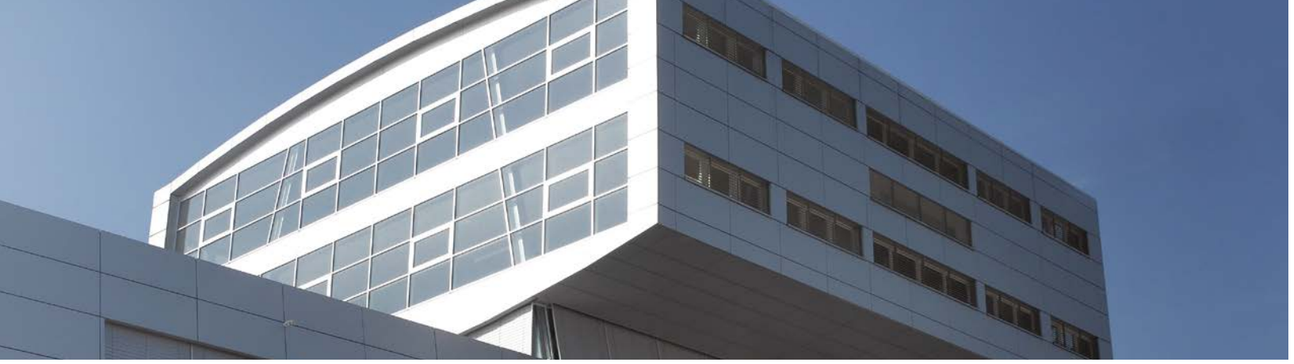
HICON®

EBNER GROUP Journal for Progress in Industrial Furnace Technology

EBNER® GROUP
Driving Green Technologies

Reducing carbon footprints with EBNER technology



EBNER

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

As a globally-active, family-owned technology business, the **EBNER** Group takes environmental responsibility very seriously.

Global warming and the climate catastrophes occurring throughout the world, along with the unfortunately still-ongoing European conflict between Russia and the Ukraine - the uncertainty associated with which has caused gas, oil and electricity prices to explode - confirm that we have been on the right path for what has been almost 75 years.

Since the beginning of our company's history, our goal has always been to manufacture energy-efficient and resource-conserving facilities. When **EBNER** was founded in 1948, every furnace could already be heated with an electric heating system.

With our commitment to the issue of sustainability and as a pioneer in industrial facility design, we intend to promote our ambitions for the green technologies in our product line even more strongly in the future.

For this reason, I am particularly pleased to be able to present in this issue the latest developments and projects that reflect our commitment to **Driving Green Technologies**.

Starting with proven, eco-friendly **EBNER HICON/H_2®** technology and continuing through Gautschi's efforts in the field of aluminum recycling, the new "HPI ForgeMaster" mold from HPI, **EBNER** press hardening furnaces and their success in China's mobility sector, and on to Hazelett, the youngest member of the **EBNER** Group, this issue offers many fascinating glimpses into our drive toward sustainability.

I hope you enjoy this issue, and hope that I will be able to greet many of you in person at our next event or trade fair.

Until then, I wish you the best of success in our shared effort to create a sustainable and greener future!

Yours, Robert Ebner
CEO

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Going greener with HICON®.

Modernization of a bell annealer facility with proven EBNER HICON/H_2® technology.

FLORIAN PAMMINGER

EBNER news
from Germany

The need to meet changing customer requirements and increase production capacity, while reducing energy and utility consumption at the same time, led Schwermetall Halbzeugwerk GmbH of Stolberg, Germany to invest in new bell annealer equipment. The choice to supply the technology for the facility fell to EBNER.

Schwermetall Halbzeugwerk GmbH & Co. KG, headquartered in Stolberg, Germany, is a 50/50 subsidiary of the Arubis and Wieland Groups and is one of the leading manufacturers of copper and copper alloy strip. In 2019, this customer placed an order with **EBNER** for an additional **HICON/H_2**® bell annealer facility to bright anneal copper alloy strip coils in straight H_2 or N_2/H_2 mixed gas atmospheres. The new facility comprised a total of 6 **HICON/H_2**® workbases, 3 gas-fired heating bells and 3 air/water cooling bells.

The scope of supply also included additional utility supply and disposal equipment such as a supply and pressure reducing station for the necessary gases, a vacuum pump unit and a stack gas ducting system leading out over the roof. The furnace facility was installed as a replacement for both an **EBNER** bell annealer facility, which was almost 40 years old, and an even older continuous roller-hearth furnace. Due to the age of the technology, limited charge weights and limited coil diameters, these facilities no longer operated economically.

FACILITY CONFIGURATION

The facility is designed to accept coils with a maximum outer diameter of 2000 mm, which can be stacked to heights up to 4100 mm. It is thus suited for net charge weights of up to 80 tons per anneal. Of particular note is the potential processing temperature, which may be up to 850 °C. This is relatively rare in the copper base metal industry, but the continuous development of copper alloys has now made it a requirement.

During the design of the facility components, the ability to upgrade the facility to semi-automatic operation (e.g. by using automatic couplings for utility lines) was incorporated. Also included in the scope of supply was the new **VISUALFURNACES®6** Process Control System (PCS). A wide variety of maintenance and optimization modules were included with this system.

TURN-KEY IMPLEMENTATION

To implement the project, **EBNER** was selected to act as the general contractor. **EBNER** was thus confronted with a wide range of challenges, starting with planning of the layout and continuing on up to installation:

- Use of the existing foundation trench, left over from the old bell annealer facility, for the significantly larger new facility
- Minimization of production losses by operating facilities in parallel
- Upgrading of the existing bell annealer facility to the latest technical standard (through, for example, installation of S7-1500 control systems)

Removal of the old facilities, completion of foundation work by the customer and the installation and commissioning of the new (additional) bell annealer facility thus had to be carried out in two phases, which took almost one and a half years to complete. Comprehensive planning of the workflow, in close cooperation with the customer, was called for. We would like to take this opportunity to extend our warmest thanks to the project team at Schwermetall.

SUCCESSFUL COMPLETION OF THE MODERNIZATION PROJECT

The first phase, with two new workbases, successfully went into operation in 2004. Another two-workbase facility was added in 2011. With these two expansion phases, modernization of the facility has been completed for now. Schwermetall now has an annealing shop equipped with a total of 10 **HICON/H_2**® high-convection workbases, 5 gas-fired heating bells and 5 cooling bells, all meeting the latest technical standards.

www.schwermetall.de

2 valve stands and the associated control cabinets

Long-term partnership.

HUGO VOGELSANG of Hohenlimburg, Germany continues to place its trust in EBNER hardening and tempering technology.

KARL WOHLFART

EBNER news
from Germany

SASCHA EPPENSTEINER

EBNER news
from Germany

Our cooperation with HUGO VOGELSANG GmbH & Co. KG goes all the way back to the 1980s. EBNER Industrieofenbau supplied the first hardening and tempering lines at that time, which were equipped with traditional molten-metal quenches.

Over the years, a number of innovative facilities were added that allowed new markets to be developed. To name just a few examples, these included a hardening and tempering line for thin strip, a vertical hardening and tempering line with **HICON/H_2Q®** hydrogen quenching technology and a high-throughput hardening and tempering line for wide strip.

A new challenge, however, has been the extensive modernization of two existing lines.

The different process steps used to harden and temper carbon steel strip and achieve martensitic, bainitic or pearlitic microstructures include heating up, quenching and - depending on the technology in use - soaking or tempering, followed by final cooling.

However, since the first **EBNER** hardening and tempering line was commissioned almost 50 ago, many details of the process and many of the requirements have changed. Throughputs have been increased, consumption has been reduced, the strip quality that can be achieved has been improved and, of course, processes have been optimized, increasingly automated and digitalized. For years, as the global technology leader, **EBNER** has been the driving force behind such innovations at these types of facility.

When HUGO VOGELSANG forwarded an inquiry to **EBNER** regarding modernization of the two still fully-functional facilities, it was clear that extensive and detailed planning would be required to successfully realize the project.

In cooperation with the customer, the following goals were established and successfully achieved:

- Improvement of the strip quality that could be achieved, by installing new **HICON®** technological components
- Reduction of scrap material by automating operating and processing steps
- Increase of process reliability by replacing the electrical/automation systems installing a new **VISUAL FURNACES®** Process Control System (PCS) and installing an automated flatness control system (**SmartFlat®**)
- Increase of the throughput capacity by optimizing existing facility components and eliminating bottlenecks
- Increased quality assurance by installing **ShapeFlat®** flatness measuring systems at quality-critical points in the facility
- Consideration of the extremely small amount of space available, as well as the integration of current safety and environmental standards

INSTALLATION WHILE NEARBY FACILITIES CONTINUE TO OPERATE

Although installation and commissioning took place while parallel facilities continued to operate, both facilities were able to start production on schedule - despite the COVID-19 pandemic. This required a great deal of planning before on-site work could begin, and could only be achieved through close cooperation between **EBNER** and the customer. We would like to take this opportunity to thank the team from HUGO VOGELSANG and BILSTEIN SERVICE for their valuable support during the project.

STRENGTHENED MARKET POSITION

HUGO VOGELSANG, a member of the BILSTEIN Group, has been one of the world's leading manufacturers of hardened and unhardened high-quality and stainless steel strip for many years. Its products find use in a wide range of applications, such as those in the band saw, spring steel and tool industries. With the modernization of the two hardening and tempering lines, the customer's market position was strengthened even further.

EBNER looks forward to continued close cooperation, and the shared implementation of future projects employing advanced technologies.

www.vogelsang-bandstahl.de

Green development in China.

The emerging boom of China’s new energy vehicles.

CARTER CHEN

EBNER news
from China

In recent years, both the production and sales of Chinese cars have ranked among the best in the world.

The total sales of Chinese cars have more than doubled those of Europe. In particular, with the Chinese government's implementation of "carbon neutrality" and other policies, new energy vehicles (NEVs) have entered a golden period of development. In this environment, many new forces of car manufacturing have emerged in China. At the same time, due to the substantial increase in traffic, the future will see human safety become more and more important. Therefore, while ensuring safety, the lightweighting of auto bodies has been the main direction of development.

A hot forming process can produce very strong and lightweight automotive safety components to achieve controlled deformation, which strengthens the protection of vehicle occupants in the event of a collision. In the Chinese market, the demand for hot forming process equipment has thus exploded over the past two years.

As an equipment manufacturer, **EBNER** is constantly expanding its share in the Chinese market in response to the sharp increase in equipment demand. Its growth has been achieved through unremitting technical improvement and expansion of the proportion of equipment manufactured locally, particularly in the early stages of fabrication.

While meeting customers' needs for technology and quality, excellent cost performance also brings customers strong market competitiveness. As the different customers they serve also face more and more challenging conditions, their need for equipment also becomes stronger and stronger.

EBNER furnaces fulfill the requirements of green environmental protection, energy conservation and emissions reduction by preheating combustion air, improving thermal efficiency, reducing natural gas consumption, and reducing heat loss through excellent insulation structure designs. These features further reduce the carbon emissions of NEVs throughout their entire life cycle, and also reduce the operating costs of customers.

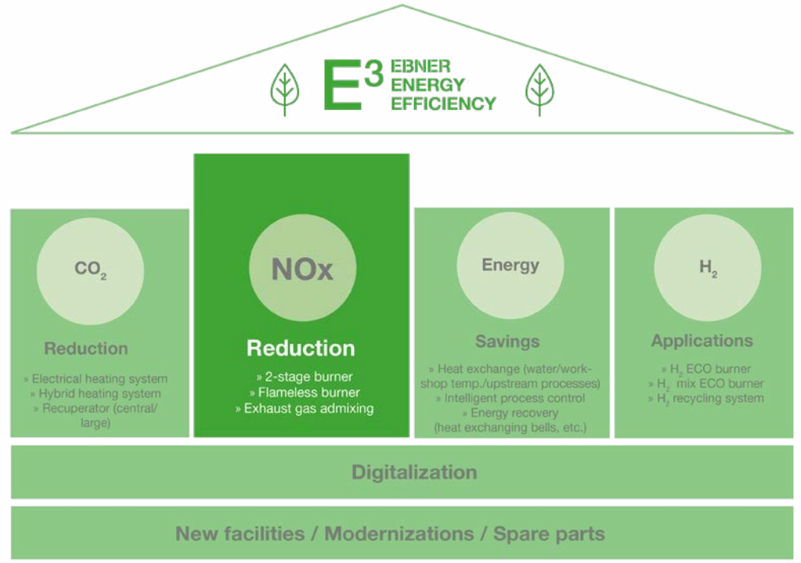
Over the past two-and-a-half years, **EBNER**’s own technology and cost advantages have led **EBNER**-brand hot forming roller-hearth furnaces to favored by the Yifeng Group, Zhejiang Bohui, Yanlong Shirun, Jingjiang Xincheng and other established hot forming component manufacturers. At the same time, emerging manufacturers including Wuhan Dongfeng Aiji, Dongguan Lucky Harvest, Chongqing Pingyang and Tenghai have also reached out to **EBNER**. All of these customers are leaders in the hot forming parts industry.

In the first half of 2022, **EBNER** has won orders for 10 hot forming furnaces.

Roller-hearth furnaces for press-hardened steel, first and second quarters, 2022	
CHONGQING TENGHAI	2
YANLONG SHIRUN	3
DONGGUAN LUCKY HARVEST	1
JINJIANG XINCHENG	2
ZHEJIANG BOHUI	2

The **EBNER** group is very optimistic about the development of the Chinese market in the lightweight automotive and new energy vehicle sectors, and will continue to contribute its own strengths to the growth of this green industry.

A green future, thanks to green EBNER systems.



EBNER systems for compliance with challenging nitrogen oxide regulations.

MICHAEL SCHIESSER

E³ EBNER ENERGY EFFICIENCY

ANDREAS STEINMASSL

EBNER Aluminum & Automotive

Increasingly strict emissions limits throughout the world, in particular for nitrogen oxides (NO_x), are increasingly becoming a challenge for both our customers and ourselves as technology leaders. The solution is to constantly and quickly move forward with green new developments.

Climate change and the ever-worsening impacts it brings with it are some of the greatest challenges that we now must face. The EBNER E³ program was specifically developed to make our technologies more climate-friendly, and one of the most important pillars of this program is NO_x reduction. Nitrogen oxides contribute significantly to global warming, in that they form a layer in the atmosphere that is difficult to penetrate and reflects solar energy back onto the Earth's surface. In a worst-case scenario, a *haze dome* can form near the surface and a layer of smog is created through photochemical reaction.

THE NO_x PILLAR OF OUR E³ STRATEGY, IN FOCUS

A range of potential solutions make it possible to sharply reduce nitrogen oxides. These range from, for example, use of our high-efficiency low NO_x burner systems to integration of $DeNO_x$ - SCR facilities from our E³ NO_x product line.

The separation efficiency of a $DeNO_x$ - SCR (Selective Catalytic Reduction) system is > 60 %. This means that a $DeNO_x$ - SCR system is one of the most powerful tools for the sustainable reduction of NO_x emissions.

LAYOUT OF A $DENO_x$ - SCR SYSTEM

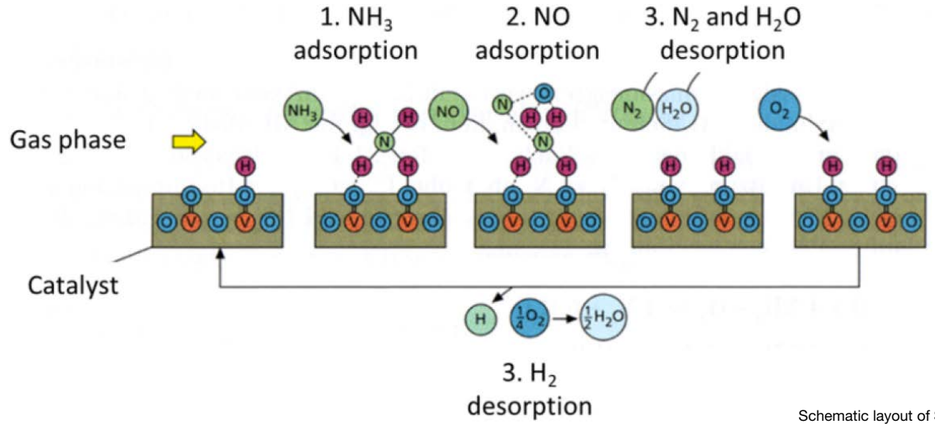
A **S**elective **C**atalytic **R**eduction (SCR) reduces NO_x emissions in the stack gas, and, with the aid of an additive (e.g. ammonia/NH_3) and a catalyst, converts them into water and nitrogen. The following reactions take place on the surface of the catalyst:

$$NO + NO_2 + 2\,NH_3 \longrightarrow 2\,N_2 + 3\,H_2O \quad (I)$$

$$4\,NO + 4\,NO_3 + O_2 \longrightarrow 4\,N_2 + 6\,H_2O \quad (II)$$

$$2\,NO_2 + 4\,NH_3 + O_2 \longrightarrow 3\,N_2 + 6\,H_2O \quad (III)$$

A $DeNO_x$ - SCR system is implemented at the exhaust gas stack, scrubbing the hot exhaust gases coming from the furnace chamber and contaminated with NO_x. The exhaust gas flows through the central stack into the $DeNO_x$ - SCR unit, passes through a straight run to reduce turbulence, and then flows toward the injector unit. The additive (e.g. ammonia or urea) is injected through a nozzle, and is evenly mixed with the exhaust gas at the mixing unit. The exhaust gas, now injected with the additive, is then moved through the catalyzer unit. This leads to the chemical cleaning reaction. At the end of the process, the exhaust gas - with a reduced level of NO_x - is forced through a continuous measuring unit and then vented through the stack.



Schematic layout of SCR reactions

A VISION BECOMES REALITY

After intensive investigations and calculations, EBNER has been able to develop a product that ensures today's strict limit values can be met. Currently in the final phases of design, the first new $DeNO_x$ - SCR system to be installed will go into operation in 2023, at a furnace for aluminum products in Asia.

Through the use of the $DeNO_x$ - SCR system, the NO_x level that was achieved in the past with an optimized recuperator and a stack gas admixing system could be drastically reduced even further. The employment of this technology once again makes it clear that *Emissions*, *Efficiency* and *Energy* are magic words. They are paving the way to green prosperity and economic stability.

The new product is easy to install as an upgrade, regardless of the current facility layout, and shows that existing facilities are well capable of continuing to heat treat in a green future. Please feel free to contact us if you would like to discuss the options for reducing emissions at your EBNER facility. #EBNERwaytoZERO

PLEASE FEEL FREE TO CONTACT US!

SERVICE@EBNER.CC

Aluminum recycling.

Gautschi sets new standards in melting aluminum scrap.

STEFAN PELECH
Gautschi news

Gautschi® celebrates 100 years 1922-2022
EBNER® GROUP MEMBER

The recycling of consumer scrap poses major challenges to the aluminum industry. While on the one hand the amount of available scrap will increase over the next few years, its purity is expected to decrease. The proportion of recycled material in end products must also be kept as high as possible, as the marketing of "green aluminum" has already started.

GAUTSCHI'S CONTRIBUTION TO ALUMINUM RECYCLING

For decades, Gautschi has been building melting and casting furnaces for the aluminum industry. It is the market leader for facilities with the highest melting rates and metal fill levels, and its latest generation of regenerative burners achieves top values in terms of energy consumption – even as they set new standards in terms of NOx emissions. The classic line of Gautschi single-chamber furnaces is suitable for industrial scrap without organic adhesions and remelting products from primary aluminum production, such as ingots of different sizes.

As soon as scrap with organic impurities such as oil, paint or plastic requires remelting, single-chamber technology reaches its limits. For this reason, Gautschi also offers multi-chamber furnaces.

MELTING TECHNOLOGY ADAPTED TO SCRAP TYPE AND SHAPE

It may be obvious that no single type of furnace is suited to all types of scrap, but when selecting a furnace there are three basic principles for scrap melting that should be followed as closely as possible:

DON'T MELT IN ATMOSPHERE! This generates droplets whose surface oxidizes immediately, leading to high metal loss. For this reason, solid metal should be immersed in a molten bath.

PREHEAT! To enable scrap to be immersed, it must be ensured that no moisture adheres to it. To also remove any organic impurities, scrap should be preheated to about 400 °C.

USE AVAILABLE ENERGY DURING MELTING! Pyrolysis gases, which are generated from organic material during preheating, are burned in the furnace. The energy content of impurities can thus be used to melt aluminum in the furnace – reducing natural gas consumption and pollutant emissions.

Recycling one kilogram of aluminum leaves a carbon footprint almost 95 % smaller than that created by one kilogram of new primary aluminum.

About 75 % of the aluminum from all aluminum products ever manufactured is still in use today, as e.g. car or airplane parts, window profiles, or packaging materials. About 35 % of the aluminum produced annually is recycled secondary aluminum produced from scrap.

Scrap can be divided into industrial scrap and post-consumer scrap. Both are collected, processed and, if necessary, mixed with primary aluminum to produce alloys suitable for new components for the transport, construction or packaging industries.

Today, annual primary aluminum production is about 68 million tons, compared to about 36 million tons of secondary aluminum production. About 14 million tons of secondary aluminum is created from industrial scrap, with the remaining 22 million tons created from post-consumer scrap. *(Source: Global Aluminum Cycle 2021)*

Following the above principles may sound easy, but the melting process must be adapted to the scrap mix for each application. Chips, cans, foils or shredders are melted down in a way that differs from that used for profile scrap, cast parts or sheet metal. Furthermore, the proportion of impurities in the scrap is limited to 3 - 6 percent by weight (depending on the type of impurity), as it may not contain more energy than that required to melt aluminum in the multi-chamber furnace.

Finding the optimal melting furnace design for the available scrap mix is Gautschi's core competence. For this purpose, standard components of different sizes are combined. The jumbo-sized model of melting furnace, SMF140, is capable of melting scrap into more than 100,000 t of liquid aluminum per year.

THE ADDITION OF ROTARY TILTING FURNACES TO THE GAUTSCHI PORTFOLIO

Dross is generated in single and multi-chamber furnaces, and is a mixture of 30 - 50 % aluminum oxide and metallic aluminum. To recover it, it is reheated in a rotary furnace with the addition of salt. It is then melted and non-metallic components are separated out.
Scrap that is too contaminated or cannot be melted in a multi-chamber furnace can also be melted in rotary furnaces, with the addition of salt.

Gautschi has also launched a new product line, namely Tilting Rotary Furnaces based on KMF technology. The MASTERmax furnace has been successfully operating in industrial applications for many years. Four sizes, from 4 to 25 t capacity, are already available and a furnace with a capacity of 50 t is currently under development. Furthermore, components for waste gas post-combustion, continuous melt-bath temperature measurement and oxygen control are being added, enabling this new product to even better meet market requirements for aluminum recovery.

This makes Gautschi the most innovative and competitive full solution provider for sustainable aluminum melting processes today.

www.gautschi.cc

Gautschi round melting furnaces

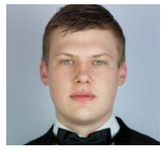
HPI ForgeMaster®

The latest generation of HPI molds reduces carbon footprints by eliminating the rim zone on forged billets.

TECHNICAL HIGHLIGHTS

- *No columnar rim (border) zone*
- *Peeling is not necessary --> full use of cast material*
- *Direct forging of 6000 series wrought aluminum*
- *Reduced carbon footprint*
- *Straightforward mold maintenance due to removable wear parts*
- *Easy maintenance of the molds due to removable wear parts*

Horizontal casting of 54 mm alloy 6082 billets; cast billets at the down-holders

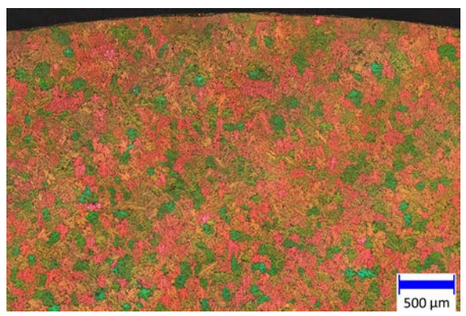


GREGOR KÜCHER
HPI news

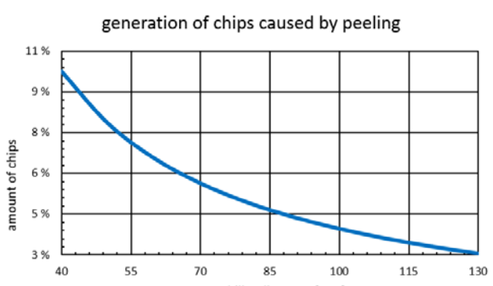
The latest generation of HPI molds opens new dimensions in product quality during horizontal aluminum casting. In particular during the forging of stock billets, the HPI ForgeMaster® provides optimal conditions for solidification, leading to homogenous strand formation with a uniform microstructure.

For the first time, forging billets (6000 series wrought aluminum) can be cast at a high-capacity facility in multiple strands, without a classic rim (border) zone. Normally, an undesirable columnar microstructure forms in this rim (border) zone due to the conditions during solidification. Conventionally-produced billets also show a rougher surface with partial oxide adhesion, making peeling unavoidable. This is not the case with HPI ForgeMaster®. Advanced manufacturing and simulation technologies allow more complex mold geometries, providing the best possible solidification conditions.

Current technology requires about 2 mm of material to be peeled off from around a billet. When one considers the typical range of dimensions for forging feedstock (40 – 130 mm), this means that 3 – 10 % of the aluminum is converted into chips.



Etched cross-section (Barker's reagent) of alloy 6082 (as cast – F), 54 mm diameter, cast with HPI ForgeMaster®



Since the amount of generated chips strongly depends on the diameter of the billet, the potential savings are enormous (see figure, below left). T

aking a typical production line operating at 25,000 tpy and with an average diameter of 90 mm as an example, this would mean that 4.4 % of the cast material would end up as in-plant scrap, in the form of chips. In this case, that would add up to 1100 tpy.

A further advantage of material cast with an HPI ForgeMaster® mold is that the billets can be forged directly into high-quality automotive components, making the homogenizing step obsolete.

As demonstrated by a recent research project, direct forging allows a particularly fine microstructure to be achieved. The high requirements of the automotive industry are thus met, even as the energy consumption for the homogenizing process (220 kWh/t Al of natural gas and 40 kWh/t Al of electricity) are saved – and the same or even better mechanical properties are achieved.

SAMPLE CALCULATION I

A typical recycling process chain requires 2.8 kWh of energy per kg of aluminum and emits 0.6 kg CO_2 per kg of aluminum to convert the chips back into billets. For a typical production line (25,000 tpy), this adds up to the emission of 660,000 kg of CO_2 and the consumption of 3,080,000 kWh of energy.

SAMPLE CALCULATION II

For an average European manufacturer, based on the calculation methods used by the Environment Agency Austria and assuming efficient processing (chips to cast billets) requiring 1.2 kWh/kg Al (natural gas) and 0.4 kWh/kg Al (electricity), the consumption of 440,000 kWh of electricity and 1,320,000 kWh of natural gas would create 418,000 kg CO_2 per year.

Green aluminum.

Vulcan Inc. chooses more environmentally friendly Hazelett casting technology.

DAVID HAZELETT

Hazelett Strip Casting Corporation

Vulcan Aluminum began as a small sign manufacturer in Birmingham, Alabama, in 1935 and has continued to grow for over 80 years.

Today, Vulcan Inc. is an employee-owned company located in Foley, near the Alabama Gulf Coast. They have 265 employees and a 32-acre campus that includes five integrated manufacturing companies and operations.

Vulcan Aluminum Mill produces coils of aluminum sheet that are used by its sister operations to produce sign blanks and signs for the traffic industry. Vulcan also supplies finished coils of AA5052 and AA5754 alloy sheet to the broader semi-fabricated aluminum sheet market.

Vulcan operated a pre-owned Hazelett continuous strip casting machine for 35 years, before replacing it in January with a new Hazelett Model AS1300 Twin-belt Casting Machine. During the intervening years, Hazelett had of course made many improvements to its casting machine designs for aluminum.

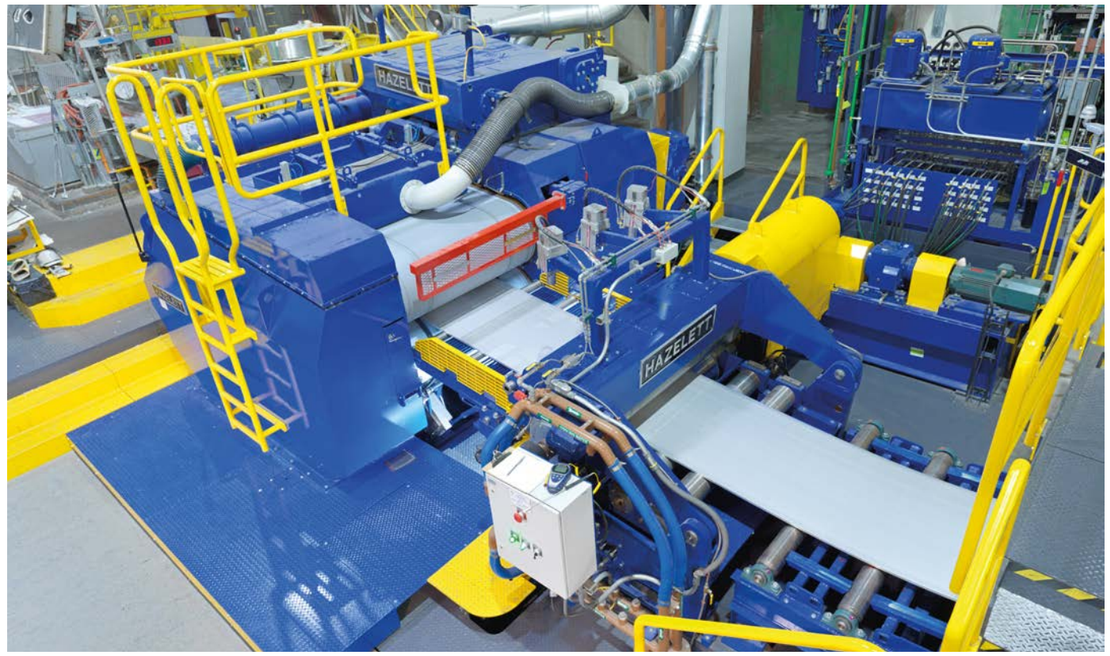
Vulcan's new casting machine incorporates all of those improvements. Capable of producing 52" (1320 mm) wide aluminum strip at over 33 tonnes/hour, this new Hazelett AS1320 Twin-belt Casting Machine increases Vulcan's capacity and efficiency while improving surface quality and product capabilities.

Hazelett customers operate 13 Hazelett aluminum strip casting lines in North America, Europe and Asia, casting as narrow as 300 mm and as wide as 2000 mm with annual production rates ranging from a few thousand tonnes/year up to 250,000 tonnes/year.

Alloys cast include AA1XXX, AA3XXX, AA5XXX, AA6XXX and AA8XXX series and are used for many sheet applications including foil stock, fin stock, building sheet, truck trailer sheet, inner and structural autobody sheet and deep drawing sheet, as well as strip for containers formed by impact extrusion.

With its new Hazelett casting machine, Vulcan joins other Hazelett aluminum customers in their ability to offer high-quality low-CO_2 aluminum sheet for multiple applications.

www.vulcan.com



25% less CO_2.

Integrated melting, casting & rolling lines for production of continuous cast aluminum strip with reduced CO_2 footprint.

DAVID HAZELETT

Hazelett Strip Casting Corporation

Hazelett Strip-Casting Corporation became a member of the EBNER Group in late 2021. Hazelett brought along not only its unique Twin-Belt Continuous Strip Casting Process, but also many years of successful cooperation with rolling mill supplier, Mino S.p.A. (Mino is also a minority shareholder in Hazelett.)

EBNER and EBNER Group members Hazelett, Gautschi and GNA, in cooperation with MINO S.p.A, now offer fully integrated lines for continuous cast aluminum strip. We can supply leading technology and equipment starting from treating and melting scrap or other aluminum feedstock, continuing through casting, hot rolling, cold rolling, and thermal processing, down to high-quality finished sheet and coil with reduced CO_2 footprint compared with other processes.

CLIMATE-FRIENDLY ALUMINUM

Aluminum is recognized as one of the most important materials in the fight against climate change thanks to its recyclability. While most of the focus has been on reducing the carbon footprint of primary aluminum production and increasing recycling, pressure is mounting to reduce the carbon footprint of processes that transform the aluminum into semi-finished products. The process route that we offer is a viable and tested solution to reduce the CO_2 footprint of aluminum sheet.

The figure below depicts each of the major process routes used to produce aluminum strip. The conventional DC casting/conventional hot rolling process route is shown first. There are many processing steps required by this route, some of which require substantial electrical and thermal energy inputs.

ADVANTAGES OF THE HAZELETT CONTINUOUS CASTING PROCESS

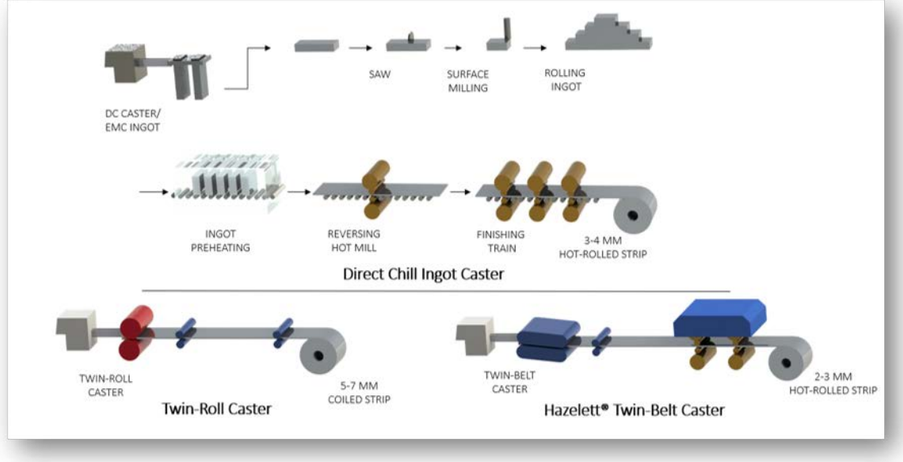
By comparison, the continuous casting process routes are much shorter and require significantly less energy. There are two major continuous casting processes utilized to produce aluminum sheet: Twin-Roll Casting (TRC) and Twin-Belt Casting (TBC). With the Hazelett TBC process, casting is followed by in-line hot rolling to produce a hot-rolled strip that is thinner than TRC cast strip, requiring less subsequent cold rolling, and thus less energy input, than the TRC process.

Mino, with the assistance of Hazelett and Gautschi, has developed a model comparing the CO_2 footprint of these three processes for the transformation of aluminum into foil (350 µm) stock.

It reveals that the Hazelett TBC process with in-line rolling provides a 25 % reduction in CO_2 footprint compared with the DC casting/conventional hot rolling process.

This conclusion was reached using a “cradle-to-gate” analysis. “Cradle-to-gate” refers to the carbon impact of a product (in this case, foil stock), starting from its origin to the moment the product exits the gate of the plant.

Processes in the manufacture of aluminum strip



All CO_2 emissions required to transform the aluminum feedstock into coils of foil stock (350 µm thickness, H14, 1750 mm wide) are considered. The feedstock is assumed to be a mix of 90 % primary ingot and internal scrap plus 10 % external scrap and alloying elements.

The ADEMA Base Carbone database is used for the primary aluminum footprint. Because the CO_2 emissions related to the primary production of aluminum dominate the analyses and there is debate over whether or not recycled post-consumer scrap should receive another CO_2 penalty, the graphical comparison shown below begins with the feedstock.

25 % LESS CO_2

With an approx. 25 % smaller transformation CO_2 footprint than a DC casting/conventional hot rolling process and a 17 % smaller transformation CO_2 footprint than a Twin Roll process, the Hazelett Twin-Belt Process stands alone as the “greenest” process for the production of aluminum foil stock.

Analyses for other end products, including common alloy sheet, autobody sheet and beverage container sheet are planned. The results are expected to be in line with those found for foil stock.

Combining the leading technology of Hazelett and other **EBNER** Group companies with that of Mino, we are in position to offer fully integrated aluminum strip casting and rolling lines that represent the best available choice for reducing carbon footprint in the transformation of aluminum into strip and sheet products.

Together with the advances in aluminum reduction technology, recycling, melting and downstream processes powered by renewable energy, we envision a day when the **EBNER** Group can enable the production of CO_2-free aluminum sheet.

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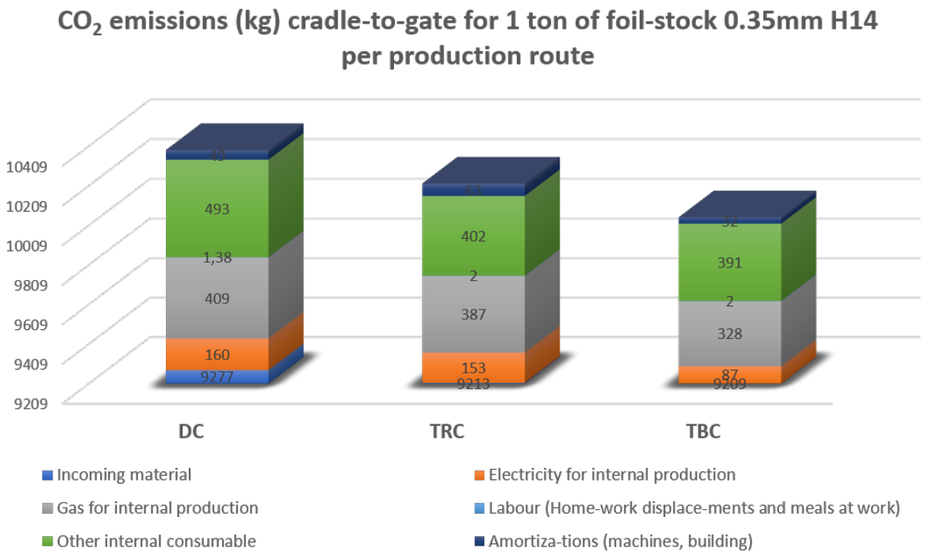
Note: Carbon footprint data should be regarded as reference values only. The absolute values may vary, depending on the method used and the actual suppliers of primary metal and energy. However, the relationships between the different casting/rolling technologies will generally remain the same.



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We look forward to seeing you there!

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

224 Quadral Drive, Wadsworth, Ohio 44281
USA

EBNER Industrieofenbau GmbH
T: (+43) 732 6868, E: sales@ebner.cc

Ebner-Platz 1
4060 Leonding
AUSTRIA

EBNER Industrial Furnaces (Taicang) Co.,Ltd.
EBNER Trading (Taicang) Co., Ltd.
T: (+86) 512 5357 6868, E: sales@ebner.cn
Gautschi Industrial Equipment (Suzhou) Co., Ltd.
T: (+86) 512 5383 8642-801
E: info@gautschi.com.cn
EED Furnaces (Taicang) Co.,Ltd.
T: (+86) 512 / 5320 8896
E: eed-sales@eedfurnaces.com
Beijing East Road 82, 215400 Taicang, Jiangsu
CHINA

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

Schloßstraße 32, 5282 Ranshofen
AUSTRIA

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

9495 Trans-Canada Hwy
Saint-Laurent, Quebec, 4HS 1V3
CANADA

EBNER India Pvt. Ltd.
T: (+91) 22 6139 3333, E: office-ei@ebner.cc

A/310-311 Dynasty Business Park
J B Nagar / Andheri-Kurla Road
Andheri East / Mumbai - 400059
INDIA

EBNER F&E Labor, Leonding

Casthouse (R)Evolution Center, Ranshofen

Hazelett Strip-Casting Corporation
T: (+1) 802 863-6376
E: hazelett@hazelett.com

PO Box 600
135 West Lakeshore Drive
Colchester, Vermont 05446
USA

Hazelett F&E Labor, Kingston