ALUMINIUM 2020: Focus on megatrends

The world of aluminium is already now looking ahead to its leading trade fair next year with great anticipation. Because despite global rises in demand the industry faces a variety of challenges – from globalisation and new mobility to digitalisation, recycling and sustainability themes. From 6 to 8 October 2020 ALUMINIUM in Düsseldorf will showcase the opportunity and growth perspective for the industry. Approval from the sector is huge.

Already one year to the start of the trade fair 90% of the 80,000 square metres of exhibition space are booked up – a clear indication of the dynamism in the aluminium industry. In total, the organiser Reed Exhibitions brings together more than 1,000 exhibitors and 27,000 visitors from over 120 nations.

The aluminium industry sends out important impulses – for lightweight construction and material innovations in automotive production, aviation, mechanical engineering, construction, boat building, in packaging as well as in the sports and leisure sectors. In six exhibition halls global players, specialists and young, innovative enterprises will showcase the performance spectrum of the material and the whole cross-section of the industry – from aluminium production, finishing machines and equipment to finished products and recycling. ALUMINIUM is the global marketplace for its industry. The investment volume that visitors brought to the previous ALUMINIUM amounted to over EUR 14 billion. Almost one in two trade fair visitors comes to Düsseldorf with concrete sourcing intentions. No wonder this trade fair for the aluminium industry is the most important event worldwide. Some two thirds of the exhibitors and visitors to the trade fair come from abroad.

The trade fair also shows how well connected the value chain is across national borders. Alongside the mega trends New Mobility and Digitalisation the ALUMINIUM trade fair 2020 will place special focus on resource efficiency and sustainability because business developments will in future also depend on companies’ resource productivity.

By occupying a themed area on aluminium recycling the trade fair makes it clear how recycling continues to gain importance as a source of raw material and contribution to resource efficiency. Even today aluminium scrap is considered one of the most economically valuable secondary raw material and, hence, a key factor in the aluminium value chain.

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For exhibitors: 6 - 8 October 2020: 8:00 am – 7:00 pm
For visitors: 6 - 8 October 2020: 9:00 am – 6:00 pm

www.aluminium-messe.com
We asked ...  

Thomas Reuther, Member of the Executive Board of TRIMET Aluminium SE

APR: What importance does your company attach to the ALUMINIUM trade fair?  
Thomas Reuther: ALUMINIUM is the place to be for the global aluminium industry. This is where we see the latest trends and have the opportunity to exchange information with suppliers and customers about the market and the latest market developments, and do so in the shortest possible time. The date of the fair in the fourth quarter is perfect. It allows us to review the current business year for the first time towards the end of the year and helps us to determine our strategy for the year ahead.

APR: What issues and challenges are affecting the aluminium sector and will be the focus of the next ALUMINIUM?  
Thomas Reuther: Political issues such as the trade war and the downturn in the global economy will certainly be in the spotlight. Sustainability is also important to us at TRIMET. We want to intensify our commitment and we see this as having an impact on the entire industry and our markets. This will certainly also be a topic of discussion on our stand in Hall 11.

APR: In which markets do you see opportunities for innovation that involves aluminium?  
Thomas Reuther: We see the greatest potential in transport and the changing demands being made on aluminium there. The packaging sector also offers room for innovation, as can be seen from the strong growth in aluminium cans in a number of countries. It is in these markets in particular that we see further development potential for our metal.

ALUMINIUM with new leadership team

Get into the world and back to the Rhine – this applies to both Goetz-Ulf Jungmichel (52), who returns to Reed Expositions as an Event Director after 17 years in the international trade fair business including eight years as the Director of “boot”, and to Michael Köhler (40) who for seven years was the Event Director for material trade fairs, now back on board again in Düsseldorf since the middle of the year after international posts in the interim at Reed Exhibitions in the USA and Austria – in a new position as the central acting Sales Director.

And also the third in the group has more than ten years of experience in the trade fair business, most recently as Senior Project Manager of “inter-pack”, one of the largest trade fairs in the world. Malte Seifert (34) becomes the new ALUMINIUM project manager. A broad pool of experience in international brand management distinguishes him.

“We with this new leadership team are bringing together a trio that looks back on more than 40 years of expertise altogether in the international convention business and has succeeded in moving big tanker vessels over that period,” says Hans-Joachim Erbel, CEO at Reed Exhibitions Deutschland GmbH.

A metaphor which particularly fits Goetz-Ulf Jungmichel. During his time as a Director of “boot” he succeeded in charting a new course to success for this flagship during the stormy years of the financial and economic crisis bucking the general trend and managing to position the fair as the absolute market leader.

“I am also delighted that we can welcome back to their home turf two former young-sters, Goetz-Ulf Jungmichel and Michael Köhler who received the “rough cut” at Reed, as seasoned trade-fair professionals, demonstrating the strong ties with Reed,” says Hans-Joachim Erbel.

A journey that Olaf Freier will embark upon in the opposite direction, so to speak. Because “away from the Rhine and into the world” reads the motto for Olaf Freier. The former Event Director of the materials trade fairs – successfully at the helm since 2015 – has been predominantly active in St. Albans since the beginning of the year – at the headquarters of Mack Brooks Exhibitions, a company owned by Reed Exhibitions since January.

“A change which is of central importance to the alignment, especially in view of the international roll-out of Mack Brooks’ existing trade fairs. Olaf takes on a central function here with great responsibility. A logical step for his professional prospects,” said Hans-Joachim Erbel, who is also in the lead when it comes to the further development of Mack Brooks.

One reason why the responsibility for material trade fairs will also be realigned at management level. In future, Michael Freter will be accountable for them. Freter, who has been Managing Director of Reed Exhibitions Deutschland for eleven years now, is already in charge of four trade fairs today.

And for Linda Hein? Also for the director and project manager of ALUMINIUM a journey begins, which will also lead her into a previously unknown world. The current manager, who joined Reed in 2006 and learned about managing a trade show here, will use her mother and her parental leave to turn to the new world.
New study estimates the average aluminium content of European produced cars to reach nearly 180 kg in 2019, meaning a 20% increase since 2016. The study from DuckerFrontier and commissioned by the European Aluminium industry association also forecasts the average aluminium content to further increase to almost 200 kg per vehicle by 2025. The positive outlook and uninterrupted aluminium growth is largely attributed to aluminium’s role in lightweighting cars and as an enabler of electromobility.

The study includes data from automotive OEMs and suppliers and European Aluminium member companies and has been developed by DuckerFrontier. It is based on a detailed analysis of the use of aluminium castings, extrusions, forgings, and sheets for 38 component groups and covering 95% of the EU28 car production in 2019.

The amount of aluminium used in cars is expected to see a significant increase by 2025, according to the third edition of the Aluminium Content in Cars study from DuckerFrontier. The study predicts that the aluminium content of cars produced in Europe will reach nearly 200 kg per vehicle by 2025, up from 179 kg today. This is in line with the most positive scenario developed by DuckerFrontier in 2016. The study also shows that electric and plug-in hybrid vehicles use significantly more aluminium than the average car.

Carmakers’ preference for aluminium is largely linked to its lightweight nature, making all cars more energy-efficient, no matter if it is a petrol, diesel or electrified vehicle. Due to its inherent strength and its excellent ability to absorb crash energy, well-engineered aluminium car parts can be made safer than steel but up to 50% lighter. Lighter cars substantially contribute to reducing CO2 emissions and improving fuel efficiency.

“Aluminium is a true enabler of electromobility. The combination of aluminium sheet, extrusions and castings bring perfect solutions for electric vehicles. Both as protection of the batteries and to reduce the weight of the vehicle to increase its performance or range,” said Dieter Holl, chairman of the Automotive & Transport Board at European Aluminium.

The study points to electrification as one of the main drivers for the future growth of the aluminium content in all product forms. Battery boxes, electric motor housings, but also body closures and body structures are highlighted as key applications for increased aluminium penetration in the future. Depending on the car segment, the average aluminium content per vehicle is forecasted to increase from at least 2.9 kg by 2025 in the A-segment and up to 38.0 kg in the D-segment.

The aluminium industry is closely collaborating with car manufacturers to drive lightweighting even further. Only during the last two decades, hundreds of new alloys have been developed to better answer to the demand of the vehicle manufacturers. Higher strength, better formability and improved energy absorption are a few of the areas the industry is focusing on.

The aluminium industry is also investing in innovations that will help the transition to electromobility. Charging stations, electric power cables and wind power plants are some of the products where aluminium is already playing an important role.

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Unfair trade ought to be sanctioned, in just the same way as acts of political and military retaliation.

"To meet carbon emission targets, appropriate driving technology is as essential as the use of lightweight construction."

"Tariffs are causing asymmetrical distortions in the markets and are usually damaging to all market participants."

APR: An caricature of the US industry's pose antiquated tariffs, yet it-refused to do so. China has gone too far, and has in fact provoked a response. America's reaction was drastic. It clearly demonstrates a submission to dependency.

Bruno Rüttimann: The situation has been triggered on a huge scale. As a WTO member, China and its unilateral, self-serving economic practices are virtually flouting common agreed rules of how to trade and compete. In terms of a classical drama, this starting point would be the thesis or driving force. Whilst the nations have been powerless spectators of this development, or rather tolerated it in the hope of potential deals, Donald Trump has refused to do so. China has gone too far, and has in fact provoked a response. America's reaction was drastic. It may seem paradoxical for a nation that advocates free trade to impose antiquated tariffs, yet it characterises the US industry's impasse. To be sure, it is legitimate and vital to condemn China's reaction was drastic. It may seem paradoxical for a nation that advocates free trade to impose antiquated tariffs, yet it characterises the US industry's impasse. To be sure, it is legitimate and vital to condemn China's practices outright. Unfortunately, such a reaction is also unwise as it depresses the entire global economy. This would be the antithesis to Hegelian dialectic.

Bruno G. Rüttimann: Indeed, though in a nuanced manner, because the semis industry is of strategic importance to OEMs. Back in 2010, the American Extruders Council prompted a 500% per cent tariff on extruded semi-finished products. The US aluminium industry is the investment volume of trade fair visitors (2018)
and military retaliation. Same way as acts of political 
tactics to clearly address potential 
OECD as well as FACE, al-
clearly visible in the new Silk 
increase. To compensate the slow-
domestic structural issues, if in-
fit for export. During the next 
a gigantic high-speed railway 
lines will equally trans-
by simple electric motors. Elec-
to retain that combustion 
will have to remain realistic – there 
involves the shift towards electromobility. Many aluminium 
companies are already com-
ing forward with product solu-
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seriously. Nevertheless we have 
still time to manage the struc-
tural change.

Bruno Rüttimann: Today we are 
experiencing at first hand the 
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the economy. We are undoubt-
cdy living in an age of rapid 
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els are short. Stability is nothing 
more than a reminiscence of 
the “good old days” of a bygone 
era.

Bruno G. Rüttimann, 
Dr. Ing. MBA, worked in the aluminium industry for twenty years. His fields of expertise are globali-
sation, strategy and lean production. Currently he 
works as a lecturer at ETH Zurich (ETHZ) and is a 
consultant for Inspire AG, an institute for know-
how and technology transfer at ETHZ. 
brunoruettmann@bluewin.ch

The ongoing trade 
war has already cost 
some hundreds of billions of dollars in 
economic output.

APR: M. Rüttimann, thank you very much for talking to us.

APR:

Bruno Rüttimann: It is true that even after ten years the level 
prior to the crisis has not yet been achieved. Besides, the 
Trump policy as well as Brexit could create a similar setback, 
as entire supply chains have to be re-established from scratch. 
It is also necessary to recall 
that before the crisis, the rally 
of 2007 was overheated and 
did not reflect the final demand 
in real terms. That said, alu-
minium is undoubtedly an on-
going success story. What is 
more, the transport sector, which 
has meanwhile developed into a fast-growing market for alumi-
num, is also going strong. It 
took ecological constraints that 
are now tangible, but the bene-
fits of a cost-effective light alloy are 
eventually fully realised, even 
more than in the construction sector. To meet carbon emission 
targets, appropriate driving tech-
nology is as essential as the 
use of lightweight construction.

APR: Is this dynamic trend 
going to last?

Bruno Rüttimann: The increased 
environmental awareness 
has certainly been crucial for alu-
mium solutions to succeed 
in the transport sector, both in 
mass and individual transport. 
However, let's not forget that 
mobility has only been possible 
with the basis of prosperity. 
a fact that applies to emerging 
economies as well. Nowadays, 
mobility is a basic need. In 
order to ease our conscience, 
less energy has to be consumed, 
and a reduction in weight be-
comes essential. For this pur-
pose, aluminium is virtually pre-
destined and perfectly suitable. 
Therefore I am certain that this 
trend will persist.

APR: How to you assess the potential of electromobility?

Bruno Rüttimann: In my view, 
there is a degree of over-estima-
tion. We demonise diesel 
and glorify electric drive power, 
whilst the impact on the electricity 
market and the transformation 
of our industrial system are 
carelessly neglected. As studies 
made by the ETH Zurich have 
shown, 50 per cent of vehicles 
in 2055 will have an electric 
motor, though half of them will 
be hybrid engines. The devel-
oment will therefore be slower 
than expected. Nor is it sensible 
to electricity everything. What 
we are going to see is a mixture of 
small cars with exclusively elec-
tric engines for urban zones 
and alternative energy concepts 
in the extra-urban areas. Com-
bustion engines, whether run-
ning on diesel or petrol, are 
not yet obsolete.

APR: Are you referring to a 
transformation of the industrial 
economy? What are we to ex-
pect?

Bruno Rüttimann: The trend 
towards electromobility will have 
profound effects on some in-
dustries, with impacts on em-
ployment in the car and supply 
chain. Complex combustion 
engines are going to be replaced 
by simple electric motors. Elec-
romobility will equate the 
use of aluminium and 
Nowadays, many motor 
gearbox housings are made of 
cast aluminium to reduce 
weight. These components 
are as well as forged crankshafts 
or camshafts, pistons and spark 
plugs are no longer needed for 
electric motors. Foundries and 
foundries are also likely to 
benefit from the shift towards electromobility. Many aluminium 
companies are already com-
in any future with product solu-
tions for variable battery packs. 
These changes have to be taken 
seriously. Nevertheless we have 
still time to manage the struc-
tural change.

APR: Finally, would you give a concluding summary?

Bruno Rüttimann: Today we are 
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era.

I. Schopenhauer had lived in 
our days, he would say, this 
is the most chaotic of all possi-
bile worlds.

APR: M. Rüttimann, thank you very much for talking to us.

68% of exhibitors 
come from abroad

We will be exhibiting at ALUMINIUM 2020 in Düsseldorf, Hall 10 - Stand F63

Automatic lightweighting

BSN Thermprozesstechnik GmbH
Kammerbachstrasse 64
D- 52152 Simmerath
Television + 49 2473-9277-0
E-Mail: info@bsn-therm.de

Continuous jet heating furnaces for rapid heating and uniform heat treat-
ment in forging lines (suspension parts, hinges, wheel rims, etc.), including 
swaging stations, final cooling to handling temperature, and integration into 
conveyorized production lines.

Continuous jet heating furnaces for an exceptionally efficient and/or fast 
heating of sheet metal components (shafts, hoods, covers, etc.) made of 
high-strength age hardenable aluminium alloys, complete with jet cooling 
for extremely high quenching rates after the solution annealing stage, 
including oil or both convection, single or two-sided application and gas 
foaming or electric heating system.

Continuous convection heating furnaces for the heat treatment of castings 
(engine blocks, cylinder heads, structural parts, suspension components, 
etc.) in water and air quenching as well as a descaling system integra-
ted into the furnace chamber for individual quenching of parts.

The most cost efficient solution for reducing vehicle mass 
currently lies in the use of aluminium alloys. Especially in 
bodywork, suspension and powertrain systems, which 
account for the dominant portion of a car’s weight, aluminium 
can substitute many other component materials. 
For a large number of parts, aluminium has achieved the breakthrough 
to mass production already. 
New production lines now in planning or already in 
the implementation phase will make for additional growth. 
At present, for instance, we are seeing investment in rolling 
mill capacity for high strength aluminium on a global scale.

BSN supplies furnace concepts specifically developed 
for the associated requirements in terms of quality and 
features.

An overview of these furnace designs is given on the right side.

www-bsn-therm.de

Space-saving multi-crank rotary hearth furnaces using convection heating for 
the treatment of forgings and castings (heat treatment of individual parts 
and material flow without product contact), including water quench, air 
spinning and industrial robot for part handling.
Flexible and transparent material flow system by Böhler Steuerungen

Fully automatic plant logistics at the new Thöni plant in Pfaffenhofen

Thöni Holding in Telfs (Tyrol) manufactures and supplies high-grade aluminium extruded sections. To extend its production capacity the continually growing company has built a new plant in nearby Pfaffenhofen. For the implementation of the fully automated plant logistics system, as already many times in the past, Thöni relied on the MCVIS transport system and know-how of Böhler Steuerungen, the family-owned company in Vorarlberg.

For a total of 76 million euros, Thöni group has installed at its new plant location in Pfaffenhofen a highly modern production unit, which combines the production and processing of extrusions with one another. The relatively large size of the investment is explained by the fact that besides the extrusion press capacity, the depth of production and processing has also been increased. In the particular interest should attach to the unique feature – at least in Europe – that extrusion is combined with internal high-pressure forming (HPF).

Plant logistics is at the heart of production

At the new plant in Pfaffenhofen, the main activity is the processing of extruded profiles in a multi-stage process to produce components for the automobile industry. The internal plant logistical system begins directly after the profiles have been stacked into skips. After a stabilization process, in a further processing step the profiles are taken to an HPF press. After being heat treated, the profiles are machined. For the subsequent surface treatment at the parent plant in Telfs, the profiles are separated, loaded onto trucks and retransported to the new plant in Pfaffenhofen and fed back into the system. There further processing takes place, in which the profiles are joined together with other components to produce ready-to-fit vehicle parts. These are then packaged in special containers for delivery.

The core of this highly complex production sequence is the internal logistics system. With the help of three automatic cranes and fully automated conveyor technology, the one hand transport between the further-processing units is ensured and on the other hand the associated block storage with a total capacity of around 1,250 skips racks (when 80% full) is served.

Conveyors before and after the individual further-processing units provide buffer positions and thereby to a large extent decouples the production sequences from the material transport. In addition, conveyor technology enables racks to be fed into and extracts from the automatic system at three points. To complete the concept, besides the production of automobile components the processing of “standard orders” should also be enabled. For this, two partially automated packing stations including paper dispensers are connected into the automatic logistics system.

Automation at the PLC level

The task to be carried out by Böhler Steuerungen consisted in automation at the PLC level, and implementing the transport control system.

Automation at the PLC level includes not only the working out of programs and the commissioning. In addition, the directly associated peripheral activities such as planning of the electrical systems, the production of electrical cabinets and the operator consoles associated with them and the installation of the equipment on site, including the implementation of safety-related access-monitoring procedures, were realised by Böhler Steuerungen.

In the context of automation Böhler Steuerungen set store by the greatest possible availability of the conveyor technology. Thus, each of the automatic cranes has an autonomously operating PLC, into which conveyors served by the automatic crane concerned is also connected. The two packing stations with their paper dispensers also have independent PLC controls. Thus, areas have been produced which can to a large extent operate autonomously and independently of one another.

The MCVIS transport control system

The automatic cranes and the ground-level conveyor technology are co-ordinated by a master MCVIS transport control system. The MCVIS transport control system (MCVIS being short for Manufacturing Control and Visualization System) was first implemented at Thöni in 2005 and has since then been continually developed further, optimised and adapted to varying production sequences.

Today, MCVIS supports the operating personnel with complete visualisation of all the storage and transport locations, including representation of the respective rack skip contents for detailed production planning and the recognition and elimination of any possible malfunctions. At the touch of a button, the relevant data such as order number, quantity, processing status, etc. are displayed for every order location. The preparation of diagrams, evaluations and reports ensures transparency in the order planning and the material tracking.

Particular attention was devoted to optimised material flow. MCVIS reacts flexibly to the continually varying plant conditions. Thus, the transport capacity of the equipment is increased, for example by the creation of dual cycles. Furthermore, in some areas two racks can also be transported next to one another at the same time. Thanks to these optimisation measures, and together with a “smart” and variable priority control system, MCVIS ensures the greatest possible throughput capability and flexibility.

Today, with the installation of MCVIS at both its sites, Telfs and Pfaffenhofen, Thöni has an integrated, fully automatic, flexible and transparent material flow system and therefore enjoys the best prerequisites for punctual, just-in-time deliveries in the highly competitive market of automobile suppliers.

The project team of Böhler Steuerungen implemented the MCVIS transport control system at the new Thöni extrusion plant.

64 companies currently follow the ALUMINIUM trade fair brand around the globe as Global Partners

One of three automatic cranes used for the internal plant logistics

Photos and diagram: Böhler Steuerungen
We offer a stage for optimism

Three questions to Goetz-Ulf Jungmichel, Event Director ALUMINIUM on the preparations for ALUMINIUM 2020.

APR: Mr Jungmichel, you have been serving Reed Exhibitions as the new Division Head for Materials Trade Fairs for several weeks now. Your area of responsibility also includes ALUMINIUM. You are taking over the preparations for the trade fair? Goetz-Ulf Jungmichel: We are very satisfied with the preparations and the booking levels. Compared to the previous ALUMINIUM edition over 90% of the exhibition area are already occupied at this stage. The economic development varies widely internationally, but on a global scale the demand for aluminium continues rising. Of course, we see the trade policy controversies, the reorganisation of markets, the insecurity in the automotive industry – as the still biggest consumer of aluminium – or the difficult situation on mechanical engineering. However, we also feel the optimism with which the aluminium sector rises up to these challenges worldwide.

APR: Which contribution can ALUMINIUM make here? Goetz-Ulf Jungmichel: We offer a stage for this optimism. The trade fair assumes a central guidance function first and foremost as a global marketplace as much as it is a technology platform. On the one hand, we venture a glimpse into the future of the aluminium industry; on the other, we show what a future with aluminium could look like.

APR: How do you intend to perform this task? Goetz-Ulf Jungmichel: Our biggest challenge as a trade fair organiser is the modern staging of aluminium as a material, especially for application industries. In concert with our exhibitors we have to make it clear why there is no alternative to this material. Why will the automotive future only be successful with aluminium? Why is aluminium indispensable in the construction sector? In future we wish to make the USP of aluminium for the key applications even more visible and assume an active role in raising awareness for this material.

Efficient trade fair visit – matchmaking uncovers undreamt-of potential

Who is at the trade fair? Who has answers to my specific questions? With whom can I put new ideas into practice? Via the Matchmaking Platform potential cooperation partners can be filtered by product category, industry, country or company and appointments can be made direct.

Personal contact is one of the main reasons why exhibitors and visitors take part in trade fairs such as ALUMINIUM. But what are the easiest ways for exhibitors and trade visitors to find each other in the digital age? The answer is “matchmaking” – a networking & meeting platform allowing visitors and exhibitors to reach out already in the run-up to ALUMINIUM.

To this end exhibitors and visitors generate a profile on the platform including all important information on their product range or desired solutions. A smart algorithm matches the profiles of registered exhibitors and visitors and submits matching proposals for potential suppliers or customers to participants. Then both can choose who they want to meet personally at ALUMINIUM. And the platform also extends invitations for a meeting. Participation in the Matchmaking Programme is free to exhibitors and visitors alike.

ALUMINIUM – a worldwide brand

The concept of the ALUMINIUM trade fair has long been an export hit, as ALUMINIUM, as the parent fair, is now ranked by other events in all the world’s important markets. Reed Exhibitions organises the leading international aluminium fairs in Germany, China, India, the USA, Brazil and the United Arab Emirates. Together, the six events bring together around 2,300 exhibitors and 66,000 visitors. The next ALUMINIUM CHINA will take place in Shanghai around July 2020. ALUMINIUM in Düsseldorf in October will be followed immediately by ALUMINIUM BRAZIL in Sao Paulo. Around 70 companies are currently following the ALUMINIUM trade fairs around the world as “Global Partners” – so they not only exhibit in Düsseldorf, but also at other events.

www.aluminium-messe.com
EDI stands for electronic data interchange. EDI standards in the narrower sense are specific processes that facilitate the exchange of data between companies. Niemet, the Bremen-based metal trader and service centre for non-ferrous semifinished products, has long been enjoying success with its customers by using EDI to transfer standardised business data between companies.

Although this sounds rather cumbersome in theory, the participating companies benefit in practice from tighter data security and accelerated business processes.

One major customer in the technology sector regularly orders products such as aluminium plates from Niemet. He reports on his experiences: “With around 70 orders and numerous positions every day, EDI reduces our workload enormously. We probably couldn’t manage all this without EDI. No paperwork is required, and our delivery times are now extremely short.”

One major advantage of this form of standardised communication is that processes such as orders can be executed more quickly. Another is that sources of error are avoided. In practice, an order placed using EDI proceeds as follows: The planner places an order including the necessary data such as specifications, dimensions, tolerances and quantity. The computer system then converts the order data into a system-compatible format. An article number, for example, is assigned to the products ordered to ensure that the information sent to production is unambiguous.

The subsequent information flow is based entirely on the one-off data entry made by the planner. This eliminates the risk of error that occurs when data is entered multiple times. The entire production process is treated in this way: delivery schedules, orders, forecasts, order confirmations, completion notices and invoices – all this information is sent directly to the units that process the respective data. The data is transferred quickly between companies and across borders while excluding transmission errors.

“We are glad to offer our customers support and advice when implementing EDI,” says partner Jörn Niemann. “In doing so, we take transparent steps to ensure that the company barely notices the switch to EDI processes. However, the benefits quickly become evident.”

Niemet / Manfred J.C. Niemann Zentrale KG
Hall 13, Stand E24
www.niemet.de

Niemet Service area saws and plate cuttings

Faster delivery with electronic data interchange (EDI)
Industrial furnaces: Improving energy efficiency through refurbishment

For over 45 years, Reimann GmbH has stood for industrial solutions in the steel, aluminium and energy industries. From Mönchengladbach Reimann delivers to Europe and oversees Reimann produces can be found in countries such as Norway, Belgium, USA, Saudi Arabia, Dubai or Kuwait. Over the past 10 years, the family-owned company has transformed itself from a pure steel constructor to an industrial manufacturer who takes on complex industrial projects for well-known groups at home and abroad.

In our interview we talk to the managing partner of Reimann GmbH, Jürgen Kreutzer, and Christoph Apel, head of furnace technology, about the renovation of existing furnace plants, the growth segment for Reimann.

APR: You are one of the main pillars of the furnace refurbishment at Reimann. How do you see your task then and now?

Jürgen Kreutzer: When Reimann received the first furnace refurbishment projects, it was not foreseeable that this would one day become such an important division with its own production hall. I have been given the opportunity to do some development work here and to further develop our range of services.

Today I have a team of about 45 employees. Our latest coup, the introduction of the test setup, was one of my ideas, because in our projects we are always faced with the task of improving energy efficiency and increasing the performance of a plant. So it was obvious to first carry out tests in our company and thus analyse the sense of a change before we change something in a plant that might not achieve the targeted goal in the end. Jürgen Kreutzer supported my idea right from the start, which is of course a special motivation for me.

APR: What makes a furnace renovation so special for you, what does it depend on?

Jürgen Kreutzer: The work of a renovation requires special knowhow and, as so often, it depends on details. In most cases, new burner technologies are required for the plants as part of the refurbishment work. As a specialist, we are ready to take care of a completely new electronic control system. When production steps need to be optimised and certain parts need to be heated faster, for example, our engineers calculate the changes in air flows. In this way, they can be directed specifically to the parts to be heated.

Jürgen Kreutzer: Managing Partner of Reimann GmbH

APR: What trends do you see in German industrial furnace construction? In your opinion, what are the challenges of the coming years?

Jürgen Kreutzer: Energy efficiency and resource efficiency remain at the top of industry’s priority list. It is important to know that a good two thirds of the final energy consumption is used for process heat, i.e. for the provision of operational services. Only a quarter of the final energy consumption is accounted for by the operation of machines and motors.

So the better the energy efficiency of the systems, the less heat escapes, the greater the savings in energy consumption. In view of the latest political decisions concerning the climate package, energy efficiency, the reduction of heating times and heat losses and thus the insulating of existing systems will come even more into focus. The recently launched federal subsidy programmes, which promote investments aimed at reducing CO₂ emissions from plants, will make refurbishment packages more interesting. Here we are ready to advise our customers.

APR: Mr Kreutzer, Mr Apel, thank you very much for the interview.

Jürgen Kreutzer: What does it depend on?

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Innovation work.

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Jürgen Kreutzer: Our test showed that by a changed arrangement of a fan wheel the glow time can be reduced by about 10% and thus CO₂ and energy can be saved. In addition, the throughput can be increased by about 5-6%. At the same time, we have also tested other materials for the fan wheel. Here, too, efficiency increases can be achieved depending on the material used. We discussed this changed position of the fan wheel with the customer. The necessary changes will be implemented as part of the renovation work.

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APR: Mr Kreutzer, Mr Apel, thank you very much for the interview.
Adhesive processes: Pretreatment of aluminum lights with atmospheric pressure plasma

Groundbreaking decision: Adhesion without primers

Just a few years ago, lighting manufacturer Waldmann based in Swabia in Southern Germany decided to radically change his pretreatment process prior to bonding. Instead of wet chemicals, atmospheric pressure plasma achieves the high level of adhesion required for the thousands of aluminum lighting housings produced each year.

One of the company’s specialist areas is the production of industrial lighting, especially LED surface-mounted machine lighting. Since these lights are designed to illuminate machine interiors, their housings and covers are frequently exposed to high mechanical loads (e.g. flying chips) and in particular, to chemical substances such as cooling lubricants and oil (Fig. 1). None of this should compromise the tightness of these luminaires, which is why the requirements for the bonded joints of the housing are extremely high. An especially effective pretreatment of the material surface is invariably required to produce a strong, long-term stable bond.

In search of an alternative

The use of wet-chemical substances is still one of the most widely used pretreatment methods in the industry. It was no different at Waldmann. For years, an employee working in a separate pretreatment booth cleaned the adhesive surfaces by hand using a cotton cloth soaked in solvents. He then inserted the parts in an automatic priming station, where they were treated first with an activator and then again with a chemical adhesion promoter using a felt applicator. The fourth step was to remove the parts and air-dry them, then finally transport them by trolley a distance of ten meters to the bonding station.

Waldmann had been looking for an alternative to this method for a very long time. Not only was it harmful to the environment; the use of chemically reactive substances was associated with substantial additional costs for cleaning, materials and disposal. Other factors such as open times, shelf-life and storage stability of the primer, as well as cleanliness of the rise cables in the station also had to be continuously monitored. The activator, adhesion promoter, spare parts, service and maintenance of the primer station alone incurred annual costs running into five figures. It was clear that the entire wet-chemical process should give way to a more efficient, environmentally friendly method.

Plasma instead of solvents

Waldmann’s rethinking of the pretreatment of its luminarie housings was put into concrete terms by a seminar held by the adhesive manufacturer Rampf, which, among other topics, dealt with the environmentally friendly pretreatment of material surfaces using atmospheric pressure plasma (AD plasma). More precisely, the Openair-Plasma technology (Fig. 2) from Plasmatreat.

The process is known for its use of plasma nozzles, the environmentally friendly technology used worldwide requires only compressed air as process gas and electrical energy for the operation of the nozzles. As a result, VOC emissions (volatile organic compounds) are avoided during production from the outset. The highly effective process is used mainly on materials such as plastics, metals, glass and ceramics.

The plasma nozzles perform three operations in a single step lasting only a matter of seconds: Dry microfine cleaning, electrostatic discharging and simultaneous activation of the surface. The result is homogeneous wettability of the material surface and long-time stable adhesion of the adhesive bond or coating, even under challenging load conditions. During cleaning, the high energy level of the AP plasma fragments the structure of organic substances on the surface of the material and removes unwanted contamination even from sensitive surfaces. Furthermore, the very high output rate of the plasma ensures that particles loosely adhering to the surface are removed.

Surface activation means modifying a surface at molecular level in order to optimize adhesive characteristics for down-stream processes such as bonding or coating, for example. Plasma nozzles are area-selective, in other words the plasma is applied with pinpoint precision only where pretreatment is required. Long-time stable adhesion is conditional on the surface energy already present in the substrate. The entire pretreatment process takes only seconds and the materials can be further processed immediately after cleaning and activation.

Safe for electronic components

Waldmann was particularly impressed by the high process reliability and accurate reproducibility of the environmentally friendly plasma process, as well as its speed and efficiency. But they still had some reservations: Would the electrical potential in the plasma beam damage the sensitive SMD components? Since the electronics are pre-installed in some of Waldmann’s lighting housings, they feared that the electrical potential present in the plasma could cause short-circuits, leading to the destruction of electronic components. Plasmatreat confirmed that although these concerns were justified in principle, the Openair-Plasma technology had a special feature: In recent years the company had developed special nozzle heads which discharged the electrical potential to such an extent that the plasma impinging on the material surface was virtually potential-free. This now made it possible to pretreat even highly sensitive SMD assemblies and other delicate electronic components without damaging them.

A significant rise in the surface temperature occurs during activation due to the chemical and physical interaction of the plasma with the substrate. The effect is particularly pronounced with non-polar plastics. Aluminum and glass have inherently good surface energy, but this energy which gives them their adhesive characteristics is often compromised by layers of dust deposits, grease and oils or other contaminants. This is where the high microfine cleaning action of the plasma (Fig. 3) comes into play, revealing once again the surface energy already present in the substrate. The entire pretreatment process takes only seconds and the materials can be further processed immediately after cleaning and activation.

Test ink measurements carried out before plasma treatment revealed surface tensions of \( < 44 \) dyne for aluminium, \( > 36 \) dyne for glass and \( > 40 \) dyne for plastic. After plasma activation, values ranging from \( > 56 \) dyne to \( > 72 \) dyne were measured on...
all three substrates, which corresponds to the modified energy values of the material surfaces. There then followed a series of tests including single-tap shear and tensile shear strength tests (DIN EN 1465), constant humidity climate tests (DIN EN ISO 6270-2), climate cycling tests (BMW 108 KWD) and 1000-hour storage of several adhesive samples at 50°C in different cooling lubricants and oils. But the all-important adhesive test to confirm the long-term stability and safety of use of the adhesive bond was the cataplasma test, the sole purpose of which is to destroy an adhesive bond. The plasma-pretreated adhesive bond withstand even this test.

Integrated into the process chain

The plasma technology was integrated into series production in autumn 2015. This new pretreatment process has eliminated two entire process steps, and also dispensed with the need for drying times and interim storage. Equipped with a potential-free rotary nozzle and controlled by a CNC-3 (xyz) axes portal, the plasma system now operates for eight to twelve hours a day in a continuous process and treats 1000 lighting housings per week. Bonding now takes place immediately after pretreatment in a new bonding station situated directly opposite the plasma system (Fig. 5). The LED electronics in all the lights function perfectly and the high level of process reliability has long since been proven too. According to Waldmann, not only has the plasma treatment created the ideal conditions for bonding, the process demonstrably improves the surface quality and long-term behaviour of the adhesive bond as well.

Author: Ines A. Melamies, specialized journalist, Factbox@de press agency

Fig. 5: Advanced rust reactivation: Plasma system and bonding station facing one another. The components can be bonded and further processed immediately after pretreatment.

Hofmann has existed since 1946 and has developed from a supplier of small furnaces to become a pure manufacturer of special equipment. The plants are continually developed further, with particular attention is given to user-friendliness and low-maintenance designs. The customer’s wishes are strongly taken into account in the plant design, programming and visualization. After a test run, the units are designed, programmed, made and assembled in-house.

Heat treatment with great temperature precision and process reproducibility

Hofmann-Wärmetechnik from Linz in Upper Austria is a manufacturer of heat treatment equipment for the aviation and automobile industries. The company delivers turnkey special plants all over the world, which are specially adapted for the customer concerned, the heat treatment process and the local circumstances. With around 60 employees, Hofmann the units are designed, programmed, made and assembled in-house.

Customers come from a variety of application sectors, for example classical suppliers such as forging operations and foundries, and up to O&Ms in the aviation and automobile industries. Customers in the aviation sector include for example Airbus, Eurocopter and Pilatus, while in the automotive sector customers include Daimler, Audi and BMW. The Nadcap (National Aerospace and Defense Contractors Accreditation Program) specifications of the AMS 2750 also present plant manufacturers and furnace operators with major challenges. In such customer circles particular attention is paid to the following points:

• Great temperature precision in the furnace and during the cooling phase
• An essential factor relating to heat treatment plant is a detailed knowledge of the batch data.
• In the heat treatment of structural aluminium components the parts being heat treated are usually combined with the charging rack: the plant operator scans the components and the rack and starts the process: The rack is tracked throughout the passage of the batch and the rack number is checked at defined points. The process parameters (temperature, rotation speeds, pressures, times) are recorded in a data package at every position and the rack is classified as ’tolerated’ (not in order).
• After the end of the process the rack is scanned once again and its data are linked to the data of the components and stored correspondingly.
• Process reproducibility, regardless of the charging position in the heat treatment rack
• Short transfer times from the furnace to the air blast or quenching tank
• Archiving of batch data, tracking and evaluation or documentation

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When the Aluminium 2020 trade fair is held at the Düsseldorf exhibition centre next autumn, the industry’s biggest meeting worldwide will also include Danish exhibitors once again. At a shared stand, they will be presenting new solutions for various industrial sectors. Focusing increasingly on sustainability and circular economics, Danish industry is also aligned with the sustainable development goals of the UN Agenda 2030.

The Danish companies exhibiting at Düsseldorf will include Sjølund, HAI Horsens, the Skamol Group, Gustav Østergaard Mønsterafbrik, Dansk Mønsterafbrik, Alumeco and – for the first time – AM Tooling. Sjølund specialises in the processing of aluminium and steel profiles. For a building in Dubai, for example, they have supplied more than 10,000 different 3D rolled window profiles. HAI Horsens is one of Northern Europe’s leading specialists in the surface treatment of aluminium. At its main office in Denmark, aluminium elements of all sizes – including facade cladding – undergo surface treatment. Skamol develops and produces insulation materials for the aluminium industry. The company's solutions help industrial customers achieve significant energy savings. Gustav Østergaard Mønsterafbik is the oldest rolling mill in Denmark. Among other products, it rolls steel sheet and aluminium workpieces such as profiles for window and door production, for facade cladding and wind turbines. Dansk Møntafabrik (Danish materials network) coordinates projects between universities, industry and the public sector. The aluminium specialist Alumeco has a broad range of aluminium profiles and customer-specific profiles in its portfolio. And AM Tooling – a newcomer to Düsseldorf – manufactures speciality machinery used to produce customised parts or process blanks. With more than 60 employees, its production includes, among other things, aluminium blanks and profiles for the automotive industry.

Leading the way in sustainable development

In 2015, the Member States of the United Nations adopted the 2030 Agenda for Sustainable Development. Its core comprises 17 Sustainable Development Goals covering economic, ecological and social aspects. In the spring of 2017, the Danish government published an associated national action plan, submitting at the same time two strategic documents to facilitate work on the sustainability goals through to 2030. According to international studies, Denmark currently leads the world in achieving the sustainable development goals of the 34 countries evaluated. Germany ranks 6th behind Denmark, Sweden, Finland, France and Austria.

The Danish Federation of Industry (DI), of which Alumínium Danmark is also a member, has taken a lead role in advising its member companies. This maintains focus on sustainable business development and ensures the implementation of the global goals. At its annual meeting, the association recently presented its plan showing how CO₂ can be reduced by 65% by 2030.

Achim Steiner, Administrator of the Northern Office of the UNDP: “Denmark and Danish companies are way ahead when it comes to implementing the Sustainable Development Goals. Danish companies are part of the solution and have a strong competitive position. Denmark should serve as an example, showing the world how to carry out a commercially competitive “green conversion”. As a member of the Danish Federation of Industry, Aluminium Danmark will support and advise the Aluminium exhibitors at ALUMINIUM 2020 regarding the implementation of the UN SDGs.

Trade fair exhibitors for many years now, Skamol is one of the Danish companies that already complies with the requirements of the UN SDGs – by developing products that provide the aluminium industry with opportunities to save energy, for example. It plans to continue contributing, above all by ensuring affordable, sustainable energy for all (UN Goal 7). In the area of infrastructure, sustainable industrialisation and innovation (UN Goal 9), and by ensuring responsible, sustainable methods of consumption and production (UN Goal 12) as well as in implementing immediate measures to fight climate change and its effects (UN Goal 13).

With its technical insulation systems, Skamol also aims to help reduce fuel consumption and CO₂ emissions – at its customers’ facilities as well as in its own production and development. In order to further reduce waste, the company recently developed a new process that enables the nearly complete recycling of residual material left over when cutting boards during calcium silicate and vermiculite production. Excess heat from one of the plants also provides inexpensive heating for nearby homes. A new business model that will recover, recycle and reuse waste products is still under development. It represents a dramatic innovation in the industry and might already be presented at next year’s trade fair.

In Düsseldorf, the company will present its technical insulation system SkamoALU, which comprises some 28 projects. A product with even further enhanced thermal properties will also be unveiled.

HAI and Sjølund join forces

The Danish companies Sjølund and HAI Horsens have already been sharing an exhibition stand at the aluminium trade fair for years now. A partnership developed from this collaboration in 2018, whereby both Sjølund and HAI were already participating in the fabrication of “The Opus”, a building in Dublin designed by the architect Zaha Hadid. Now the two companies want to bundle their know-how and growth, especially beyond Denmark’s borders.

In that context, architecture is one focus of their work. Sjølund has expertise in the rolling of aluminium and steel used in the cladding of curved facades, for example. And because the company has sufficient capacity to roll steel and aluminium profiles with virtually any conceivable dimensions and radii, it can tailor its products to specific applications. For the Coop Building in Manchester, for example, it supplied 700 different anodised aluminium profiles. The building has already received multiple awards for both its architecture and its energy efficiency.

Sjølund’s partner HAI Horsens, for its part, contributed to the Oslo Opera House, a building with a slanted roof that seems like an extension of the Oslo fjord. HAI Horsens treated the façade’s sheet aluminium for high corrosion-resistance, whereby the perforated sheets were coated with a special coating process that maintains the brilliance of the sheet metal. Subsequently, the sheets were anodised by natural means, so that they create harmonies with both the outer coating and the other materials used.

“Together our companies will now close ranks – not only at the trade fair, but also in everyday practice,” according to Hanno Petersen, Regional Business Manager for Sjølund. Invest-

ments have been made in international marketing in recent years and are gradually bearing fruit. Together with HAI Horsens, they now want to achieve export growth by profiting from one another on the international market. “We want to intensify our project activity and make shared use of competences and expertise,” adds Lam Kjergaard, Export Sales Department at HAI Horsens.

Currently, the focus is on a joint construction project in Oslo, which has just been completed. Sjøøyen Atrium 3 is the newest construction phase of an office building with twelve storeys and a total of 25,000 m² of floorspace. While the interior of the building is marked by the use of natural materials, the exterior façades are covered by brightly coloured anodised aluminium sheet with a golden sheen. For the first time, Sjølund and HAI Horsens share responsibility here for the special shape and colour of the elements.

The two companies will be sharing a stand at ALUMINIUM 2020, where they will present, among other things, their joint projects and new developments.
HAI Group expands capacity
Hammerer Aluminium Industries (HAI) is expanding its capacity with the takeover of Hydro Extrusion’s plant in Chisineu-Cris, Romania.

**The extrusion plant in Chisineu-Cris covers an area of 140,000 m² with a floor area of 10,000 m² and its two extrusion presses have a total production capacity of approximately 22,000 tonnes a year.** The HAI Group is thus opening up urgently needed capacity for it to support its customers’ growth in 2021, with a high level of capacity utilisation already foreseeable in 2020. According to a HAI Group press release, “This extrusion capacity will relieve the strain on the company’s other plants in Soest and Ranshofen, thus enabling further growth with long-standing customers there as well.”

With the takeover, HAI is rigorously expanding its capacity and taking a further strategic step in the development of its three areas of business: building and construction, industrial applications and transport.

HAI says its takeover of the new location in Romania “is a sensible investment in a number of ways”. Not only would there be synergistic effects with the company’s existing subsidiary in Santa Cruz, which is only about 20 km away. “We can take over an infrastructure that is already in operation together with 200 employees and their expertise,” emphasises HAI CEO Rob van Gils. “This makes this investment much easier to plan and less risky than a new development on a greenfield site.”

HAI is thus continuing on its path of growth. The company was founded in 2007 and has its headquarters in Ranshofen, Upper Austria; it operates six other plants in Germany and Romania. The acquisition is increasing its workforce to approx. 1400 employees. HAI now has 18 extrusion presses with an extrusion capacity of 100,000 tonnes a year and together with an annual founded capacity of 200,000 tonnes emphasises its claim to be one of the leading companies in the European aluminium industry.

In 2018, HAI generated sales of around 510 million euros in its three production divisions Casting, Extrusion and Processing. The HAI Group’s products can be found in the building sector, automotive and transport technology, electrical engineering and mechanical and plant engineering.

HAI develops comprehensive holistic solutions – from special alloys through to precision cutting. In the processing sector, the company attaches great importance to intensive and long-lasting development partnerships.

The HAI Group has set itself ambitious goals by clearly focusing on defined customer segments and growth markets, it wants to increase turnover by 2025 and at least maintain the same level of profitability. In accordance with the group strategy, the company intends to grow primarily by intensifying its added value further in the direction of its customers.

Mecal: Best solutions in the machining of aluminium profiles

**Mecal** is a successful company in the field of aluminium and light alloy machining: the whole range of machines and systems dedicated to the machining of aluminium, PVC and light alloy profiles has been designed and developed in Frascarolo, Parma, Italy, for more than 40 years.

The 5-axis machining centre MC 304 Anil-5 MDT and the double mitre saw TDC 622 Edgemaster fully express this production vision. The machining centre is characterised by extremely high machining capacity and utmost versatility.

The tool magazine with 12 positions is located on the carriage of the machine; the tool change can be carried out in any position of the working area, with significant time reduction between different machining types. The machining centre is equipped with a cutting module (MDT) devoted to machine profiles completely, including the extruded bar sectioning and facing. The use of digital electronics enables to apply fibre optic for the data transmission, which guarantees high speed and total absence of interferences due to external factors. The motorised clamps for locking the piece are independent and can be simultaneously positioned in very short times also during the machining cycle, to speed up production and to guarantee high accuracy standards of the finished product. The 3D graphics software offers a high-level programming flexibility, a friendly use and an intuitive graphical interface. External CAD LINK available. This results in a great reduction of programming times.

Mecal is a company with a strong production vision and a broad portfolio of solutions able to meet all the cutting needs. Solid and reliable, but with a modern and innovative design.

The double mitre saws of the SW 553 Series have been completely renewed to offer even more efficient performance and even higher quality standards.

Characterised by wide cutting capacity by means of saw blades 550-600 mm, these machines are realised with cutting length of 5000 mm or 6000 mm. Available with pneumatic or electronic control, frontal and straight blade feed with speed adjustment and depth limited, are equipped with an industrial computer Think Touch Screen and a very user-friendly interface. Dynamic protection guards for a total covering of the cutting area.

The double mitre saw for combined cuts TDC 622 Edgemaster is characterised by high cutting capacity and great flexibility which enables to switch between machining types in very short times, thus optimising the production cycle. The machine is based on a 5-axis system controlled by brushless servomotors. The blades are lubricated by a spray mist system. The profile locking systems are movable with automatic movement related to the angular position of the cutting units. The technological development of the TDC 622 Edgemaster has been greatly spurred by the world of aluminium profiles, always looking for larger and larger sections to extend their applications: the operator must have machines able to section large sizes switching between profiles in the shortest possible time, still guaranteeing excellence quality standards. The TDC 622 Edgemaster enables all this.

Mecal Hall 9, Stand G68 www.mecal.com

**Double mitre saw for combined cuts TDC 622 Edgemaster**

We asked …

**Derin Akersoy, Marketing Manager at Asan Alüminyum**

APR: What significance does the ALUMINIUM trade fair have for your company?

Derin Akersoy: The Aluminium trade fair is the largest global fair that is specific to aluminium. Therefore it is one of the most important platforms for Asan Alüminyum, as Western Europe is also our main export market. At the Aluminium Show, we meet with many of our existing business partners to strengthen our ongoing business collaborations, while establishing contact with potential customers, as well.

APR: Which topics and challenges move the aluminium industry and will be the focus of the next ALUMINIUM?

Derin Akersoy: Aluminium is a “green” metal by its nature, thanks to its 100% recyclability. It also has some other superior qualities, such as lightness, barrier properties against light, heat and moisture. These properties not only contribute to industrial and technological advancements, but also contribute significantly to a sustainable future. Therefore, we foresee that sustainability will be an important focus on the next Aluminium Show.

We, as Asan Alüminyum, are also focusing on becoming more environmentally sustainable in all of our processes. We reduce our carbon emissions per ton through the energy-efficiency projects we implement each year. We also recycle internal and external aluminium scrap in our integrated recycling facility. Finally, we produce clean electrical energy in our renewable energy power plant, at a rate that is equivalent to the annual consumption of our production facilities. In summary, at the Aluminium Show, we aim to communicate, how we strive to make the world more sustainable for future generations.

APR: In which markets do you see opportunities for innovations from and with aluminium? Derin Akersoy: As I have explained before, aluminium has many extra-ordinary properties, such as lightness, high barrier to light, heat and moisture, high conductivity, easy formability etc. With the increase of urbanization, there will be further opportunities for innovations with aluminium in the packaging sector. Aluminium foil is a key contributor to resource efficiency in flexible packaging applications and therefore significantly reduces food waste. Automotive is also clearly an area, where aluminium use will lead to new innovations, as automobiles need to become lighter and more fuel efficient year by year.

**Asan Alüminyum Hall 11, Stand D33 www.assanaluminium.com**

**Double mitre saw MC 304 Anil-5 MDT**
On the way to Industry 4.0 – Digitalization in industrial furnace manufacturing

by Simon Kemme, Kunal Mody, Walfried Schmidt, Günter Valder

The way to Industry 4.0 is an evolutionary process which offers great potential for improving and stabilizing production processes and for increasing energy and resource efficiency by way of digitalization and networking. As a supplier to foundries and semifinished products, Otto Junker GmbH is determined to meet this challenge as demonstrated herein on the example of its process models (Digital Twins).

While the automation level and hence, the degree of digitalization of modern industrial furnace equipment, be it melting or heat treatment systems, has kept rising in recent years, these systems and the associated peripherals have, in many cases, largely remained digital islands to this day. Although extensive digital networking and the consistent acquisition and, above all, consolidation of all available data for the purposes of comprehensive higher-level analysis within the meaning of Industry 4.0 is well underway in foundries and semifinished product manufacturing plants, there are still many steps that remain to be taken. Otto Junker GmbH is making every effort to support this global process in the best possible manner. This shall be detailed in the following sections on the example of its process models (Digital Twins).

Process Models (Digital Twins) Motivation

Thermoprocessing systems are used to selectively adjust the properties of a component by a defined heat treatment. To this end, the temperature profile within the material must be controlled in such a way that the desired metallurgical processes can take place. The most important control parameters are the holding temperature and holding time, the cooling rate and the ageing temperature, if applicable. Although the ideal temperature profile may be known from laboratory tests, it is usually not possible in an industrial process to verify whether it is actually being observed. With the aid of process modelling, the full temperature profile inside the material or component can be determined by means of a few selected temperature measurements. Thanks to this mathematical approach, the data will be available in a structured form that facilitates further processing in an Industry 40 environment.

Thus, for every product passing through the system it is possible to automatically generate a digital twin that will facilitate networking with upstream or downstream process steps.

Modular system for process models

To be able to supply process models as efficiently as possible for all equipment in its product range, Otto Junker GmbH has developed a software library that enables processes to be mapped as an FVM simulation using a modular system of building blocks. The fundamental systems of this have been explained, e.g. in [1].

Volume elements can be created and linked to diverse boundary conditions. Each volume owns geometrical dimensions as well as information about its material properties. The links represent different heat transfer mechanisms. It is thus possible to map effects such as heat conduction, convective heat transfer with or without phase change, radiation or enthalpy flows. The system is then transferred to a user capable of providing both steady and nonsteady solutions to systems of this kind. In doing so, it relies on various numerical methods such as the Crank-Nicolson method, MUSCL schemes or Adams-Moulton methods in order to be able to handle shocks and discontinuities in the temperature profile.

These methods can be found in the standard specialized literature, e.g. [2–4].

Application example of an ingot quench

In the production of aluminum ingots with dimensions of 4.5 x 1.2 x 0.5 m, an ingot is initially heat-treated in pusher furnaces. Here they are homogenized at approx. 540°C. Thereafter, they must cool down to a uniform temperature of 400°C before they can be hot rolled. For the ends of the ingot, a slightly higher temperature is desired because this is advantageous in the rolling process. Simply letting the temperature drop in air by free convection would take too long, moreover, the desired temperature profile would not be achievable in this manner. For this reason, water quenching with a subsequent soak phase is employed.

The ingots are fed to the quench from the various furnaces on a roller conveyor. In the quench they are subjected to a selective application of water before they are transferred to a soak chamber. There they are held at ambient temperature of 400°C for 20 min. After that, the ingots are moved to the hot rolling mill for further processing.

It is thus a requirement on the water quench that it should remove no more energy from the ingot than needs to be withdrawn to achieve a uniform temperature decrease from 540 to 400°C. After all, it is not intended that any further energy is introduced into the soak chamber. This way, both the energy demand and, ultimately, process costs will be minimized.

For the foregoing purposes, the surface temperature of each ingot is measured directly upstream of the quench. Thereafter, its transfer from the furnace to the quench is simulated using a process model based on the abovementioned modular system. The ingot is assumed to possess a homogeneous temperature distribution upon entering the furnace, and to lose heat by free convection during the transfer. If the surface temperature thus computed coincides with the measured one, the simulated temperature distribution will be used as a basis for the further calculations.

An initial recipe is now selected for the quench, and the entire process is simulated in the way to the end of the soak cycle. A test is then carried out to ascertain whether or not the requirements on the ingot temperature are met. If necessary, the recipe will be adapted to the quench and a new simulation will be carried out. This process will be repeated until a setting is found that will cause the ingot to leave the soak chamber with just the desired temperature profile. This recipe is then loaded into the quench controller and executed. About 5 to 10 simulation runs are necessary, but these take only a few seconds to complete. In this manner, every ingot geometry is treated with a tailor-made recipe so as to make optimum use of the residual heat.

The results of such a simulation are graphically presented in Fig. 1a through Fig. 1f. Fig. 1a shows the temperature distribution in the ingot at the time when its front end has just exited the quench. In Fig. 1b, the first half of the ingot is outside the quench. It is evident that the surface of that portion has already become distinctly hotter again than it was in the quench. Its temperature has risen from around 50°C to approx. 250°C due to heat conductance from the interior of the ingot. Ultimately, the ingot’s temperature profile upon leaving the water quench is rendered in Fig. 1c.

Fig. 1d through Fig. 1f show how the temperature evolution over the soak phase. It should be noted that the colour scale in this diagram differs from the one in the previous images. In Fig. 1d, we can still detect major temperature differences. As is evident from Fig. 1e and 1f, these differences decrease over time. Ultimately, a temperature of around 480°C is reached inside the ingot while its ends are slightly hotter to provide improved rolling properties.

Conclusion and outlook

The process model presented above generates a digital twin of every ingot, documenting the temperature profile during the quenching process. Should any problems arise during hot rolling of certain ingots, these could thus be correlated to earlier process steps through data mining methods. This is a precondition for an extensive interlinking of processes and equipment (networking) in the context of Industry 4.0.

In addition, an optimum recipe is generated for every ingot, thereby increasing process quality. The plant operator can directly specify the desired temperature the ingot should have upon exiting the soak chamber. Process parameters such as the water application density and ingot conveying speed are defined via an optimization routine. This routine is able to map the process with the aid of a process model.
New Tomra machine sorts even smallest metal parts

At Aluminum USA, Tomra Sorting Recycling has launched the X-Tract X6 Fines for the high-purity sorting of mixed non-ferrous metal fractions. The new machine can detect and sort grains of metal of almost half the size of what was previously sortable. This capability has been achieved by developing Tomra’s exclusive and field-proven high-speed X-ray transmission (XRT) technology, which sorts materials according to differences in their density. Broad-band radiation penetrates the materials in the sorting line to obtain spectral absorption information, which is measured by an X-ray camera. Within this process, the atomic density of the materials is identified regardless of their thickness.

Mecal Increasing the sensitivity of the high-resolution X-ray camera has made it possible to detect and sort grain sizes as small as 5-40 mm, thus measurably reducing product losses. Extensive validation runs of the X-Tract X6 Fines in high-throughput applications demonstrated the machine’s ability to consistently attain unrivalled purity levels of 98-99%. The X-Tract X6 Fines is equipped with Tomra’s Dualine Dual Energy Technology. This employs two independent devices with different spectral sensitivities, so that materials are sorted regardless of the material’s thickness. By detecting and prioritizing between single object processing and area processing, Duoline recognizes differences in objects overlapping on the sorting line, a significant advantage when lines are running higher throughputs.

Another useful advantage is the provision of multi-density channels. Whereas previous X-Tract models sorted materials according to two classes, separating it into high-density and low-density fractions, the new X-Tract features multiple density channels. This allows a greater number of classes for separating materials according to density, achieving greater sorting precision even with mixed metals and small grain sizes. Valerio Sama, head of Product Management Recycling at Tomra, commented: “The smallness of the metal grains that can now be detected and sorted by Tomra’s X-Tract technology is unrivalled. This will enable sorting operations to unlock even more value from secondary materials. But while our X-ray sorting technology reaches new levels of sophistication, the new X-Tract X6 Fines retains the familiar controls of the standard X-Tract and brings the peace of mind that comes with an industry-proven technology.”

Pyrotek completes new manufacturing plant in Dubai

Pyrotek Inc. is to complete construction in November of a new, 6,185m² manufacturing facility in Dubai, UAE. The plant, which is scheduled to be occupied in January 2020, will serve and supply the rapidly growing aluminium smelting industry in the region.

This plant will grow our footprint in the heart of the major global aluminium smelting regions,” says Nigel Clear, Pyrotek’s general manager in the region. “It’s also very close to EGA (Emirates Global Aluminium), the biggest aluminium producer in the Persian Gulf.”

Pyrotek has been in Dubai for 20 years, and currently operates a sales and warehousing facility in the Jebel Ali Free Zone that serves the UAE, Oman, Jordan, Egypt, Lebanon and northern Africa. Along with providing products to companies in the aluminium industry, the existing facility supplies glass, steel, and noise control industry customers. Pyrotek’s product range for the aluminium industry comprises consumable products, equipment and engineering expertise for smelters, casthouses and foundries.

Use resources efficiently. Use aluminium.

Recycling aluminium scrap makes an important contribution to using resources prudently, intelligently and economically. The energy needed for recycling is only 5% of the energy originally required to extract the metal from its ore. And products that benefit from aluminium’s lightness save even more energy during their service lives.

Pyrotek
Hall 11, Stand D39
www.pyrotek.com

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The environmentally friendly and resource-conserving use of building materials is increasing all the time. Raw materials, primary metals and energy are becoming more expensive – the importance of recycled materials is growing. Aluminium has recycling qualities that no other metal can match. This is one of the reasons why the Aluminium und Umwelt im Fenster- und Fassadenbau (A|U|F, Aluminium and Environment in Window and Façade Construction) recycling initiative, which is dedicated to aluminium recycling in the construction sector, was founded 25 years ago.

The A|U|F initiative’s aim is to return used aluminium from building applications, especially windows, doors and façades, to a closed material loop and thus ensure that used aluminium components are recycled and processed into profiles for building applications again. “With the A|U|F collection system, we want to keep the high-quality and much sought-after aluminium alloys from scrap building materials in a closed loop,” explains A|U|F’s chairman Walter Lonsinger.

New patented sorting techniques for processing used scrap mean it is now possible to produce aluminium alloys for building applications that contain up to 90 per cent recycled material. This means only a small proportion of unalloyed material is needed to ensure the new window or façade component again in accordance with A|U|F’s regulations as part of a closed and monitored recycling process.

“Aluminium profiles used in window and façade construction are high-quality alloys,” says Walter Lonsinger. “If the material is transferred to other recycling loops, we will lose it.” This means, for example, that if aluminium scrap is exported to China or India on a one-way ticket, it will no longer be available for use in Europe, where the aim is to increase the proportion of aluminium products recycled. The initiative increases market transparency and at the same time strengthens the European economy because the material stays within Europe. This is also one reason why EA, the European aluminium association, wants to extend the A|U|F model to the rest of Europe.

More than 200 members A|U|F now has 206 member companies, including system houses, metal fabricators and planning offices. In addition, the initiative can rely on eleven environmental partners with over 270 collection centres. The acquisition of new members is increasing continuously. Over the first half of 2019, the initiative processed into windows, façades or other aluminium components again in accordance with A|U|F’s regulations as part of a closed and monitored recycling process. Of a total of some 95,000 tonnes of aluminium scrap produced annually in Germany in the building sector, almost every third tonne is currently processed into windows, façades or other aluminium components again in accordance with A|U|F’s regulations as part of a closed and monitored recycling process.

Of visitors come to ALUMINIUM with concrete investment intentions.

For more and more tenders for façades, windows or doors, architects are now demanding concrete proof of the qualified material loop that has been used. A|U|F members have no problem providing such proof: a certificate issued annually provides the awarding authorities with proof that the company participates in the product-related recycling process.

Walter Lonsinger has the future firmly in his sights: “We want to acquire more members and convince them that closed material loops in Germany and other European countries are a must if we are to have optimum recycling and thus help avoid restrictions or bans on the use of aluminium.” At the same time, A|U|F wants to work with decision-makers, investors, building owners, architects and planning departments to ensure that suppliers of metal construction services can prove that they participate in a closed material loop. The aim is to work together in future to bring even more scrap into the closed loop.

The aluminium profiles produced have the desired material properties. The A|U|F model, which is dedicated to aluminium recycling in the construction sector, was founded 25 years ago.

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The A|U|F initiative enjoys a good reputation in the building and construction industry.
Aalberts surface treatment at ALUMINIUM 2020

Functional surface finishing for the aluminum industry

At ALUMINIUM 2020, Aalberts surface treatment will showcase why surface technology is a key technology for successful aluminum products. With the help of modern functional coatings, corrosion and non-stick behavior, friction and wear characteristics of different aluminum components can be adjusted as well as precisely adapted to certain requirements.

As of January 1, 2019, AHG Oberflächen and Impreglon merged under the roof of their parent company Aalberts into one business unit called Aalberts surface treatment. With the merger, both partners created a global full-service provider of functional surface refinements.

“The combination of core competences and the regional presence of both partners enables us to build a high-performance entity that meets all different requirements for first-class industrial coating solutions. Aalberts surface treatment is a leading, innovative and globally active technology provider that supports its customers as a competent partner. Now we can even better serve the realization of large projects for global key accounts, backed by our strong parent company Aalberts N.V.,” says Michael Preinerstorfer, CEO of Aalberts surface treatment.

Both partners complement each other with regard to their product portfolios and their many years of intensive production expertise. Thus, Aalberts surface treatment offers a broad range of processes to surface finish all sorts of different metal and plastic components. With the applied coating processes, components are protected against corrosion and wear or provided with special properties. Main processes include, besides other, electrotechnical, hard anodizing, polymer and zinc flake coating. Some of them are applied only partially. Production capabilities range from economically efficient coatings of small mass parts to individual solutions for high-tech components. In addition, Aalberts surface treatment offers various process chemicals for surface technology with the refinement of more than one billion components per year. Aalberts surface treatment serves customers from all key industries.

Selga-Coat, for example, is a coating process specifically developed and patented by Aalberts surface treatment. More precisely, Selga-Coat is a technology for the selective galvanic coating of aluminum surfaces. Only pre-defined surface areas are hard anodized. All other areas are covered, inside a tool, with an integrated sealing system. The process is primarily used in the automotive and mechanical engineering industries because, on the one hand, technical components are manufactured in large numbers, and on the other hand, coating demands are very sophisticated.

When it comes to electrotechnical nickel plating, technical knowhow in combination with excellent process technology is vital. Aalberts surface treatment unifies decades of intensive experience and operates in Weitershofen Europe’s largest electrotechnical nickel plating plant for serial and small parts. By applying electrotechnical-nickel-plating (Durini-Coat) on iron and non-ferrous materials like aluminum, the surface is coated with a nickel-phosphorus alloy of specific composition. The coatings’ scope of performance ranges from chemical, corrosion and wear resistance to dimensional accuracy and ideal anti-friction properties as well as electrical conductivity and increased hardness.

To realize highest demands on corrosion protection together with thinnest layer thickness possible, zinc flake systems are often first choice. Zinc flake finishing processes are non-electrolytic. By using techniques such as dip-spinning, spraying, dip coating or wet painting extremely corrosion resistant zinc flake coatings are applied. In contrast to other finishes, they permanently prevent damages caused by hydrogen embrittlement. These coating processes are ideal for complicated shapes as well as bulk material. Zinc flake coatings from Aalberts surface treatment are used in the automotive and construction industries worldwide as cathodic anti-corrosion coatings.

Aalberts surface treatment has a number of other coating processes in its portfolio especially for components made of aluminum alloys: anodizing, anti-friction coatings, chrome-free passivation, color anodizing, gold plating, hard anodizing, nanocoatings, nickel sulphamate, polymer coatings, sealing, tin plating or wet painting. The sales team of Aalberts surface treatment is looking forward to welcome guests from different industries to answer all questions.

Aalberts Surface Treatment
Hall 10, Stand N30/17
www.aalberts.com/st
Aluminum heat treatment: A topic for the present and the future

Dr. Baykut Gültekin, Dr. Dominik Schröder

Aluminum is constantly in competition with other materials as steel, plastic or carbon fiber materials. In the sixties of the 20th century, the first aluminum engine gearboxes and chassis parts were produced in large series production. The first car bodies for Audi were made 20 years ago. In the years that followed, however, Audi also stated that the materials must be specially selected for each area and every application.

Particularly in the field of steels, there have been significant steps in the development of high-strength and dual-phase steels over the last 20 years. As a result, the choice of materials has also partly moved back from aluminum to steel. For the aluminum industry, this meant increasing efforts to regain market shares. In the meantime, for many parts, aluminum has prevailed for wheels, engine blocks, cylinder heads, crankcases, shock tower, suspension arm, just to name a few. The activities focus on both, the development of materials and the further development of heat treatment processes while the requirements for the heat treatment are passed on to the plant manufacturers.

Essential factors of heat treatment

Heat treatment is challenged by achieving a homogeneous material heating and optimized cooling in order to achieve the desired mechanical properties but also to avoid material distortion. Targeted mechanical properties are mostly determined on the cooling performance, while a rough quenching will always lead to a distortion. The dimensional accuracy of aluminum components, which later must be installed with accurate fit, is of equally high importance as the mechanical properties. For this reason, the heating is already graded today. The steps of heat treatment including cooling are therefore always a compromise between mechanical properties and dimensional accuracy. The aging can take place at a high temperature during a short time or longer at a lower temperature, in order to achieve maximum strength values.

The absolute temperatures are alloy driven. The rule is that the eutectic temperatures shift to lower temperatures with the proportion of alloying elements. The alloys are selected to meet both strength and ductility requirements. Therefore, only a few alloys are suitable for certain requirements, whose mechanical properties then have to be optimized by the type of heat treatment.

Various possibilities of heat treatment, especially during aging

In order to suppress the precipitation of the alloying elements gone into solution, the cooling must be quick enough to prevent formation of phases takes place, which are later no longer available for hardening during aging. The diagram in Figure 1 shows the required cooling rate in the yellow curve. In the subsequent thermal aging, the precipitation can be carried out over different phases, depending on the temperature and aging time.

In addition to the large number of alloys and tolerances for the alloy composition, new parameters result during the heat treatment. On a logarithmic scale, it becomes clear that with increasing temperature, the period for precipitation within a certain zone becomes shorter and shorter. This raises a new requirement for plant construction to bring the parts in a batch as evenly as possible to set temperature. However, this is only possible if the batch combination in the basket allows a uniform transfer of heat at all. Significant parameters for this purpose is an optimal flow through the charge, which requires powerful circulation fans.

In practice, the first parts of a batch reach the set temperature after 15 minutes after charging into the furnace. The last parts reach the targeted temperature only 10 to 15 minutes later. At an aging time of 6 hours at 180°C, no influence on the mechanical properties is expected. However, if the holding time for aging is only 30 minutes at 225°C, then this might result in some parts having already exceeded the optimal holding time while others have not yet reached this point. This results in considerable differences in the mechanical properties within one batch. Geometrical distortion inside larger components may already occur during heating. A cross beam from the automotive industry could achieve the desired mechanical properties at one end, while the other end shows a deviation from this values.

On the other hand, it is state of the art to run the aging as quickly as possible to lower temperatures. This results in considerable differences in the mechanical properties, as shown in Figure 4. Calculations show that a cooling rate of up to 4 K/s can be achieved with a piston flow. With air jet flows at 100 m/s exit velocity, up to 300 W/m²K can be reached. For a 3 mm thick component, a cooling rate of 4 K/s can be achieved with a piston flow.

With a nozzle flow, as shown in Figure 3, up to 10 K/s can be realized on average, depending on the position in the basket. An enrichment of the air with water results again in a significant increase in the cooling rate. For a uniform application, water is to atomize into small droplets and transported by a stream of air. With the atomization of the water an optimal droplet size has to be adjusted which follows the air flow and not gravity. With standard wall thicknesses of aluminum structural parts of 2 to 3 mm, cooling rates of up to 10 K/s can be applied without increasing the distortion of the parts.

Plant engineering for high-quality materials

The combination of high convection furnaces and quenching devices with a suitable design of the baskets for the components allows a high quality heat treatment with minimum holding times and cooling rates, which ensure the maximum mechanical strength from the parts. In addition, distortion can be minimized by means of staged temperature profiles in the solution annealing and aging furnace. A plant compiled for the necessary heat treatment steps is shown in Figure 4.

Tasks for the development of heat treatment

The aluminum heat treatment plants currently meet the requirements of the components. However, the goal should be to digitize the processes, as already done in many other areas of heat treatment. Models must represent the heat treatment, which has already been partially accomplished. In the field of jet flow with water, a calculation of the cooling rate has not yet been captured by a mathematical algorithm, because DNB (Departure from Nucleate Boiling)-3 and Leidenfrost temperatures strongly depend on droplet size and thus the impulse of the impinging water, and also the component thickness and the angle of inflow. Therefore, these processes are initially only detected empirically, which makes it difficult to generate a digital twin for process control.

Summary

In summary, it is fact that the latest generation of heat treatment equipment, as shown in Figure 4, with a multivalves cooling device can fully meet the increased demands on mechanical properties and distortion. This is reached by a quick and more homogenous heating in the solution and aging furnaces and an increased cooling rate up to 20 K/s. With these features, the aluminum is well placed against the “competition” steel and can go to the next round.

Figure 1: Precipitation diagram for AlCu4

Figure 2: Precipitation areas of various aluminum alloys and their critical temperature ranges

Figure 3: Nozzles – Air cooling chamber for quenching aluminum components

Figure 4: Solution annealing and aging furnace of an aluminum heat treatment plant
Real Alloy: The real standard for recycled light metal

Real Alloy is the global market leader in third-party aluminum recycling and specification alloy production. The company converts aluminum and magnesium scrap as well as by-products into reusable metal for a growing number of applications across various industries. Their customers can choose from an extensive range of cast and wrought products made from aluminum and magnesium alloys, delivered to their door in the form of molten metal, ingots, RSI, or cones.

With 22 facilities in six countries across North America and Europe, Real Alloy is ideally positioned to respond to the needs of an increasingly recycling-conscious world.

Markets, Customers, Partners
Aluminum and magnesium scrap and dross recycling has a bright future in markets all around the globe. Recycled aluminum has vast potential. A large variety of raw materials such as turnings, foils, shredded scrap, incinerator scrap, or drosses can be converted into different shapes and quality grades to meet the needs of various industry segments – from lightweight automotive engineering to the production of well-designed food packaging. Real Alloy is highly experienced in classifying different scrap types, creating formulas for different specifications, remelting scrap, and providing industries with alloyed aluminum according to their requirements. Furthermore, the company operates as a service provider for the entire industry by toll converting or swapping any kind of aluminum scrap and offering overarching recycling solutions.

Real Alloy offers three main services:
- Production of dedicated alloys based on full-price business
- Swapping material units against others by making optimal use of the equipment
- Toll converting of scrap and drosses and returning the metal to customers

Locations in Europe
United Kingdom: Real Alloy operates a recycling plant in Swansea on the south coast of Wales. The site’s main function is toll converting customer scrap waste streams and generating wrought alloys. The plant produces RSI and deoxidants.

Germany: Real Alloy’s three recycling facilities in Germany produce high-quality specification aluminum and magnesium alloys. All three plants are located near major economic hubs (Düsseldorf, Munich, and Stuttgart) and specialize in converting customer scrap and post-consumer waste streams. The plants in Töbing, Dettlaus and Grevenbroich produce liquid metal, ingots and RSI.

Norway: There are two Real Alloy plants in Eidsvåg and Raudsand: the Alumox wrought alloy recycling plant and the Reox plant for waste recycling and the treatment of salt slag. Scrap waste streams are toll converted.

Real Alloy customers can choose from a wide range of cast and wrought products in aluminum and magnesium alloys.

Photo: Real Alloy

Real Alloy: The real standard for recycled light metal.

More than 40,000 subscribers in 100 countries – become part of the ALUMINIUM community! Register now for the ALUMINIUM Newsletter:

www.realalloy.com
Aluminium Processing Growth

PhoenixTM Temperature Profiling Systems for the Aluminium Industry

In today’s manufacturing market aluminium is increasingly becoming the material of choice being lighter, safer and more sustainable. Manufacturers looking to replace existing materials with aluminium are needing new methodologies to prove that new thermal processing of aluminium parts and products is done to specification, efficiently and economically. Helping with this need PhoenixTM offers a range of Temperature profiling solutions designed specifically for applications in the aluminium manufacturing market.

PhoenixTM Temperature Profiling Solutions

The PhoenixTM temperature profiling system is designed to travel through the thermal process measuring the product and furnace environment. A high accuracy, waterproof, multichannel datalogger records temperatures from thermocouple inputs, located at points of interest on or in around the product. To protect the datalogger as it travels through the hostile furnace a thermal barrier Hot Box is employed to keep the logger at a safe working temperature to prevent damage and give accuracy of measurement. The design and choice of barrier is strongly influenced by the demands of the process as well as the later (Aluminium Processing Solutions). PhoenixTM prides itself on offering the most comprehensive, flexible and durable range of barriers to suit, even the highest of temperatures and longest soak times, hostile environments whether pressure, gases or quenches, and process challenges such space limitations, product rotation and robotic handling systems. A popular enhancement to the system is the use of 2-way RF telemetry providing real time thermal monitoring during exit from the furnace. The thermal graph of the furnace can be reviewed and analysed to give a traceable, certified record of the process performed. Such information is critical to satisfy CQI-9, AMS2750 and other regulatory demands. Fully TUS Compliant reports can be produced in moments from the simple and intuitive software, making accurate TUS a simple and quick task. Information can be used to not only prove product quality but provide the means to confidently change process characteristics to improve productivity and process efficiency (Optimise Soak Temperatures & Times).

PhoenixTM Datalogger Range

Models ranging from 6 to 20 channels can be provided with a variety of thermocouple options (types K, N, R, S, B) to suit measurement temperature and accuracy demands (AMS2750 & CQI-9). The logger can be offered in either standard (80°C/180°C) or high temperature operating temperatures (Barrier Core Temperature (180°C/320°F) variants to allow use of either standard thermal barrier designs (Dual Phase – Heat Suck) or high performance (Phased Evaporation – Water Tank).

Live Radio Communication

The logger is available with a unique 2-way RF system option allowing live monitoring of temperatures as the system travels through the furnace. Provided with a high performance 1.4GHz networking protocol, the RF signal can be transmitted through a series of routers linked back to the main coordinator connected to the monitoring PC. The operator can see on his PC at his desk what is happening in the process live. For an hour process such live data gives the operator confidence that process is working without that worry associated with a non-RF system to download from the logger at the end of the run. In many processes there can be locations where it is physically impossible to get a RF signal out of the furnace, (i.e. the water quench). With conventional systems this results in process data gaps. For the PhoenixTM system this is prevented using a fully automatic ‘catch up’ feature. Any data that is missed will be sent when the RF signal is re-established guaranteeing in most applications 100% in-process data review.

Aluminium Processing – Bespoke Thermal Barrier Solutions

Preheat of Aluminium Slabs/Ingots prior to Hot Rolling (Pusher Furnace)

Thermal barrier embodied into the slab (machined or melted out) to allow safe transit of the test slab through pusher furnaces (Typically 550°C/1022°F). Thermal protection continues into the core of the slab/ingot. Water tank designed to give capacity (volume of water) to allow protection of logger running safely at 100°C/212°F as water boils and evaporates off. Filling mechanisms designed so that even during slab rotation (180°) entering and exiting furnace water protection is not lost from the tank.

Aluminium Log Homogenisation (Walking Beam Furnace)

After casting aluminium logs are homogenised before being supplied to extrusion companies. The walking beam process becomes demanding not only due to the excessive durations (12 to 13 hours at 580°C/1076°F) but the fact that the profiling system has to rotate with the log and therefore needs to be the same form as the log with the same diameter or less. The PhoenixTM rotating cylindrical barrier design meets the demands of the process perfectly. The barrier is attached to a shortened log and thermocouples are routed along the log in a machined channel to prevent problems during movement through the furnace. Design of the barrier water tank, providing thermal protection, guarantees that water capacity is maximised with no loss of water during continuous process rotation.

T6 Solution Reheat of Aluminium Automotive Products (e.g.: Alloy Wheels, Cylinders)

The need to monitor solution treatment, quench and then the age hardening process requires not only a system that will protect against heat over a long process duration but also withstand the rigours of being plunged into a water quench between the two heating phases. The PhoenixTM HTS6 system has been designed specifically for the T6 process. The data logger is installed in the water tank cavity of the thermal barrier, with a water tight seal comprising of heavy duty gaskets and compression glands, through which the thermocouples exit. Providing significant thermal protection, the outer cage contains the thermal insulation blanket wrapped water tank is capable of running continuously through all three processes without interruption. In the quench the water tank is replenished and the blanket will absorb water providing further protection during the age hardening process. The T606 can provide protection at 550°C/1022°F for up to 20 hours.

Increasingly with a move to robotic handling in rotary T6 Walking Beam furnaces, where space is even more critical and automatic handling of barriers becomes essential further new barrier solutions have been developed. Utilising the water tank thermal protection principle, the cage containing thermal blanket is replaced by a micro-porous insulation skin and robust outer stainless-steel case. The resulting barrier can be shaped to allow the barrier to be picked up by robotic clamps as part of automatic transfer into either furnance or quench process. The PhoenixTM rotating cylindrical of barrier design meets the demands of the process perfectly. The barrier is attached to a shortened log and thermocouples are routed along the log in a machined channel to prevent problems during movement through the furnace. Design of the barrier water tank, providing thermal protection, guarantees that water capacity is maximised with no loss of water during continuous process rotation.

Aluminium Brazing (KAB & Vacuum)

Monitoring controlled atmosphere brazing (CAB) processes used in the manufacture of radiators and condensers although not a thermally demanding application, compared to others discussed, it does come with its own specific challenges. Mesh belt furnaces often have limited access requiring the use of low profile barrier designs. Chemicals in the flux used in the process create Hydrofluoric acid which can chemically attack the glass cloth used in most thermal barrier constructions. To overcome this issue the CAB barrier is designed with a front loading design to minimize the amount of exposed cloth. As its name suggests the CAB process can be in some cases be compromised by the degassing of oxygen from the barrier. To eliminate such problem the barrier insulation is pre-treated with a vacuum heated/radrgen purge procedure. A further option is available for use just prior to the profile run where a nitrogen purge can be performed to remove remaining air from internal insulation and logger cavity.

Paint Cure on Aluminium Car Bodies

With the drive for fuel economy and tighter emissions controls automotive manufacturers are moving away from traditional steel to lighter aluminium. With this move there is even more need to profile the paint process to ensure that the various coating chemistries (E-coat, Primer Surfacers, Top & Clear Coat) are cured correctly to give both physical protection and cosmetic appearance. The PhoenixTM Finishing system allows the cure process to be monitored accurately.

Age Hardening & Powder Coating Aluminium Architectural Products

Aluminium extrusions are commonly used in the manufacture of windows, door and other architectural products. As part of the manufacturing process the extruded aluminium profile needs to be artificially age hardened. This process is essential to ensure ultimate tensile strength and yield strength and requires that the product is soaked at typically 185°C/365°F for 4-5 hours. Measurement of the load core in the ageing furnace is critical to ensure consistency of product ageing throughout the batch. To monitor such processes the Phoenix T501 system is perfect at allowing product temperature reading off the oven void without need for trailing thermocouples.

It can also be used to survey the oven (TUS) to validate temperature distribution without product. The final manufacturing step for the extrusion is the powder coating. To protect against, coating life time guarantees, warranty claims, applicators often are required to supply coating suppliers with evidence of product curing performance. Accredited applicant schemes will require that production runs are certified with a profile trace showing that the powder coated product achieved the correct time ° Temperature. The PhoenixTM Compact finishing system is the perfect tool for monitoring such processes. Whether an applicator or coating supplier the system is portable, easy to use and provides the certified traceable documentation needed for process validation and quality assurance.

AMS2750/ CQI-9 Furnace Temperature Uniformity Surveys (TUS)

Complementing the range of product profiling solutions PhoenixTM is able to offer fully AMS2750 and CQI-9 compliant Tempurature Uniformity Survey (TUS) solutions. Combining the thermal barrier or external logger offerings the system can be used to validate that the furnace set-points defined in the TUS are within specified limits. The Thermal View Survey Software package provides full review, analysis and reporting to satisfy the strict requirements of regulatory standards.

Conclusion

PhoenixTM offers complete, reliable in process temperature profiling solutions, for use across the aluminium processing industry. Offering unique solutions to meet the specific application challenges PhoenixTM provides, tried and tested systems, used globally by key market players to understand, control and improve their manufacturing operations.
Düsseldorf-based Gesamtverband der Aluminiumindustrie e.V. (GDA) regularly organises congresses that focus on technical and market topics in the aluminium sector. The EAC, European Aluminium Congress, which is held every two years, and the European Aluminium Conference, which is organised to coincide with the biennial ALUMINIUM trade fair, serve as forums for the transfer of knowledge.

Both events bring together high-profile experts from all over the world. The specialist presentations give a wide-ranging and intense overview of the future opportunities for aluminium in the different user markets.

EAC: International meeting point for the aluminium industry

On 25 and 26 November 2019, GDA will be hosting the EAC European Aluminium Congress 2019 in Düsseldorf under the motto ‘Aluminium and Mobility’. GDA is organising the event under the auspices of the D-A-CH Alliance for Aluminium, with the support of alu.ch, the Swiss aluminium association, and Wirtschaftskammer Österreich. Fachverband NE-Metallindustrie, the non-ferrous metals trade association of the Austrian Economic Chambers.

The key topics of the congress will be the various potential uses of aluminium and possible advancements that will make vehicles and other means of transport of the future even lighter and more energy efficient. Speakers and participants from OEMs, plant and machinery manufacturers, and suppliers of components and equipment will discuss innovative developments, new technologies, strategies and the prospects for the use of aluminium in future mobility applications and their solutions. An exhibition and sponsoring opportunities round off the programme.

The EAC Congress ‘Aluminium and Mobility’ will be divided into a total of four sessions devoted to Automotive, Markets, Processes Heat Treatment and Joining Technologies and Surface, Additive Manufacturing, Recycling. The congress language will be English, and all presentations will be translated simultaneously into German and English.

Further information can be found at www.aluminium-congress.com, where it is also possible to register online for EAC 2019.


For the sixth time, GDA will be organising the conference to accompany the ALUMINIUM 2020 trade fair in collaboration with Reed Exhibitions, the fair’s organiser. Under the conference’s motto ‘Aluminium – Material for the Future’ there will be presentations on Plant and Equipment, Additive Manufacturing, Automotive, Surface, Recycling Technologies and Aluminium Markets. The presentations are intended to provide a broad and thorough overview of the future opportunities for aluminium in the various user markets. The conference language will be English, and all presentations will be translated simultaneously into German and English.

As a co-initiator and conceptual partner of the ALUMINIUM trade fair, GDA will be exhibiting in Düsseldorf again in 2020 and will have its own stand (Hall 13, Stand D49). The association will provide information and advice on the use of aluminium in a company-neutral and product-independent manner. At the same time, the GDA stand will serve as a communications platform and meeting point for visitors and exhibitors. Lightweight construction, digitalisation, urbanisation, efficient use of resources and energy, and demographic and climate change are the long-term megatrends and require intensive discussion between society, industry and research.

“...The EAC is the international meeting place for the aluminium industry. However, it is not limited solely to the sector, the opposite is true. The EAC is a meeting place where we can network with our customers and suppliers as well as with representatives from the world of politics. This year’s motto, ‘Aluminium and Mobility’, also covers much more than merely the debate on electromobility and climate protection in the transport sector. Digitalisation will change mobility enormously. It goes further than Industry 4.0 or Level 4 technologies in cars: it also includes mobility distributed across more modes of transport. This opens up opportunities for our companies. And in aluminium, the suppliers of ‘New Mobility’ have a material that enables them to achieve maximum efficiency and sustainability.”

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Extrusion plants rely on hot saw

Author: P. Johnes, Haan

The preparatory work on the extrusion line includes cutting the continuously cast logs into workable billets. For more than two decades the industry has been working intensively on this process step, which has a significant influence on the effectiveness of the company.

The result now shows that the hot saw is currently the cheapest of the available alternatives. Not only new plants prefer this solution but also older plants are being retrofitted.

Hot shear or saw?

For a long time, shearing and sawing competed when cutting the extension billets from the continuously cast, approximately 8-m-long log. Although the hot shear works quickly and without material loss and allows a high degree of flexibility when changing the billet length, the sawed billet has gradually gained acceptance. Its advantage is a smooth, clean cutting surface, which reduces the risk of inclusions and defects during extrusion. The main disadvantage of hot shearing is that the end face of the billet is torn open by harder alloy seams and at shear temperatures below 370°C. With soft materials, the deformation of the billet in the direction of the shearing force is a major disadvantage. The saw, on the other hand, enables stable reproducible production. With the introduction of carbidewelded blades for aluminium processing in the 1990s, it was possible to significantly increase the cutting rate and the service life of the saw blades. The disadvantage of sawing, however, is the loss of material due to the chips. With a billet diameter of 263 mm and an 8 mm wide cutting gap, for example, an annual chip accumulation of a good 150 tonnes had to be reckoned with, as was calculated in a report from the year 2008.

The circular saw machine designed for aluminium processing must be equipped with a higher output than a comparable system for steel processing – despite the significantly lower specific cutting force of aluminium materials.

Problems when sawing heated logs

A further difference between shearing and sawing is due to the working process before the extrusion press.

If hot shearing is used, the continuously cast log acts as a whole is heated in the gas furnace. At the furnace outlet, the billet is sheared off and – if this is intended – transferred to the induction furnace to generate an axial temperature profile. In the other case, the sheared billet passes directly into the billet loader.

When working with a cold circular saw, the billets must be cut off before entering the gas furnace. They then pass through the furnace as individual parts arranged one behind the other, whereby the heat flow is impaired by the parting surfaces.

This led to the idea of inserting the saw instead of the shears at the furnace outlet, where the material heated to between 350 and 400°C has to be sawn. Such a solution has all the advantages of circular sawing, but it also promises a sensible material flow and a flexible reaction to changes in billet lengths. Finally, it offers the possibility of replacing a hot shear previously installed with any further technical changes to the system.

The idea of hot sawing is not new, but could not be realised satisfactorily for a long time due to the machining properties of aluminium wrought materials. Experiments were not lacking. With wrought aluminium alloys as relatively ductile materials, the chip shape and the resulting surface are critical. With decreasing strength, the tendency to chip breakage decreases, and safe chip removal is therefore an important criterion. The surface is endangered by the formation of built-up edges. Built-up cutting edges are – typical especially for aluminium materials – material welds on the chip surface, which can detach periodically and impair the machined surface. Such build-up welds can be avoided by a series of measures and various strategies. These concern the geometric design of the cutting edge (flake angle, clearance angle, chamfers, etc.), the cutting parameters and, above all, the cooling lubricants to be used.

Development of a hot saw ready for practical use

The company extrutec, located in Radolfzell, Germany, has long-term experience in sawing and claims to have helped the hot saw to its breakthrough. extrutec GmbH was founded in 2005 by the managing partner Uwe Gönner. With the appointment of Joachim Sokoll as technical manager in 2006, the company had a management with many years of experience at its disposal. A further, extremely important personnel addition was the cutting device can be easily integrated into the automatic extrusion press operation. Finally, when comparing the procurement costs, the hot saw performs much better than the hot shear.

Market development

Due to the advantages mentioned above, the hot saw is becoming more and more popular today. It is now standard equipment on newly installed lines. extrutec announces that the company currently has eleven hot saws in its order books. Seven of the other plants, four further units are to replace an existing hot saw. There is no doubt about the economic benefit of a hot saw, but it cannot be clearly quantified. The most likely outcome would be the loss of material due to the saw cut, although this is also subject to the strong fluctuating scrap prices. The higher productivity, which more than compensates for the amount of scrap, depends on the boundary conditions in the individual case and therefore varies from case to case.

Hot saws for heavy billets

Field of application

The newly founded company, which did not have to take into consideration a well established, long-standing portfolio, personal sensitivities or grown traditions, made energetic use of this leeway. In the past decade extrutec has developed and implemented a number of new and important ideas in the field of field of billet heating, where the energy requirement could be significantly reduced in the section of furnace systems for artificial ageing; extremely flexible and efficient profile cooling; for tool heating; for the cutting of extrusion billets and other.

The development of a practical hot saw was achieved by intensively working on each of the problems mentioned and solving them - also with the help of external tool partners. This applies in particular to the development of a cooling lubricant suitable for interrupted cutting in conjunction with a minimum lubrication device, which enables a stable workable and long service life. Up to 70,000 cuts (and far beyond) can be made.

By optimizing the coordination of tool geometry, cutting parameters and cooling lubricant, it was also possible to reduce the cutting width to less than 4 mm, compared to the value mentioned above, this means a material saving of a good 50%. The chips can be automatically disposed of and, if necessary, briquetted with a powerful extraction device.

With regard to the design, the swivel saw has in the meantime emerged as the most suitable version. With its narrower design, it is also suitable for retrofitting.

Function and special features

The aluminium logs heated in the gas furnace are transported through the downstream hot extrusion press. This in turn means that a circular saw machine designed for aluminium processing must be equipped with a higher output than a comparable system for steel processing – despite the significantly lower specific cutting force of aluminium materials.

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Machine shops, industrial producers and CNC-machinery manufacturers, now in all continents, are working with the software company camProx of Karlsruhe, Germany. Since their founding 15 years ago, Ingo Haußler and Oliver Neumann and their team have been working every day to help ease their customers’ workflows. The latest founding of a Ko Sattva site earlier this year opens the door to the local industry.

Listening to and understanding customers’ diverse problems and desires is the foundation that has made the once small software company an internationally active establishment. “We really see ourselves as not only a software company, but also as a purveyor of knowledge for thousands of small tasks; with this knowledge we create innovation,” says Ingo Haußler. “We have a lot of tool boxes for the many things that we have seen and solved.”

It is about the special needs of machining aluminum and steel profiles, for which no other CAM system offers such a fast and flexible solution. It is about milling machine manufacturers who make high quality machines for this special sector. It is about the simplification and the most complete automation of NC program preparation. At around 90% single-piece production, all the earlier are inexpensive to correct. “The earlier we are involved in the purchase or sale of a machine, in the planning of production processes with complex machines or production systems, the faster and more successfully a process can be executed, resulting in a satisfied customer with a perfectly producing machine or industrial system”, explains Oliver Neumann, adding “Errors detected early are inexpensive to correct. After only a short time, a remedy can cost ten times as much, and soon a hundred times.” In order to understand the overall process, camProx has been working for years with all the global players and giants of the industry, such as Orgadata and Schuco.

It’s important for the company to offer a user-friendly complete solution for the control of CNC machines to automate the entire production line, to connect the data and interfaces, and automatically to convert CAD data into machining data. In that process, good planning, collision prevention, satisfied customers and the business success for all involved are paramount.

“We are currently developing the next generation of our CAD/CAM programs. Using a strict modular structure and with all that we have learned over the years, we intend to gradually start serving additional customer groups. We are convinced that our technical concept and our practice of respectfully working with our customers and partners will lead to further success in the long term”, forecasts Ingo Haußler confidently.
On 24 September 1997 the time had come: ALUMINIUM was launched in Essen. A total of 265 exhibitors set up their stands in Exhibition Halls 1 and 2, 5,394 trade visitors came to see them. It was striking even then that more than half of the exhibiting companies and nearly 40 per cent of the visitors hailed from abroad. And it goes without saying that the organisations celebrating their anniversaries in 2017 – GDA and Hydro – were represented at the inaugural event, as were renowned industry greats such as today’s SMS Group. A brilliant start with special guest adding an extra dose of glamour: Queen Sonja of Norway made the trek from Oslo to open the first ALUMINIUM. She probably wasn’t aware back then that she would inaugurate one the most successful industrial trade fairs to hit the market in the past 20 years. It’s been so successful and growing that 65 years after the initial “No”, Düsseldorf did ultimately get its chance – and has been the site of the ALUMINIUM trade fair since 2012.

**Impressions from 20 years ALUMINIUM fair...**

...with crowned heads, designers, ministers, astronauts, racing drivers, and forerunners of artificial intelligence.