UPCAST Review

UPCAST OY is the leading supplier of upward continuous casting technology for a wide range of non-ferrous applications.

Esko Valtaoja,
a writer and a Professor Emeritus of space astronomy:

The future is an open road

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Jo Rogiers,
GM of Aurubis Belgium

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New from UPCAST®

What's up

8mm DIAMETER AND 5m/min CASTING SPEED …

… was given as the target by the person responsible for the UPCAST® process. The year was 1986. "Get to work."

A typical cast product back then had a diameter of 20mm, which was then cold rolled into 8mm. Or sometimes at its very smallest it was 14.4mm, which was already formable by drawing. So why not cast directly the rod with the 8mm diameter? Also, when talking about the casting speed, it was possible to reach 5m/min, but only in the tests and under controlled laboratory circumstances.

The first 8mm project was realised after a few years, but with a casting speed of no more than 2.55m/min. It was important to be very cautious since there were many details still unsolved regarding the servo system and coiling, in addition to the casting process itself. The speed was then increased remarkably in a short time.

I joined the "Upcast department" of the Outokumpu concern 33 years ago. They had just formed a new R&D team. In that team my job included design, purchases and testing. Since we had no Pilot test hall of our own, we always had to agree on the testing time with the foundries of Outokumpu, which they of course had to adjust with their production. I, as the youngest member of the team, was naturally the "stooge" who carried out all kinds of tasks. Many times, things proceeded very slowly.

Markku Koivisto has incomparable and extensive experience and know-how of the UPCAST® process and technology and has personally had an enormous impact on its development and improvements over the years. Markku Koivisto is a well known and highly respected person all over the world in the copper casting business.

Nowadays Upcast Oy has a modern Pilot hall of its own with two lines and furnaces as well as sufficient personnel, which means a certain independence from others. The development work progresses much faster than it did three decades ago. However, one still always thinks of ways of speeding up the development processes further.

I have worked with upwards casting technology for my entire UPCAST career, except for a short period at the end of the 1980s when I had the great opportunity to participate also in the C&R (Cast & Roll) development. The key issue also in that process was to get the smaller grain size into the cast billet. The very first C&R and the 8mm upwards casting processes developed by Outokumpu Oy were commissioned at about the same time. Both processes were well received by the customers in the market. Today at Upcast Oy´s Pilot Plant there are increasingly intensive ongoing development projects with various copper and other nonferrous alloys for the UPCAST® process.

I am also responsible for the engineering at Upcast Oy and it's nice to remember the times when all the design work was manual with design boards, even though by the time I started at the company there were two desk computers: one was used only for preparing the UPCAST manuals and the other one was marked with the "do not touch" sign. Currently, all the design work is with 3D modelling, the work is faster and the quality much higher than in the early years, not forgetting that the work itself is more pleasant with the computers. The 3D modelling also enables simulation, which is a big advantage.

> The machinery and technology in the UPCAST® process have gone through a significant change over the years.

The machinery and technology in the UPCAST® process have gone through a significant change over the years. In particular, the EU Machinery Directive has brought along outstanding improvements to the safety of the continuous casting lines. At Upcast Oy the entire automation control system with its sensors has been renewed to meet the CE requirements. All the casting processes supplied by Upcast Oy are according to the EU Machinery Directive regardless of their destination.

Going back to the title of this text… The harsh demand to get the speed up so much was of course based on the fact that the production per hour had to reach the same level as e.g. 20mm with 0.8m/min. Should the person responsible for the UPCAST process back in 1986 have known that the requested level can be done and offered only now, he most likely would have shot himself (or us). ●

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UPCAST® first in upcasting

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• **TEXT:** JUUSO ENALA • **PHOTOS:** OLLI URPELA

THE FUTURE IS AN OPEN ROAD

Finland is a small country with a global reputation born of its innovativeness. Of the 5.5 million Finns, 24,000 hold a doctor's degree, but most Finns can only name one* off the top of their heads. Although this one tends to have an opinion about everything.

Less than one per mil of the world's population lives above the 60th parallel. According to estimates, up to half of them are Finns.The challenging, northern climate conditions, our exceptional geopolitical location and odd language have built the Finnish success story. According to research, Finland is the most stable and safest country in the world with the least amount of organised crime, best administration and the most stable banks, as well as a top-class educational system and freedom of the press. Finns are very modest. Some might even call us pessimists. 'Don't lick a drop until it has dropped,' loosely meaning the same as 'Don't count your chickens before they are hatched,' is a very Finnish proverb. Amidst all this grew **Esko Valtaoja**, a writer and a Professor Emeritus of space astronomy, who thinks that humanity itself is a success story.

**Based on the Finnish Science Barometer, according to which Finns are only able to name one living researcher, Esko Valtaoja. Due to this, a campaign called Vaihtoehto Eskolle ('an alternative to Esko') was organised on social media in late 2017 with the purpose of highlighting Finnish scientists. The campaign brought up nearly 2,000 different researchers. The face of the campaign was, naturally, Esko Valtaoja.*

Fix it though it's not broken

We meet with Valtaoja at the Museum of Technology. In these surroundings, almost everything looks like it could be from the science fiction movies of the 60s and 70s; an era when everything seemed understandable and predictable. An era when people believed that cars would fly by 2018.

– It is a good thing that people have an in-built streak of competitiveness in them. When a person jumps over a hurdle, they set the bar even higher, ready to break a new record. If not for this, we would have been content with steam engines and would not be able to use drones to fly medicine to the secluded, hard-to-reach villages of Tanzania.

During the interview, Valtaoja inspects the control board of an electrical substation from the 1940s. This gives me the perfect opportunity to ask what is, in the scale of the universe, the significance of a company that makes the world's best vertical copper casting systems.

– I can see how the company continues to refine and recycle the matter in good ways. The elements were created amidst the chaos of supernovas and asteroids, and only on Earth were people able to refine these natural resources. And even though the Club of Rome, for example, keeps warning us about the limited nature of natural resources, copper is an excellent example of how they can be recycled almost perfectly, used again and again in new and innovative ways.

The museum exhibits dozens of items that have clearly seemed great ideas at the time. Standing by an electronic mail delivery car invented 40 years ago, Valtaoja shares an easy definition for innovations that become breakthroughs.

– If an idea is presented in a publication of a technical field, it is often just utopic. When it is introduced in a popular vlog or a women's magazine, it can be considered a true innovation. In the 70s, an electronic sauna heater was developed in Finland, which could be switched on by telephone, calling it for example when leaving work. The idea did not become a hit. But it was the first sign of the Internet of Things, which is everywhere right now.

Oceans are drowning in plastic, but it's alright

Valtaoja has sometimes been criticised of being even too positive. When cries of alarm have been raised due to global warming and polluted oceans, Valtaoja has tried to calm these voices by stating that we will pull through this:

> Copper is an excellent example of how natural resources can be recycled almost perfectly.

– We already know how to stop climate change, now only political commitment and actual implementation are needed. We know how to cut down the amount of plastic waste and we are well in our way to changing people's attitudes. We have better resources for success than ever before. The people on Earth are healthier, wealthier and more educated than ever. The world is more democratic than ever. We have more problem-solvers and resources than ever before in the world's history.

The eyes of the 66-year-old Valtaoja shine. His positivity is something intrinsic to him. In public discussions, the doomsayers are often given more space.

– The gloomier you are, the wiser you are thought to be. Sometimes, people have even accused me of being an optimist. I take it as a great compliment. I am a top expert of my field, and people do not achieve that if they fall in love with their own beliefs. You need to have extensive knowledge about matters, but be able to explain them in plain language. It is often said that 'that was a very wise expert, I hardly understood a word of that'. Did the expert get their message through? Even if you face the future with an open mind, opponents are also needed. You need both gas and brake pedals in cars, too. But first and foremost, you need a clear direction.

So no end of the world?

I am familiar with Valtaoja through the media, but now I have the chance to talk with him face to face. I listen to and look at Valtaoja, almost enchanted by him. He is optimistic and positive, but he is also a realist. A few years ago, in an interview with school pupils, he gave the young people three rules to live by: know instead of believing, make the world a better place and have fun.

– The world can also be made better through joy. We Finns live in the midst of coldness and darkness, and if we were denied our flights to the sunny south or warm breakfast porridge in the name of fighting climate change, I have a hard time imagining that we could commit to something like that. The world is in better shape than ever before in its history. In a few decades, it will be even better. We should walk into the future full of joy and fresh energy. The solution is ours.

As success stories of humankind, Valtaoja brings up the improved status of women, the major improvements to literacy, increasing life expectancy and education levels, new medication and new, cleaner ways of producing food and energy. All this has led to a wealthier world and a rapid decrease of poverty. The UN is even attempting to completely eradicate absolute poverty by 2030. When I ask Valtaoja whether it is right that the 85 wealthiest people of the world own more than the 3.5 billion poorest put together, I receive an answer that is very typical to the man:

– What harm has **Bill Gates**, for example, ever done to you? He has made the lives of hundreds of millions of people better, collecting a fortune that he is donating to charity.

Thank you, Esko, for this answer, too. Indeed, Bill Gates has donated 53% of his fortune, worth nearly a hundred billion euros, through his Bill and Melinda Gates Foundation for such purposes as preventing infectious diseases and promoting education in developing countries. Gates has reported that he plans to donate almost his whole fortune to charity.

> The world is in better shape than ever before in its history. In a few decades, it will be even better.

Knowledge is pain

A space astronomer has a longer perspective to the world than most, but I cannot help but ask for advice from a man that wrote 'The Handbook of Everything' (Kaiken käsikirja). What should I do to become wiser?

– Leave social media. Read a book. Decide to build a better future. The entertainment in social media is interesting, but it also opens up the world of alternative truths. Still, this alone does not make social media bad. When **Gutenberg** invented the printing press 600 years ago, it wasn't used just for printing bibles; the prophesies of **Nostradamus** were the most popular texts. They were the porn and violence of their era. I predict that the entertaining predominance of social media will soon disappear and people will return to facts. That would be more than desirable. People often say that knowledge is pain. That is the most idiotic proverb I have heard. Ignorance is what brings pain.

You predict the future and you mostly see positive things in it. What makes it so hard to predict the future?

– People. We don't believe that the future is in our own hands. The future is not written in stone. In the end, we will do the right thing after trying other options. Remember that the future is an open road. Understand that humankind is a success story. ●

• **TEXT:** TOTTI TOISKALLIO • **PHOTOS:** INTRACTO – DIGITAL AGENCY

Sustainable success through responsible growth

More than 150 years ago, a small gold and silver separating plant was established in Hamburg, Germany, under the name of Norddeutsche Affinerie. Ten years later, the company commissioned a copper electrolysis facility – the first permanently operating facility of its kind in the world. Now in 2018, Aurubis AG has developed into a leading provider of non-ferrous metals, and the world's largest copper recycler.

Once a small local company, Aurubis has grown into a worldwide group with about 6,500 employees. While the headquarters, together with the company's largest production site, still exist in Hamburg, Aurubis has extended its operation to 22 countries in Europe, Asia and North America. Today, the company processes complex metal concentrates, copper scrap and metal-bearing recycling materials into metals of the highest quality, and can without a doubt be regarded as a forerunner in the industry.

– Our strength is our strong metallurgical expertise, which we use throughout our whole value chain, says **Jo Rogiers**, Senior Vice President Technology as well as Managing Director of Aurubis Belgium. – We have developed our own, efficient procedures for processing very complex raw materials, and we utilise our special expertise to develop alloys in order to support our customers' product developments as well as our markets, both now and in the future.

Offering a wide range of products and services for copper-related companies and applications, Aurubis is a standout among the industry thanks to its in-house cathode production, which translates into highly reliable supply, and the largest product range of copper rods and shapes with regard to diameter, coil sizes, alloys and materials – not to mention its status as the number one copper recycling company in the world.

– We also provide technical support, joint product development and customer service as well as extensive hedging and logistics concepts for our customers, **Gaëtan D'hoest**, Head of Specialties at Aurubis AG, adds.

World's largest copper recycler

Aurubis has for long been at the forefront of the industry: in its early years, it was the first company to put chemically pure electrolyte onto the market. Today, having grown to be the largest copper recycler in the world, it utilises cutting-edge recycling technology.

– Using the Kayser Recycling System (KRS) at our Lünen site, we recycle secondary raw materials with a copper content of 1 to 99 percent in an environmentally friendly and energy-efficient manner, Mr Rogiers says.

The recycling is carried out through various procedures according to the composition of the raw materials used. This enables material-specific processing of an especially wide range of recycling materials in a competitive and environmentally sound manner. Apart from copper, precious metals, nickel, tin, lead and zinc are recovered as by-products.

– Our multi-metal recycling strategy combines the efficient use of resources and energy, covering the input of increasingly complex raw materials and steady growth of the recovered metal volumes, especially the minor metals, as well as flexible raw material input.

In addition to efficient recycling, being in itself a manifestation of 'green thinking', Aurubis also implements high environmental standards in its everyday work. Coined and developed at the Hamburg plant, which is located close to the center of the city, the standards have then been put into effect at other Aurubis plants as well.

– We first introduced these standards in the 1980s and 1990s, and have updated them continuously ever since. We perceive environmental friendliness and sustainability as competitive advantages: they are thus a fundamental part of our operations, Mr Rogiers points out.

> Aurubis' objective is to develop from a copper producer into a multi-metal provider.

*GM of Aurubis Belgium, **Jo Rogiers** (left), and Head of Specialties at Aurubis AG, **Gaëtan D'hoest**, are convinced that the UPCAST® production line will give a substantial boost for the Foxrod Product Line at Aurubis' site in Olen.*

A substantial boost in productivity

Of course, no company could survive if it was not sufficiently equipped to answer the needs of its customers. During the years, Aurubis has invested in high quality hardware to support its goals and aspirations – and to keep its operations at the peak of productivity. In 2017, the company purchased its second UPCAST® production line, which was installed at Aurubis' site in Olen, Belgium.

– The new line will give a substantial boost to support the planned growth of our Foxrod Product Line, which is used to produce Oxygen Free Wirerod. The line offers an additional production capacity of 12 000 tons, bringing our total capacity to 40 000 tons, Mr D'hoest asserts.

In addition to providing substantial raise in terms of tonnes, the new UPCAST® production line allows Aurubis to increase the sales of its Copper Special Products for various growing market application segments, such as Complex Profiles and Foxrod High Performance Alloy Wirerod for the automotive industry.

– This is now the second UPCAST® line we have purchased since 2000. We have been very happy with the performance of these hassle-free, robust machines. Collaboration with UPCAST® has been very transparent and supportive throughout the whole process, Mr D'hoest declares.

From copper producer to multi-metal provider

All in all, the future is looking bright for Aurubis: with the increase of digitalisation and the use of renewable energies, the company expects steady growth in its operations.

To ensure its position at the forefront of the industry, Aurubis will pursue ongoing improvement to proactively tackle the possible challenges of international competition. That is why the company, at the end of 2017, introduced its new strategy with the central objective to develop the group from a copper producer into a multi-metal provider.

– We will consistently expand our business in the multi-metal sector to include gold, silver, nickel, tin, lead and platinum group metals, as well as minor metals such as selenium and tellurium, for example.

In the scope of the new strategy, Aurubis will also focus on processing concentrates that are even more complex in the future, and will thus be able to expand the volume of recovered metals, such as selenium and nickel.

Along with the goals for growth and efficiency of the group itself, Aurubis strives to work for the greater good through emphasizing responsibility.

– We have set our sights on ensuring that our actions serve the economy, the environment and people. We are able to draw on our expertise in metal production and recycling as well as our longstanding partnerships, Mr Rogiers concludes. ●

In fiscal year 2016/17 Aurubis produced the following group-wide:

- 1,160,000 tons of copper cathodes
- 719,000 tons of continuous cast wire rod
- 190,000 tons of continuous cast shapes
- 230,000 tons of flat rolled products and specialty wire products
- 42 tons of gold
- 1,071 tons of silver
- 2.4 million tons of sulphuric acid

• **TEXT:** ANNA KORPI-KYYNY • **PHOTOS:** KALEVI KOSKELA, TEKMUR

A maintenance visit in Kuwait

Bricklayer **Kalevi Koskela** left to work in Kuwait in December, even though he could have already retired. According to him, working keeps both your mind and body brisk.

Various jobs have taken this bricklayer at Tekmur, Kalevi Koskela, to Pakistan, Iran, Poland and Kuwait, where he left last December. The maintenance work was estimated to take four weeks, during which the bricklaying of the UPCAST® furnace was renewed.

The previous visit to the smelter was 10 years ago. And it was still being operated under the same manager that Mr Koskela got to know a decade ago.

– We became friends during my last visit and have been exchanging yuletide greetings ever since. As I was leaving this time, he said he hoped to welcome me again in another 10 years, Koskela laughs.

Kalevi Koskela is an experienced traveller.

Perseverance assures quality

UPCAST® furnaces require excellent concentration skills and perseverance from the bricklayer. The seams cannot be wider than 1mm, and for this reason the tiles need to be grinded very carefully to ensure a durable, high-quality end result.

– One must not give up or start cheating. It is only us professionals who can work with these furnaces the right way, Mr Koskela relates.

In addition to his professional skills and expertise, Mr Koskela has also developed his knowledge of foreign languages during his many trips. He can speak not only English, but also German, Swedish and Spanish as well as a little Portuguese and Russian.

– In this job you need to get along with all kinds of people. My work has taught me to let everybody have their own opinions and ways of working – I do my job and don't demand too much of others, Mr Koskela declares.

Ready after good cooperation

When on site, the work goes on for six days a week. After the workday is over, leisure time at the hotel goes into the Internet, checking out the latest news and happenings. Nowadays it is easy to keep in touch with the family via Skype. However, Mr Koskela is convinced that working away from home does require a certain mindset.

– We might even be away for two months, so having the right attitude about the journey means we understand we're there to work. I have to admit that from time to time it's very lonely, and not everybody is willing to go on these sorts of trips. For me, it's already become quite a routine.

Fish for lunch at the local restaurant by the marketplace.

On the way to work and back, the local traffic was very challenging from time to time, since the cars on the multilane roads changed lanes without turn signals.

In this case, the work was finished earlier than expected. The workers at the factory were very experienced, which made the work go smoothly.

– The people at the workplace were very friendly and helpful, and it was very nice working with them. ●

During his stay, Mr Koskela had the possibility to visit the city of Kuwait, where he saw skyscrapers one after the other, side by side. He visited the observation tower, which was 120m high.

Like one big family

tekmur

TEKMUR Oy is a longtime partner of UPCAST Oy, and their bricklayers have strong expertise. Specialisation, an excellent team spirit, and motivated workers are all Tekmur's strong points.

Tekmur has more than 20 owners, the majority of whom are its employees. This is a big advantage for the company, since the employees are highly committed. The hierarchy is therefore very low – it is very easy for everyone to approach the management and ask questions about anything.

Tekmur employs 25 people, and most of them are bricklayers. To have a long career at this company is more the rule than the exception.

– We don't even talk about a workplace as such – we're more like one big family. When we're on the road, we live and spend our free time together. The excellent atmosphere helps when the work is hectic as well, **Tomas Johnsson**, the Chair of the Board of Directors, points out.

When personnel turnover is very small, it means that the customers' internal routines along with their products and installation methods are well-known and under control.

– Bricklaying is at the heart of the customer´s processes and operations – we know how much damage even a minor change can cause. And the jobs of even 2,000 people can be dependent on production of the single furnace line, which means that if the commissioning of the line is delayed by a day or even an hour, we'll be watched very critically by a great many people. Our expertise has big impact on how successful our customers will be in the future.

Tekmur does not produce any materials itself: rather, it works in co-operation with German, British and Austrian companies.

– That's why we sit on the same side of the table with our customers and evaluate together which material is best suited for a particular furnace and site.

Mr Johnsson believes that the co-operation between material and equipment suppliers will increase.

– Together we can solve problems efficiently and supply even better furnaces for our customers, he says confidently. ●

• **TEXT:** SARI LOMMERSE • **PHOTOS:** UPCAST

Optimised energy consumption saves money

Furnaces are crucial equipment in UPCAST® continuous casting line to assure high-quality process and end product. They also play a key role in the energy consumption. Optimised use of energy decreases heat losses and production costs.

Janne Hosio, Sales Manager

Energy consumption is the biggest individual cost factor in the production. Typically, it is about 58–67% of the overall costs.

What impacts consumption are the furnace type and the inductor attached to it, as well as the lining materials. With the right combination, energy consumption can be minimised.

– It is essential to choose the right combination suitable for each product and capacity. There is always a certain amount of energy loss in the furnace, and if the line is not run with full capacity, the losses increase in relation per produced tonne. Energy usage is always at its most efficient when run with the production rate specifically designed and calculated for the line, says **Janne Hosio**, Sales Manager.

The capacity requirements vary a lot, and that is why Upcast Oy has designed new sizes of furnaces to meet the different needs of customers.

– We've got several sizes of furnaces, and various power inductors can be combined with them. We have designed smaller furnaces for lower capacity requirements and bigger ones for higher demands, and over the years the gaps in size range have been condensed. We can offer the right, cost-efficient solution for all capacities.

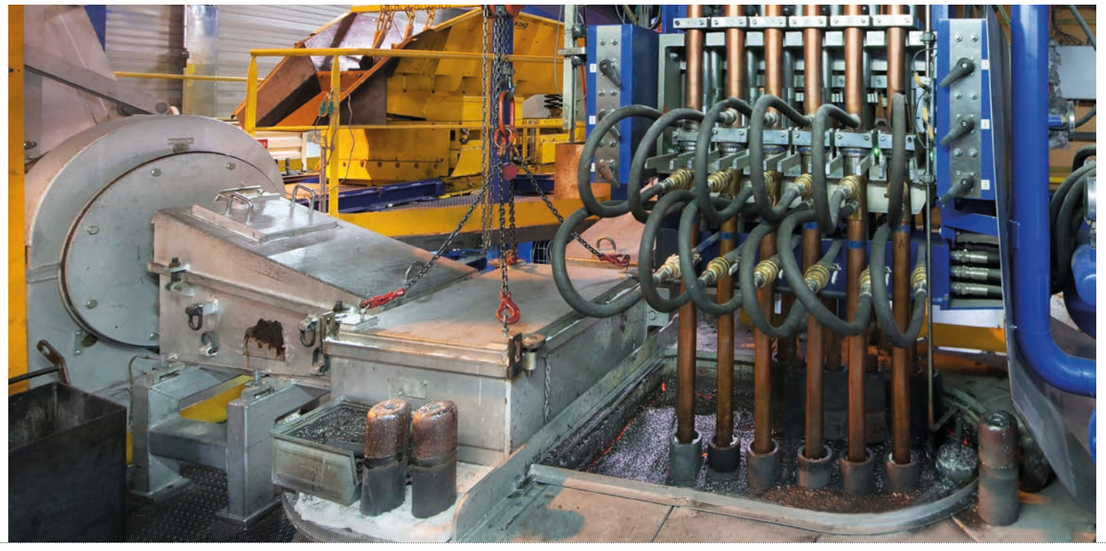
Product development work is based on the data received in t he field

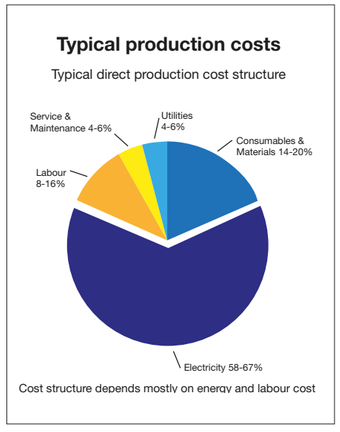
UPCAST® furnaces are equipped with energy-efficient inductors transferring energy efficiently into the furnace. The power supply can be controlled steplessly, enabling any power range to be used efficiently.

– Power was regulated with rather coarse steps earlier using step transformers. Now with transistor converters we can use exactly the amount of power needed, which also reduces the amount of heat losses. The variation of temperature is also reduced, which saves more energy as well.

UPCAST® has long experience of casting lines, and continuous development work has been done, based on the actual values of existing lines. It has been possible this way to develop a more efficient and wider product range for customers.

– Even a 10% reduction in energy consumption means a remarkable amount of money in production costs, which directly impacts customer competitiveness and the payback time of the investment. Optimising energy consumption also makes the lines more environmentally friendly, Mr Hosio says.





> Even a 10% reduction in energy consumption means a remarkable amount of money in production costs.

• **TEXT:** SAMI OLLILA • **PHOTO:** UPCAST

Machinery safety requirements showing more integration in the world

Sami Ollila, Project Manager

The EU Machinery Directive was originally published in 1998, and the current version was accepted in 2006. The purpose of this directive is to integrate the regulations and requirements with regard to the safety of machinery and equipment, and remove trade barriers by increasing the free movement of goods within the EU/ETA. Nowadays, the Machinery Directive is being more and more acknowledged in the world, including, e.g. Turkey, Norway and Switzerland, and one of the biggest projects in the history of mankind is to assure that people can always leave the workplace healthy and safe after work.

We at Upcast Oy consider machinery safety a matter of honour. The very basic requirement in the design of the casting line is to guarantee that the line is of high quality, it is easy to operate, and all possible risks related to health and safety are taken into account. The company has know-how, experience and expertise gathered over decades of these aspects. The design actively utilises the EN standards for machinery safety, which assures that the solutions are tested and proven to be good. The professional team evaluates and analyses the risks, which are then minimised through many technical methods. With regard to any possible remaining risks, the customer will be well informed during training as well as in dealing with operation instructions and warning signs. Knowing in detail the methods related to and determined in the EU Directives, EN Standards and Machinery Directive represents a huge advantage in the market – where not everybody has a similar understanding of it and its complexity. It is good to remember that the buyer also has the responsibility to check and make certain that the supplier has sufficient knowledge and experience in the field of machinery safety and can thereby deliver safe machinery and equipment.

It is also good to keep in mind that although the line is designed and built to meet the highest safety requirements, substantial responsibility for the safe operation of machinery remains with customers and their operators. The safety equipment must not be removed or modified, the original spare parts and consumables should be used, and customers should invest in their own safety culture in order to maximize the machinery safety of the casting line. Upcast Oy strongly appreciates the feedback received from our customers: getting close-call reports and development suggestions will help us to continuously improve our lines and their machinery safety.

> The professional team evaluates and analyses the risks, which are then minimised through many technical methods.

Many of us love our jobs, but we have to keep in mind that our families and friends also want to have us back home safe, sound and healthy every day after work. Let's all maintain and improve machinery safety together. ●

• **TEXT:** TOTTI TOISKALLIO • **PHOTOS: RUSS-ELEKTROOFEN**

HIGHEST QUALITY THROUGH CLOSE COLLABORATION

Since 1945, RUSS-Elektroofen has been an important supplier in almost 2800 melting plant projects worldwide. The company's know-how in electrical technology also plays a very important role in the supply chain for UPCAST® continuous casting lines.

Andre Riff
Project Manager

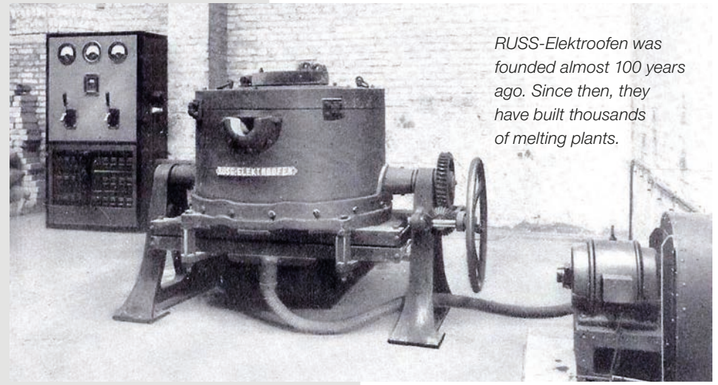
When RUSS-Elektroofen's Project Manager **Andre Riff** describes the company as a "traditional family business", one might think of a small, local firm operated by a few family members. However, the roots of the company actually go far back in history: RUSS-ELEKTROOFEN PRODUKTIONS GMBH & CO. KG was founded in 1923 in Cologne, Germany and currently the almost hundred-year-old company manufactures transistor converters, furnaces and billet heaters of the highest quality, supplying them for companies throughout the world. RUSS-Elektroofen's unique 'recipe' for transistor converter manufacturing makes it the best company to deliver high-quality transistor converters for UPCAST® production lines.

Since 1945, RUSS-Elektroofen has participated in 2,800 melting plant projects. In the beginning, these included resistor heating furnaces, but during the last 30 years the company has shifted its focus into induction furnaces. As a reliable and stable company with a long track record, RUSS-Elektroofen is a desired collaborator in the industry.

– Our strengths are special expertise in electrics and the ability to manufacture and construct customer-specific products, which are optimized for best efficiency and practical value, Mr Riff says.

> During the 13 years of co-operation, the companies have completed over 30 joint projects.

RUSS-ELEKTROOFEN



RUSS-Elektroofen was founded almost 100 years ago. Since then, they have built thousands of melting plants.

Over 30 joint projects with UPCAST

Collaboration between Upcast and RUSS-Elektroofen began in 2005. During the 13 years of co-operation, Upcast and RUSS-Elektroofen have completed over 30 joint projects. These have mostly been UPCAST® production lines, which use RUSS-Elektroofen's inductors and transistor converters – inductors to heat up and maintain the heat of the furnaces, as well as TIV converters to provide, for example, stepless power control. According to Mr. Riff, collaboration has been very easy due to the companies' shared desire to deliver the highest quality to their customers.

– Direct contact between Upcast and RUSS is utmost important. Meetings take place regularly, upcoming projects are discussed, and the technical expertise can be exchanged for the continuous improvement of the products," Mr Riff explains.

Both Upcast and RUSS-Elektroofen have always worked internationally and, despite the headquarters residing in different countries, distance has never been an obstacle for working closely together.

– Our facilities have been located in Hemer, Germany since 2006, but our operations cover the whole world – like Upcast´s operations, too, Mr Riff declares.

Long life & low energy consumption

The main reason behind Upcast's and RUSS-Elektroofen's collaboration is – quite clearly – high quality: in the copper and non-ferrous metal branch, RUSS-Elektroofen verifiably boast the inductors with the lowest energy consumption and longest life.

– Our main advantages over our competitors are years of experience, flexibility and the ability to build customized and cost efficient products, Mr Riff points out.

In RUSS-Elektroofen's case, efficiency does not only mean productivity, but the ratio between consumption and production rates. As the price of energy will probably keep going up in the future, RUSS-Elektroofen sees great potential in developing energy-efficient melting plants.

– Today, melting furnaces consume vast amounts of energy. We will continue to develop our products further, always making them better – also in the sense of minimising consumption, Mr Riff sums up. ●

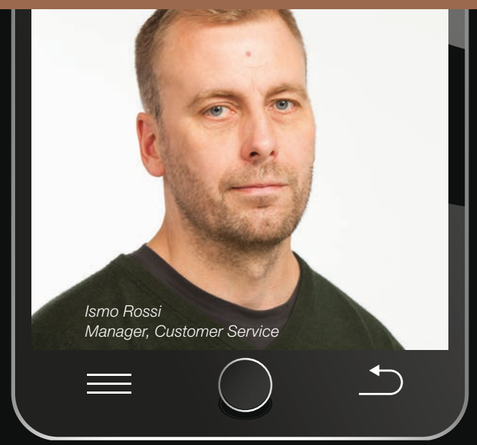
1923
FOUNDED BY EMIL FRIEDRICH RUSS

1995
CURRENT MANAGING DIRECTOR ROLF SCHULLER JOINS RUSS

1995
DELIVERY OF THE FIRST TRANSISTOR CONVERTER FOR THE CHANNEL FURNACE APPLICATION

1997
DELIVERY OF THE FIRST TRANSISTOR CONVERTER FOR THE CRUCIBLE FURNACE APPLICATION BELOW 50 HZ

2006
COMPANY RELOCATED FROM COLOGNE TO HEMER, GERMANY



No need to be too self-confident in this job!

I am a very practical person and like to work with my hands. Before Upcast Oy, I worked at its predecessor, Outokumpu, as a commissioning engineer, but left to work elsewhere for a while and returned to the familiar Upcast team in 2007 as the Customer Service Manager. This job requires a lot of technical know-how and experience, which I have gained over the years. It's only four years since my last commissioning – I was available to go and had the necessary skills while the commissioning engineers were working on other sites.

I'm helping our customers to solve and find solutions for their technical issues, whether they're deficiencies or challenges. The work is mainly problem-solving and thus requires patience and flexibility. Many times you bend in your personal life, and that can mean even postponing your vacation if the customer has some acute situation that just has to be resolved.

Now, after almost 25 years of experience in the business, I can say I know the routine and have some know-how for the job. That said, you have to maintain a humble attitude, because all the time you're facing new issues, questions and problems which you haven't solved earlier. Working with metal melt – using expensive equipment in an environment involving risks to the safety of people – you must never be too self-confident and take overly quick actions, but rather always consider whether you yourself can overcome the problem or if it's better to get some advice.

Nowadays, I don't give in to too much pressure at work: I know we can take care of all the issues and difficult situations sooner or later. But it always feels good to be able to help customers by solving their problems.

It's also great to see how Upcast Oy has been successful all these years. In addition to providing work for our own employees, we give it to many of our suppliers and enable the operations of our customers at the same time. It shows we're doing things right! ●

• **TEXT:** SARI LOMMERSE • **PHOTO:** UPCAST

I am very excited to get to work on the site

Mikko Vatka, project engineer, electrical

Mikko Vatka started at Upcast Oy´s project department in September 2017. He is the new electrical project engineer, whose duties include participating in the procurement process of the projects, carrying out factory tests for the electrical systems and participating in the commissioning of the lines and upgrades at the customer´s site.

– For the time being I have been working in the Pori office, prepared some of the purchases and answered questions coming from the customers. I am really looking forward to getting to the first site for the commissioning, where the technical details with regard to the business and the continuous UPCAST® casting line itself will become more concrete. I am very anxious to travel to the site, Mikko says.

Mikko worked before at TVO´s nuclear power plant in Olkiluoto for four years as a commissioning engineer and electrical designer in a very large international project. When Mikko heard about the open position at Upcast Oy, he wanted to go for it right away.

– I had heard from many of my colleagues, suppliers and former employees that the company executes very interesting projects, and that they have an excellent working environment and good people. What could be a better driving force? When I started last autumn, I noted the good approach for service and working together as a team. I believe that these are exactly the things with which we can produce added value to the customers and maintain a long-lasting cooperation relationship.

In his free time Mikko spends time with his family – his wife and two children, aged 2 and 3 – e.g. in the summer time at their summer cottage and on the water. Mikko is an active member of the local electrical association, and together they visit many different production facilities in different lines of business. So, technology and electrical details accompany Mikko in his leisure time as well.

– I am an authorised electrician and I like to build, fix, adjust and tune various devices. I also want to encourage my children to be curious and do things with their hands.

Mikko studied electric power engineering at Tampere University of Technology (TUT). During his studies he also spent half a year in the Czech Republic as an exchange student, which was a broadening experience that laid good grounds for his future working life.

– During those six months I met interesting people from all over the world. That got me interested in working in international projects with people from various cultures, Mikko concludes. ●

• **TEXT:** HANNA-LEENA MÄKITALO • **PHOTOS:** ETS-LINDGREN, AN ESCO COMPANY

Why copper?

Many of us have had our body or part of it scanned by an MRI scanner. MRI stands for Magnetic Resonance Imaging and is one of the most accurate devices used in hospitals and medical clinics because of the sliced pictures of the human body and its organs and tissues that it creates.

We do not necessarily think about the device itself or its environment when we enter the MRI scanner "tube." Usually the situation is exciting to us, and we are very nervous about the operation and especially the results.

It is, however, interesting to discover that the magnet is placed inside an RF shielded room, a so-called Faraday cage, in order to assure a safe environment for the measurement and high-quality images without radio frequency interference. The floor has to be extremely rigid to provide a steady platform for the heavy equipment, and there has to be some acoustic shielding provided as well since the magnet is very noisy when in operation.

In most cases these shielded enclosures are made of non-ferromagnetic materials like copper or aluminium, but nowadays galvanised steel can also be used. In addition to the walls, floor and ceiling, the critical parts of any shield are the openings, such as doors and viewing windows and all the other feedthroughs as well (air, compressed air, electricity etc.). The supplier needs to know how to design the whole room so that these openings do not form weak points allowing for leakages at the required frequencies. Electrical continuity needs to be assured at every point so that the required 80–100 dB shielding effectiveness can be reached everywhere.

Copper assures reliable MRI-scan

There are three primary reasons to use annealed copper as the RF shielding medium (the comparisons below are mainly done between copper and galvanised steel):

1. First is **conductivity**: Effectively, an RF shield is an electrically conductive circuit about a three-dimensional space (the room). The more conductive a material is, the better its shielding effectiveness. The primary RF conductor with a galvanised steel shield is the zinc coating on the base steel plate. Copper has a conductivity rating of 1.0, whereas zinc on the other hand has a conductivity of 0.26, and that of aluminium is also clearly less than copper. The only metal that has a higher conductivity rating than copper is pure silver, with a rating of 1.05.

2. Second is **corrosion**: Most metals corrode, with gold being an exception. All RF shields are made up of joined metal sheets. It is very important that efforts are made to prevent corrosion, not so much on the metal surfaces but at the joints of the metal sheets that make up the overall RF shield. Copper corrodes to copper oxide. Copper oxide is electrically conductive. The RF joints in the modular copper shield are pure annealed copper to copper and are 1–3/4" wide. Corrosion at the panel joints made of copper will have little, if any, effect on the conductivity of the panel joints, thus maintaining the shielding effectiveness. Zinc, on the other hand, corrodes to zinc oxide, better known as white rust. Zinc oxide is a ceramic and electrically inert. As such, corrosion at the panel joints of a galvanised steel shield will reduce the overall shielding effectiveness due to a reduction in surface conductivity.

3. Third is **gross surface contact area:** Another reason why the copper shield is considered superior. When the panel joint faces form a large surface contact area, it provides superior electrical conductivity. The panels are also normally connected mechanically with through bolts placing the RF joint in compression, which affords much higher clamping pressures between the copper surfaces of adjoining panels. With the galvanised shield, the RF contact area is essentially just the edge of the 2" wide steel friction clamp. This produces a very narrow contact area. The framing clamp is a slip connection so that the panels are effectively held together by friction. If too much torque is used on the 1/4x20 screws that secure the clamps, the clamps will deform further, reducing the RF contact area. Another drawback is that the compression clamp will cut through the zinc plating and into the underlying base sheet steel. Additional corrosion can then occur on the base steel, compounding the reduction in overall conductivity.

It's just amazing how much expertise, experience and detailed knowledge surrounds us in our everyday life to which we hardly ever pay attention! ●

SPECIAL VISITORS AT UPCAST

Upcast Oy had the honour of hosting the visit of Finnish ambassadors to various South American countries and other influential persons working with export trade organisations at the end of August last year. The visit was part of their tour in the Pori area arranged by the local chamber of commerce. During their short visit, the guests heard about Upcast Oy´s history, products, current business and markets. It was specifically interesting for them to see how many lines the company has delivered to countries in South America. It was nice to be able to exchange contact information, since our ambassadors out there are very enthusiastic to support all the business efforts in their respective host countries by spreading information on the Finnish companies´ businesses and their expertise in order to connect said companies with local potential customers. ●

UPCAST® User Meeting – an event to look forward to

Almost every second year since 2000, Upcast Oy has organised UPCAST® User Meetings to bring together their customers and partners from all over the world to exchange ideas and experiences about the upward continuous casting process as well as to learn about the latest developments. The UPCAST® process and technology is the key topic for the intensive discussions during the few days spent together. It is a rare and exceptional situation to have so much expertise, experience and knowledge of continuous upwards casting gathered together in one room. What a great opportunity!

An increasing number of users have participated in these meetings every time, which of course sets various challenges to Upcast. The topics in the seminar need to be well-chosen and interesting, and the venue must be easy to fly from everywhere. Thirdly, Upcast has always chosen the location so that it is close to some UPCAST® casting line or some other facility of interest related to the copper casting business where a visit can be arranged.

Three years ago, the meeting took place in Finnish Lapland, and one day at the end of the week was spent in Pori, where the customers were able to visit the tank house of Boliden and conduct factory visits to Cupori and Aurubis. The tour ended at the UPCAST® Pilot plant, where there were two casting lines in operation and a delicious buffet lunch was served before the farewell.

In September 2017, about 70 people from many different countries spent a week in the beautiful scenery of Croatia. The seminar was held in Zagreb and one sunny day in Zadar, which was chosen as the "Best European Destination in 2016". The meeting was then closed after a visit to Eurocable´s factory (EUROCABLE GROUP, Eurocable Group d.d.). The tour included so much more in addition to the UPCAST® process and was extremely interesting, professional and perfectly organised by Production Director Tomislav Hren and his team. Everybody felt good going home and will certainly join the next event in 2019. Where? That remains to be seen. ●

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