

compact steel

03 / 2015

The ThyssenKrupp Steel Europe customer magazine
thyssenkrupp-steel-europe.com

RESEARCH

How ICAMS in Bochum searches for new materials

INFO GRAPHIC

We invest, you benefit

MODELING

Why precision calculation pays off

Partners for generations

ThyssenKrupp Steel Europe helps family-owned companies grow and provides long-term support

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ThyssenKrupp Steel Europe
Thinking the future of steel



ThyssenKrupp

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Research and manufacture

ThyssenKrupp Steel Europe
supports Germany's small and
medium-sized businesses with
scientific analyses, data-driven
quality assurance, and material
development.





The data king
Andreas Kern
heads Quality
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Dear readers!

The internet has made the markets volatile and rendered many customer relationships superficial. One click and they've moved on to your competitors. So how does customer loyalty work today? How can we ensure that long-standing customers will continue to grow with us in the next generation? We know our customers expect outstanding quality, but they also need us to be dependable, to listen to their needs and find tailored solutions. Loyalty has a lot to do with trust. And trust is something we have to work hard to create and maintain.

Read the cover story for an example of how it works in practice. We take a look behind the scenes and provide insights into our day-to-day cooperation with the family-run companies Miele and the Winkelmann Group, which have grown together with us over the last decades.

Our expertise in steel is also based on intensive cooperation with science institutes such as ICAMS at the Ruhr University Bochum. The Interdisciplinary Center for Advanced Materials Simulation has specialized in simulation and model calculations. We took a look over the experts' shoulders and let them explain how the cooperation with us works. I hope you enjoy the interesting insights we have in store for you.

Yours,
Dr. Heribert R. Fischer
Director of Sales & Innovation

View





Sun worshippers in the wind tunnel

“Deep in the West, where the sun gathers dust...” is the start of Herbert Grönemeyer’s tribute to Bochum. He’s a popular German musician who swooned about his city of birth in 1984. Long gone is the dust there generated by mining. Instead, the green power of the yellow sun is harnessed as a source of power. The Bochum University of Applied Sciences has been developing solar-powered electric vehicles for 15 years. It produced a car that holds the Guinness Record for the longest journey by solar electric vehicle. The Bochum scientists regularly use the World Solar Challenge in Australia as a proving ground for their feats. In a race covering 3,000 kilometers, participants navigate the continent Down-Under from north to south every two years. As cooperation and technology partner, ThyssenKrupp has participated in it for years. The ThyssenKrupp SunRiser, which is currently stationed in the wind tunnel at Daimler in Stuttgart, Germany, is having its aerodynamics put to the test. It utilizes components from Steel Europe, Bilstein, Magnettechnik, Plastics, Presta, and Schulte. This year’s model will line up with the rest on the start line in Darwin on 18 October. With any luck, this aerodynamic two-seater sports car will cross the finish line in Adelaide six days later, hopefully taking first place. Good luck!

Changing of the guard in Unit 3

The turbine set at Duisburg's power plant was replaced after more than ten years of service.

The power plants operated by ThyssenKrupp Steel Europe need a general overhaul on a regular basis. This means that the turbines are also replaced approximately every ten to 15 years. Recently this honor fell upon Duisburg's power plant in the Ruhrort district. The entire turbine set was dismantled in order to exchange the rotor unit, which is the critical component of a turbine. It is an oversized axle on which the blades of various sizes are mounted one after the next.

In addition, the main steamline was replaced and the guidance and control system was overhauled. It was a tremendous endeavor involving up to 100 external and internal experts at times.

The new generator transformer, which was also installed in the process, weighs nearly 170 metric tons. Even for ThyssenKrupp Steel Europe's power plant experts, this massive project posed a number of challenges.

The manufacture of steel requires a lot of energy. For this reason, the Group operates its own power plant fleet and converts the process gases generated during production into electricity. It saves money and is a sustainable alternative. The power plant in Duisburg can generate 560 megawatts, enough energy to cover the needs of the steel mill.

For more information on the Group's activities in sustainability, visit: www.thyssenkrupp-steel-europe.com/en/company/sustainability/sustainability-overview.html.

New managing directors – subsidiaries name successors



In October Norman Baltrusch (left) will join the management board at Hoesch Hohenlimburg to take charge of the Controlling/Accounting/IT directorate, replacing Michael Stausberg, who will retire after 47 years of commendable service. CEO Dr. Jens Overrath, who is responsible for Technology and Quality, will also take responsibility for Sales. Also in October Oliver Hoffmann (right), previously Head of the Application Technology department in the Technology & Innovation unit, will join the management board at ThyssenKrupp Rasselstein with responsibility for Technology. He replaces Karl-Ernst Friedrich, who held this position since 2005.

Medium-wide strip specialists honored once again

Hoesch Hohenlimburg was honored with the Supplier of the Year award by its long-time partner Kirchhoff Automotive Deutschland GmbH. The decision was based on the company's monthly supplier surveys. Quality, logistics, and service offerings are in the spotlight each time, in addition to the status of the suppliers' quality and environmental management systems. It's the second time that the specialist manufacturer of precision steel strip has received this award from Kirchhoff in the Raw Material (strip steel) category.

Photos: ThyssenKrupp Steel Europe Photography



Chief Human Resources Officer Thomas Schlenz (center) and his colleagues are proud of the award.

You're on the safe side with us

ThyssenKrupp Steel Europe places high priority on its employees' safety and health. The work they perform every day must not make them ill or lead to accidents or other dangerous outcomes. To this end, a system promoting occupational safety and health was developed and has now received TÜV NORD certification. Independent experts spent three years intensively reviewing the processes that are intended to prevent injuries and dangerous situations. The awarding of certification means that the company fulfills all requirements placed on an effective workplace safety management system. ■

Heavy plate for Brazil's construction industry

Manufacturers in Brazil now have the entire portfolio of steel products in ThyssenKrupp Steel Europe's range of heavy plate locally. The South American market can now source its high-strength specialized engineering steels such as N-A-XTRA® and XABO® from Duisburg, Germany, thanks to the cooperation with the XRT Steel Group. The water-quenched steels are used in mobile cranes and other applications. The PERFORM® cold forming steels for lightweight construction of utility vehicles and the hard-wearing construction steels XAR® for applications in the construction machinery industry and mining are also available. ■



Grain-oriented electrical steel before its transformation into a transformer.

The tension mounts

The EU's new Ecodesign Directive for transformers is causing a surge in demand for grain-oriented electrical steel with high permeability.

Use less electricity and help protect the environment. It is an ambitious goal to which the European Union has pledged itself. It is pinning its hopes on having the new Ecodesign Directive reduce carbon dioxide emissions in the EU by 400 million metric tons by 2020. Already there have been 20 measures passed. Now comes the next one: The first stage of a new directive for distribution and power transformers expected to save 16 terawatts of energy annually starting in 2020 took effect on 1 July. It corresponds to roughly half of Denmark's power consumption. The second stage is slated to begin in July 2021, introducing even stricter restrictions.

To meet these requirements, transformer manufacturers will require high-quality electrical steel with high permeability with which it is possible to attain much lower core losses than with the conventional material. Only a few manufacturers of grain-oriented electrical steel are capable of producing these types of product. ThyssenKrupp Electrical Steel is one such company.

Grain-oriented electrical steel is a high-tech core material, which is extremely challenging to manufacture, and it is needed to step up or step down electrical voltages and currents. It makes it possible to transport electricity across longer distances with as little loss as possible. ThyssenKrupp Electrical Steel is capable of delivering all the types of grain-oriented electrical steel needed on the market thanks to intensive research and development work and investments in the production process. What's more, it is making a sizeable contribution to the challenges in the energy sector of the future.

For more information on the EU's Ecodesign Directive, visit <http://ec.europa.eu/deutschland/>.



BROODING OVER THE FUTURE

Steel Europe is brooding over the future in a special way. The company has set up a nesting spot for a protected species of owl at a landfill site in Dinslaken. The pair is raising a fluffy brood of chicks now.

4,300

PATENT SOLUTIONS

Steel's potential has not reached its limits yet. At least it hasn't if you consider the number of patents published in Germany last year. The figure has more than doubled since the early 1990s.

Feature

Innovation that

Do you need something unique or are you looking for a special product? Whether you are a family-owned company, or a small or medium-sized enterprise – we develop and produce the products you need.

Text: Judy Born

Dr. Claudia Kuckertz

Technical Customer Support, Sales Industry

Customer: Miele

Claudia Kuckertz is meeting with her colleagues from production in the factory office of Coil Coating System 4 in Kreuztal/Ferndorf, Germany.

ns
pay off



Dr. Stefan Köhler (right)

Technical Customer Support, Sales Industry

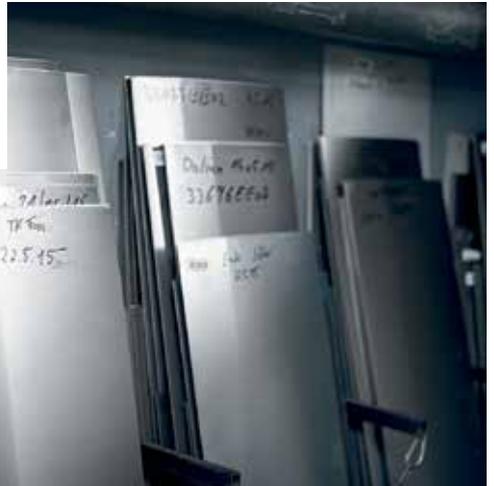
Customer: Winkelmann Group

In Duisburg, Germany, Stefan Köhler inspects the steel discs in the different stages of prefabrication together with Thomas Flöth from Application Technology.



←
Eichen
location
Claudia Kuckertz

Teamwork
Kuckertz frequently meets with Michael Schulte-Zweckel (left), who advises Miele on business questions. The more smoothly the production runs, the less she sees of Markus Vollmer (right), who heads up Coil Coating System 3.



Washing machine drums as far as the eye can see. The shiny hollow parts glide high above the manufacturing facility to the next stage of the assembly process. In a separate hall, the air is

full of bright, white side panels being transported over several kilometers of conveyor belts and into waiting trucks. A long, steady stream of components on three different levels.

Claudia Kuckertz is not alone at the end of the production line. Thorsten Störmer stands beside her. He is responsible for steel purchasing for Miele in Gütersloh. She works in Technical Customer Support for Color at ThyssenKrupp Steel Europe and has provided consultation services for Miele for the past five years. The two really get along, and that is good for both business partners. While they talk, another employee inspects each side panel. These panels are only approved for the next stage of production if they are absolutely perfect.

Störmer and Kuckertz have seen a lot of one another over the past few years. The customer support representative and the purchaser meet often to discuss concrete technical questions or work on new products. “This time, it is luckily the latter,” she says. “And the circumstances were very interesting this time around,” says Störmer, “because we not only improved on an existing material, we also developed a new product.” That product is known as PLADUR®ThermoSafe and will soon be appearing in Miele’s household appliances.

Duisburg is an exciting place to be at the moment. For the past few years, Technology & Innovation has been working on a new idea that is just about ready to hit the market. The idea emerged at one of

the regular internal workshops held by Sales and Application Technology. “We meet up with a group of our colleagues to think about the added value we could be offering our customers,” says Stefan Köhler, who works in Technical Customer Support at ThyssenKrupp Steel Europe. “But we always involve the customer relatively early on to make sure that these sessions stay on target.” Representatives from different areas then brainstorm for an entire day – and all ideas are welcome. The sessions are open, honest, and frank. “This is extremely useful for both sides. Afterwards, the group splits up into smaller committees to continue developing the ideas together with the customer. “A lot of times, the discussion revolves around finding a solution to an existing problem,” says Thomas Flöth from Application Technology in Duisburg. “In some cases, we are even able to develop an entirely new product.”

The Winkelmann Group, which Köhler has worked with for many years, provides some excellent examples in this regard. The medium-sized family-owned company is one of the leading suppliers to the automotive industry and the heating and water supply industry. The company is also a specialist in the area of flow-forming. In this process, high-pressure rollers are used at low temperatures to create complex engine and drive components from flat materials. Following a workshop with Heating and Systems Technology, which has a new production

91%
of all active businesses in Germany are family-controlled companies, and 88 percent of all companies in Germany are family-run enterprises.



Getting better all the time

Miele's brand always promises to offer more than the competition, and for four generations, the company has been making good on that promise.

It was the tail end of the 19th century – 1899 to be exact – when Carl Miele and Reinhard Zinkann opened an operation for manufacturing milk centrifuges. In 1911, Miele & Cie. introduced its first washing machine with an electric motor on the market. Even back then, the company was focused on building products to last and each one was covered by a ten-year guarantee. In the fertile 1920's, the company added vacuum cleaners, dishwashers, and bicycles to its repertoire. When the production capacity at the headquarters in Gütersloh was no longer sufficient, a second location in Bielefeld was opened in 1916.

The economic boom fostered a massive increase in demand for household appliances, which went on to become a core segment for Miele. The company built new factories in Euskirchen and Lehrte. Today, more than 115 years after its formation, Miele generates annual sales of around 3.49 billion euros worldwide – and one third of that in Germany alone. Just under 60 percent of the company's employees work in Germany.



The company has 12 plants, eight of which are located in Germany and one each in Austria, the Czech Republic, Romania, and China.

The leading provider of premium household appliance is now run by five Executive Directors as equal partners. Co-Proprietors Markus Miele and Reinhard Zinkann are among them. These two men represent the fourth generation of family leadership.



↗
Duisburg
location

Stefan Köhler



A matter of taste

Martin Metzger (right) and Stefan Köhler prefer a short trip to work and a simple exchange of ideas (above). A perfectly-formed Winkelmann product in the last stages of production, produced using just a single component (right).

location in Poland, the idea to offer thinner versions of higher-strength materials turned into a mass-market product. “The customer now receives more meters of material per paid metric ton of steel – all at the same level of quality,” says Köhler. In addition to producing many different standard products, ThyssenKrupp Steel Europe also produces numerous special products. “The innovations we are working on are the product of the way Steel Europe’s materials expertise complements our knowledge of forming,” says Leif Peters, Managing Director of the Steeltrade division at the Winkelmann Group at the group headquarters in Ahlen. His company is no ordinary metal processor, he adds, but rather a specialist in metal forming. “We like to talk about the magic of the steel sheet.”

All you have to do is listen to friends and relatives talk to see that Miele products are seen with same kind of inner magic. It is not for nothing that this fourth-generation family-owned company is the world’s leading provider of premium household appliances. But the reason behind the development of PLADUR®ThermoSafe, a newcomer in the product portfolio of the Color Business Unit at Steel Europe was not magic, it was pure pragmatism.

The innovation was fueled by a legal regulation. According to EU law, electrical household appliances made of metal which can reach a temperature of 50 degrees Celsius or higher must be equipped with a special heat protection layer. This standard applies to all new products as of 2014. The hotter the device can get, the thicker this protection layer must be. In order to protect the consumer, it does not matter where on the device this heat develops – whether it is on the front, rear, or sides. “That applies to the rear panel of our driers, for example,” says Störmer. “We

1,300

small and medium-sized companies lead the world market with their niche products. These ‘hidden champions’ are particularly successful in the field of engineering, the electrical industry, and with an array of different industrial products.

added an additional cover made of plastic, because it does not transfer heat.” But the results of this additional layer were unsatisfactory in many regards. “Naturally, we wanted to save on material and process costs. That meant that we had to manufacture an additional component. That component required assembly as well as additional process steps.” There was yet another disadvantage to this approach. “The appliance got quite a bit louder,” remarks Dirk Holschumacher from the development team in Kreuztal-Eichen, a district located in the German

Siegerland location



Joint responsibility

Dirk Holschumacher (above) was involved in developing PLADUR®ThermoSafe in Kreuztal-Eichen. Patrick Aßling (left) keeps a close eye on the quality of the coil-coated materials in Ferndorf.



Long-term success

The Winkelmann Group is one of the leading companies in the metal forming industry. Long-term thinking and planning while remaining innovative and flexible is all in a day’s work for the family-owned company.

It all began at the end of the 19th century with coffee and milk canisters, dustpans, and pails. In 1898, master craftsmen Heinrich Winkelmann and Caspar Pannhoff founded an operation for durables and agricultural goods in the city of Ahlen in the German region of Westphalia. The mining industry was booming, drawing both people and companies, and increasing demand for day-to-day goods. When Pannhoff left the company, the Winkelmann family continued to run the operation alone – and now the family-owned company is in its fourth generation.

Over its many decades of business, Winkelmann has become a specialist in metal processing and has continued to expand its product portfolio. Today the Winkelmann Group has 23 subsidiaries and is organized into the divisions Automotive, Heating and Water, Flowforming, and Steeltrade. The latter is still housed in the main administrative building in Ahlen. From here, the company manages its steel purchasing operation throughout the entire Winkelmann Group, which is currently represented in twelve countries (including Poland, Austria, China, and Turkey). Winkelmann Metal Solutions GmbH (certified in accordance with ISO 9001) not only handles the needs of the group itself, it also offers its expertise in steel purchasing and distribution to external companies.

With around 4,000 employees worldwide and sales of around 560 million euros, the Winkelmann Group is one of the big names in medium-sized companies. Although the company has many overseas production facilities, Winkelmann makes sure to manufacture at least one item from each product group at its headquarters in the German region of Westphalia.



Hot strip mill in Duisburg



Steel girders

Down in the hot strip mill in Duisburg, Stefan Köhler receives a specimen from Markus Unglaub. For the weekly production meeting, they are more likely to retreat to a quiet office.



state of North Rhine-Westphalia, the headquarters of the Color Business Unit of ThyssenKrupp Steel Europe. “So we were asked if we might have an idea for a solution,” says Kuckertz during a visit to the showroom of the Development division. Here, all manner of surface-coated flat steel products are on display, including samples for facades, utility vehicles, garage doors, and household appliances, for example products from the comprehensive PLADUR® range. “And that’s how it unfolded,” says Holschumacher, without revealing much. “We took one of our materials and covered it in a type of foil that didn’t exist before. And that prevented the heat from being transferred.” The new curved rear panel has a stylish look and a comfortable feel. For Miele, aesthetic considerations are just as important as high technical standards. It is no wonder that some of their models have won awards for design.

Weight, on the other hand, does not play a role for white goods. “Quite the contrary, a washing machine has to be heavy so that it doesn’t move during the spin cycle,” says Michael Schulte-Zweckel. He is Claudia Kuckertz’ business counterpart and, as Sales Team Leader, supervises operations for Miele. “For our customers in the household appliances sector, technical parameters are as important as fast processing and delivery.”

The automotive industry is a different story entirely. Here components cannot be light enough – without compromising strength and toughness, of course. ThyssenKrupp Steel Europe has developed special materials such as manganese-boron steel, a material used by Winkelmann to produce flex plates. “The customer can use our specialized material – and their expertise – to form a complete component with very little loss of material,” explains Stefan Köhler. “Take the vibration damper for example. The turntable, the poly-V profile, or the area that the belt runs over, are manufactured without cutting action using a single disc. It doesn’t have any screws or any

15.7

million employees

work in small and medium-sized companies. That corresponds to almost 60 percent of all employees subject to social security contributions in Germany.

unnecessary weld seams.” That means fewer process steps and a reduction in weight and material. “As a customer, that means you save money, and the car that this element will become a part of saves on gas thanks to its lighter engine component.” The companies in the Winkelmann Group deliver their end products to renowned OEMs (Original Equipment Manufacturers) in the industry, where they are installed in almost every engine and drive.

Components such as these must remain balanced, even at high rates of rotation. They have to run smoothly even when the engine hits top speeds. “Winkelmann uses either precision steel strip, a specialized strip produced by Hoesch Hohenlimburg, or hot-rolled strip produced in Duisburg that meets the necessary tolerances,” says Köhler. It is important to know that multiple steel discs – which serve as the initial shape for many components – are punched out in a pattern diagonal to the direction in which the hot-rolled strip is moving. “It is like baking. You want to get as many cookies as possible of the same thickness from the rolled-out dough. But with cookies, a deviation of 0.2 millimeters doesn’t make much of a difference. With steel strips it does.” Products from customers such as Winkelmann are at the

“Time to internationalize!”

Competition is growing for medium-sized companies.

Marc S. Tenbieg, Managing Director of the German Association for Small and Medium-Sized Enterprises (DMB), recommends increasing trade in export.

Interviewed by: Judy Born

What companies are considered small and medium-sized enterprises (SME) and what are they focused on today?

Marc S. Tenbieg: For a company to belong to the SME category, it must have up to 500 employees and a maximum annual turnover of 50 million euros. That is the definition of the Institut für Mittelstandsforschung (IfM) Bonn, the institution that guides us as an association for SMEs. Current topics of interest include tax burden, shortages in personnel and technical specialists, enterprise financing and, increasingly, the Transatlantic Trade and Investment Partnership, or TTIP.

How do you take advantage of the benefits of TTIP while mitigating the risks?

This is a multi-layered and extremely complex question, and ultimately we will have to reach a compromise in terms of give and take. On the one hand, it's about the oft-cited chlorinated chicken, on the other hand there is a lot being said about social factors such as trade unions, employer rights, and safety and security standards as well as further liberalization of public utilities and educational and health services. We have a lot of controversial discussions ahead of us.

Will this increase pressure on SMEs when it comes to competition?

It certainly will. As we know, competition can be a real energizing factor, but that means that German SMEs will be encountering more pressure on the national market. Many operations will have to be prepared for that. Companies will have to rely on exports more than ever before to ensure that they don't lose their edge. In the next 50 years, 90 percent of global demand will be outside of the European market.

Should SMEs be racing to internationalize?

Definitely! Large companies and groups are decades ahead of SMEs in this regard. They have large, global networks and know all the rules of the game. A lot of SMEs will have to gain some experience in this area. My advice is that it's time to internationalize and start thinking in larger terms and dimensions. A good first step, for example, is to begin participating in selected trade delegations. That way you can get

a first impression of a particular market in a compact form and start working on building your own small networks – and maybe even start a cooperation.

Does the DMB organize these types of trips?

No, but we can pass on contacts and give plenty of tips. In addition to the national and state ministries there are a number of organizations and institutions that offer these types of trips, for example the Euro-Mediterranean-Arab Association (EMA). SMEs need to take these kinds of offers into account.

Which industries are looking good for SMEs at the moment?

From talking with our member companies, I can say that there are currently a lot of branches where things are going well. That applies particularly to the supply industry and the range of specialized solutions. Chemical and medical products are also in high demand. Consultation, design, and engineering services are always classics, followed by solutions for renewable energy sources. Reliability, creativity, and precision are all attributes that continue to be associated with German companies.

What would happen if SMEs were to disappear from Germany?

Our country would be in a completely different position than we can imagine today. It would lose its unique character – it would lose its very soul. Our small and medium-sized enterprise structure is the subject of some envy and our economy is not dependent on just a few large industrial operations, as is the case with many other countries. Ours rests on a number of different major pillars. These pillars aren't likely to crumble just because of a little wobble. That is how we managed to survive the last big economic and financial crises in such good shape.

Complete the sentence: If I were Economic or Finance Minister...

...then I would be willing to make unpopular decisions that would result in more justice when it comes to taxes and intergenerational equity.

Without its family-owned companies, Germany would be...

...like a house without a stable structure. It would simply crumble in on itself.

The right man for the job: Marc S. Tenbieg also grew up in a family who ran a medium-sized family business. (mittelstandbund.de)





Miele in Gütersloh



Expectations

Thorsten Störmer (right), Purchasing Manager at Miele, describes the company's standards for color and material to Claudia Kuckertz, Managing Director Leif Peters (below) at the Winkelmann Group in Ahlen. He is very excited about the high-quality material.

Winkelmann Group in Ahlen



37%

of all sales for companies in Germany stem from small and medium-sized enterprises. When it comes to value creation, this figure stands at 57 percent.

cutting-edge of what is technically possible, so suppliers must be able to hold up their end of the deal. "Our customers' standards for their material have risen dramatically," says Martin Metzger, who serves Winkelmann together with his Steel Europe sales team. "We are constantly investing in the maintenance and modernization of our systems to fulfill the expectations of our customers. This is the only way to ensure that we can comply with the strict tolerance and crowning specifications of our customers."

Miele has extremely high standards as well, but at the headquarters in Gütersloh, Thorsten Störmer is very enthusiastic. "For our material, we need a supplier with proven, reliable processes who can work within the specified limits. Not everyone is up to the task. And we need contacts like Ms. Kuckertz with a high level of technological knowledge and the ability to respond quickly and in a structured manner." For example, two years ago: "We were selected as a development partner for a specific product. Miele is particularly focused on color tone and level of gloss. The company's white is brighter and glossier than the whites of other manufacturers," says Kuckertz. "Resistance to mechanical abrasion, chemical agents and fading are very important properties as well."

Supplier and customer need to share a trusting, professional partnership. "And they need to be patient with one another," says Störmer. "Process and product innovations need time. On top of that, they go through rigorous testing, so the process can take years. Suppliers looking for a quick sale aren't

the right fit for us." Steel Europe provides Miele with high-quality steel of different types and grades – from standard steels to specialized products. That is characteristic of the partnership itself – and things have been that way for years.

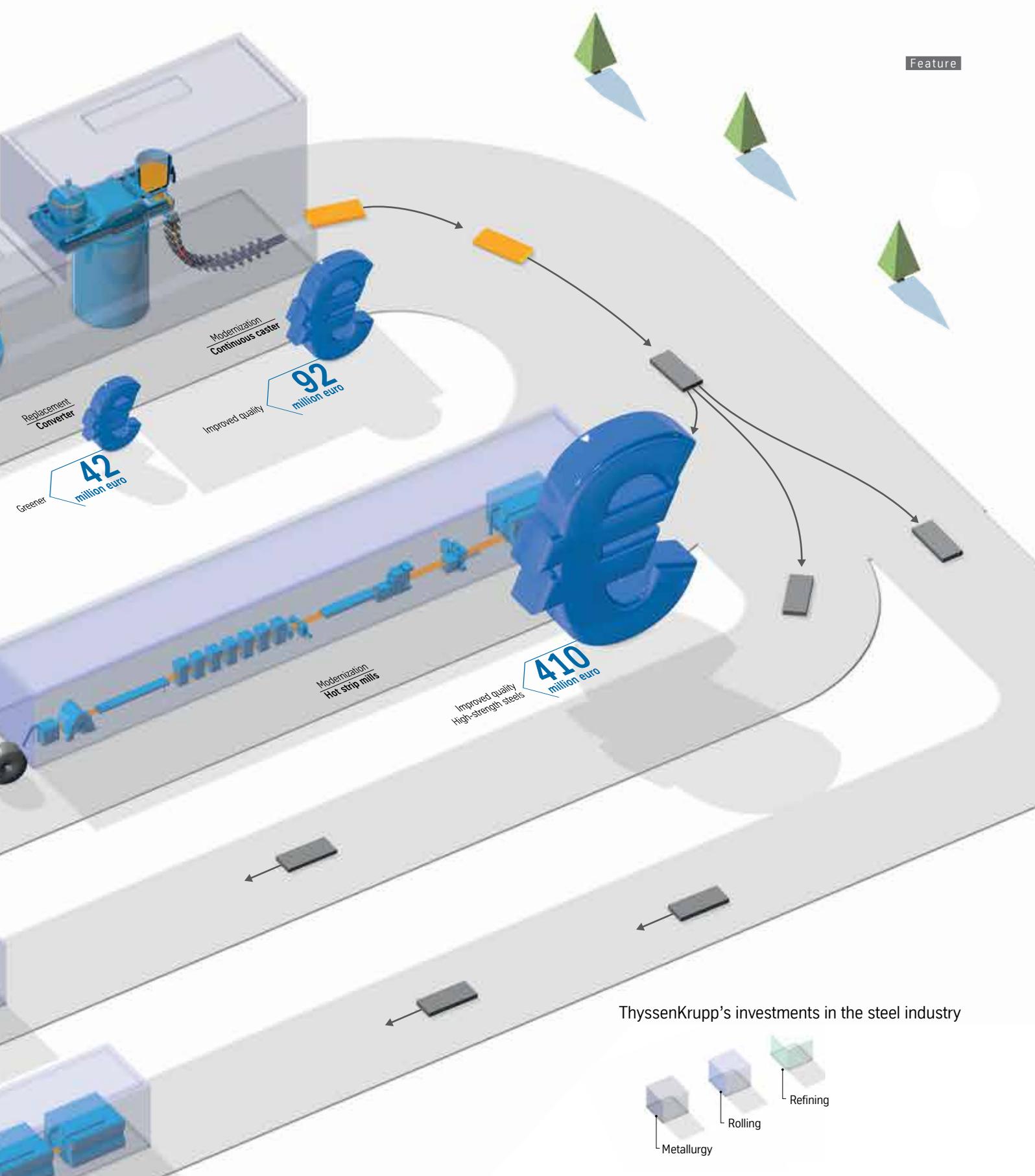
Steel Europe is one of the largest and most important suppliers to the Winkelmann Group. The ThyssenKrupp Steel Service Center in Dąbrowa Górnicza, Poland, supplies the company with additional products. "We have solved a lot of problems together over the years," says Martin Metzger. "That builds the basis for the best type of partnership." Köhler adds, "Our task is to take a relatively simple product and continue to increase the value of that product." That starts out with small quantities, then increases to larger quantities. The products are designed to be reproduced over and over again at affordable prices. Entering new markets can be difficult, but it is worth the work for everyone involved.

Photos: DMG, Rüdiger Nehmeow (2)

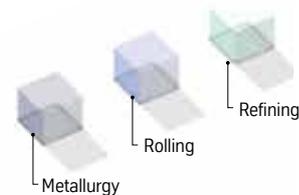
Cutting-edge everything

Over the past few years ThyssenKrupp Steel Europe has made considerable investments and continued to develop the technology used in its production facilities.





ThyssenKrupp's investments in the steel industry



Investing in the future

As the world's leading provider of flat carbon steel, ThyssenKrupp Steel Europe regularly overhauls its production facilities to make sure that they are up-to-date. The company is investing in all of the process steps involved in steel production and processing. These investments help to ensure that production remains environmentally-friendly and efficient in the long-term. Over the past few years, Duisburg-based ThyssenKrupp Steel Europe has invested around 800 million euros to modernize different units involved in materials production – starting with the stockhouse and moving on to the steel production equipment and the numerous rolling mills and refining systems. The facility can now produce

steel sheet with closer tolerances, a wider range of dimensions, and more precise surface characteristics than ever before. The modernized system is now better and more reliable when it comes to meeting customers' current and future needs. Newly developed and stronger steels and material solutions are in high demand in the automotive industry, machine and systems engineering, and the household appliance industry. The energy sector and the packaging industry are also interested in new and innovative applications. Last but not least, because of its broad customer base, ThyssenKrupp Steel Europe's investments not only benefit the company itself, they also help to strengthen German industry going forward.

Illustration: C3 Visual Lab

It pays off

How can you manage quality and what role do the casinos of Monte Carlo play in simulating mechanical properties? Prof. Andreas Kern, Head of Quality Assurance in the Heavy Plate Business Unit, provides an explanation.

Interviewed by: Judy Born

Mr. Kern, your business unit deals with sheet metal for large, solid structures. Can you name a few?

Heavy plate is used for applications of considerable size and requiring high load-bearing capacities. For example, you find it in ships, mobile cranes, pipelines, and containers for gas and oil storage.

What are your different jobs?

My department handles quality management and quality assurance during the production process. It means we are constantly inspecting and ensuring the quality of the plate every day. In addition, we work on developing new products and improving existing ones wherever the customer's requirements demand it.

And how do you do it?

We primarily utilize computational programs that continuously store and compile the data collected from our production operations. It makes it possible to regularly check the information and react quickly and in the appropriate places during the production process.

So much for the ongoing production.

What about new developments?

We also use computer-based simulation programs here. They enable us to predictively calculate the mechanical properties of a specific type of steel and put together the right mix of steel and create the manufacturing parameters. By preparing a mathematical model of the mechanical characteristics, we can have an idea of how the new steel will behave.

How does it benefit your customers?

We can greatly reduce the number of experiments and have the new or optimized steels ready more quickly for the overall process using these methods than if we were to work with real test runs. We are able to react to customer needs and requirements quickly and we can deliver a

high-quality product with a constant level of quality.

But computer-based simulations are nothing new?

You're right. And others have also been working with them for a while, both internally with us and at our competitors. However, the Heavy Plate Business Unit uses and pursues modeling in a particularly intensive way. For 20 years now, we have delved into the details of it and passed along the knowledge gained to our in-house colleagues. There is a close exchange of ideas among the cold and hot-rolled strip specialists.

What is special about your material?

We need to design the material so it can withstand great loads on the one hand, and on the other, it needs to remain formable and not suddenly break. Steel used in heavy plate has to be both tough

and easy to process. The extent to which both of these properties are present can be different and vary. It all depends on the customer's project.

What are the criteria for the material when it is used for a gas tank, for example?

It needs to be strong, yet also exhibit a correspondingly high level of resistance to brittle fracture to prevent failure when it's used in the construction project. It means that the material needs to hold up if it is subjected to a sudden or unusual impact. It cannot suddenly fail and ruin the particular structure.

What types of steel are we talking about here? Which ones are used for it?

I'm thinking about our high-strength, micro alloyed steels or high-nickel steels.

There is a method of modeling called the Monte Carlo method. It sounds a little pretentious or reminiscent of the casino highlife. What is it really?

The Monte Carlo method is a special statistical computational algorithm using random numbers that we use to simulate complex physical processes that cannot be described linearly. It was developed 70 years ago before people started working with computers. And where better to look for random numbers than at the roulette wheel? It constantly generates a random number, something that everyone associates with Monte Carlo.

Is it still used today?

Of course. The only difference now is that the computers generate the random numbers. But remember, the high-quality heavy plate that we manufacture at ThyssenKrupp is by no means a random product. It is the result of concerted efforts to produce quality, as well as a product of our high-performance modeling tools – with and without Monte Carlo!

We can manufacture new and optimized steels more quickly.

Andreas Kern, Head of Quality Assurance in the Heavy Plate Business Unit

International profile

The profiles produced by **the family-owned Welser company** keep solar collectors standing sturdy. And not only that, their products are used in many different industries worldwide. The company was founded over 350 years ago as a pan-smithing operation.

Text: Michael Schulz

All you have to do is take a trip through Germany to see how important renewable energies have become in the country. In Brandenburg, wind turbines can be seen turning all the way to the horizon, on the coast of Schleswig-Holstein, offshore wind farms jut out of the sea, and from Lower Saxony and Saxony-Anhalt all the way to Bavaria, biomass and biogas systems dot the rural landscapes.

And even solar power systems installed in fields and on the roofs of buildings have become a familiar sight. But one thing you might not notice at first glance is that many of these systems are built using steel profiles from Welser Profile.

“Environmental technology has been an important area of focus for us for many years,” says Jörn Miklas, Purchaser at the German production facility in Bönen near Dortmund. “The solar industry is becoming more and more important for us as a company.” Today, Welser is one of the leading providers of special profiles in Europe. But nearly three centuries ago, the Austrian family-owned business was on a very different path. From its formation in 1664, the company manufactured pans and small forged parts. “It was only in 1960 that Josef Welser switched to producing profiles,” says Miklas.

This decision was monumental. The company, which began as a regional operation with just a few dozen employees, has grown into an international enterprise with over 1,800 employees world-



Scanning and Skyping: A delivery from Bönen is prepared for shipping (above). Video conference with colleagues in Austria (below).





Steel profile professional: Jörn Miklas is Purchasing Manager at Welser.



Long tradition

11th-generation family company

1664 was the year the Welser company was founded in the Lower Austrian town of Ybbsitz. Now that town is home to their technology center. For nearly 300 years, the company was a pan-smithing operation. Then Welser changed its focus to profile manufacturing in 1960. The Welser family has headed up the company throughout its entire history – that is, for eleven generations.

Production in Germany

1999: the year Welser acquired the former Hoesch cold profile production facility Hagen-Kabel and RP Technik and founded its German production location in Bönen, its only facility outside of Austria.

wide. One reason for this success is the company's own process used to create custom profiles. "We process the slit strips using roller segments until they reach the desired shape – which we refer to as the cross-section – over the course of many forming steps," says Gerhard Hasenbein, Purchasing Manager and Member of the Management Board. "This makes it possible to create highly complex structures." To date, the company has developed 21,000 different cross-sections as templates for profiles using this method – and up to five new cross-sections are created every day. "By far, our largest clients have always come from the construction industry, but the automotive and environmental technology industries are becoming increasingly important," says Hasenbein.

Medium-sized company, global business

ThyssenKrupp Steel Europe has provided the flat steel for these profiles for over 30 years. Products range from hot wide strips and cold strips, hot-dip and electrolytically galvanized strips, all the way to color-coated coils. "Almost all industries rely on steel profiles, even the renewable energies industry," says Albert Knotz, Key Account Manager at the location in Gresten. "Using steel helps companies to meet a wide range of different requirements in the construction of these systems."

The process of manufacturing these profiles, for example for solar power systems, must take corrosion protection into account, along with an array of other factors. "We have to produce different products for Saudi Arabia than we do for Iceland." Temperature, humidity, bedrock quality – all of these elements influence construction. "And these factors can even vary in a single location," says Knotz. The very same field can both have rocky and sandy areas. "So the profiles used for construction vary considerably as well."

System construction is not the only challenge Welser has to face – the economic conditions of the industry present their share of hurdles as well. When the oversubsidized European market bubble burst a few years ago, the company was fortunate to have already expanded into international markets. "The drop in orders here in Europe was more than compensated for by growing overseas markets," says Knotz. Welser conducts a significant proportion of its business with the solar industry in Japan, the USA, and India. And with that, the family-owned company from the Mostviertel in Lower Austria has become a global player.

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High-profile family

For seven decades, **Wurzer** has produced steel profiles for roofs, walls, and facades. Just like his father, Georg Wurzer relies on materials from ThyssenKrupp Steel Europe.

Coils upon coils upon coils are stored in the hall of the high profile system. “It is definitely around 1,500 metric tons of steel,” estimates CEO Georg Wurzer at a glance. The extensive company facility in Affing near Augsburg, Germany, keeps plenty of material in stock because Wurzer’s customers often require deliveries to be made within just a few days, or even within a few hours. There is a lot of traffic here at the facility. Forklifts race back and forth between the different production and storage halls, and a company truck is being loaded with gutters and pipes of many meters in length.

In the roof gutter segment, this family-owned company is one of Germany’s leading manufacturers. The company is a full service provider for single-layer trapezoidal profiles, which are mainly used for exterior cladding applications. “Our strength is in our wide range of products,” says Wurzer, who joined the company in 1979 after finishing his degree in engineering. “We offer every product the market demands.” The company supplies steel retailers, building materials compa-

nies, and processors. Wurzer was founded in 1945 by locksmith Georg Wurzer Senior as a trade and repair shop for agricultural machines. Three years later, the company added a hot-dip galvanizing system to its operation – and the gutter brackets and snow guards produced by this system turned out to be far more profitable than the agricultural machines were. Another crucial element in Wurzer’s success as a profiler for roof and facade products is its current cast of 100 employees. This summer, over 400 guests gathered together to celebrate the company’s 70-year anniversary. Since the 1980’s, Wurzer has shared a close business relationship with its main supplier, ThyssenKrupp Steel Europe. The combination of quality and the people

involved was the deciding factor at the time. Today, it’s the wide-ranging portfolio and the strong, multi-decade business relationship that make ThyssenKrupp Steel Europe an excellent partner. “Wurzer Profiliertechnik stands out for its excellent partnership and reliability,” says Benjamin Fitze from Steel Europe Sales Color. “I’ve also heard that from a number of different customers.” Axel Pohl, Sales Manager of Color/Household Appliances, agrees: “At the beginning, we primarily provided Wurzer with a range of high-quality hot-dip galvanized steel products. Today we also provide the company with the hot-dip galvanized product GALVALUME® as well as a number of coil-coated PLADUR® products. I am particularly proud of the fact that we are on track to deliver our 600,000th metric ton of steel this year.”

The excellent business relationship between the two companies also plays a role when it comes to introducing new products. “Wurzer was one of the first companies to process the product PLADUR® Antikondensat and then introduce and sell it to their customers. Wurzer also recently added our new innovation PLADUR® Relief Wood, a product painted to give the appearance of real wood, to their portfolio,” says Pohl.

Currently, the Affing-based company is working on a large order for Audi. Wurzer will be delivering around 60,000 square meters of roof profiles and two-layer wall profiles for the auto manufacturer’s new production facility. That corresponds to an area the size of eight and a half soccer fields. Wurzer products are also built into the building facade of hydraulic company Hawe in Kaufbeuren and the BMW storage facility in Dingolfing, Germany. But in spite of their success, Georg Wurzer wants to keep the company grounded, and Wurzer Profiltechnik still supplies customers with “one sheet for a repair job or four for a carport.”

— kr



The steel contour business is always booming: Georg Wurzer in front of his company.



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Photos: Marcus Lechner (2), ThyssenKrupp Steel Europe

Reducing the blind spot caused by the A-pillar by 34 percent (compared to reference value)



■ New A-pillar
■ Savings compared to reference A-pillar

Jörg Gorschlüter has everything under control. Together with his team, he slimmed down the A-pillar.

Improved field of vision

Slimmer design, lower weight, same performance. Too much to expect at the same time? Yet, this feat was accomplished by combining two innovative manufacturing processes as part of the 'InCar®plus' project **Slim A-pillar**. They can also be applied to other components.

Look left, look right, begin to accelerate, and then it happens – crash! Some motorists do not obey the right-of-way or overlook other cars when making turns nearly 290 times each day. One reason why is that A-pillars, which establish the vertical support between the windshield and side windows, have become so wide that they can even impair a driver's field of vision. Manufacturers are stuck in a predicament. Modern car bodies need to ensure a clear view of the road on the one hand, and on the other, they need to be stable enough to withstand even the hardest of crash tests.

ThyssenKrupp Steel Europe, together with cooperation partner Linde + Wiemann, has developed a solution for this problem. The A-pillar has become considerably slimmer and ten percent lighter, while remaining as tough as other models available now. "The greatest advantage is that we were able to improve the field of vision greatly. It was made possible by reducing the angle of vision that was impeded by

34 percent," explains Jörg Gorschlüter. He heads the 'Slim A-pillar' project that was set up at ThyssenKrupp as part of the InCar®plus development alliance. "The manufacturing processes can be transferred to many other car body components, such as longitudinal members and B-pillars." The A-pillar is the most complex component on the car body, he says. "With this example, we show something that had previously not been possible with the technology available." Two modern technologies have been combined to manufacture it. A rounded, pipe-shaped semi-finished product is created in various cross-sections in a cold forming process using T3® technology. The formed blank is made of MBW®1500. Then we subject it to a special hot forming process that gives the part its final shape.

This ACCRA® process leverages the advantages of hydroforming and press hardening. Linde + Wiemann has developed the process further and recently took 2nd place for the A-pillar in the 2015 Steel Innovation Awards. "The company has

many years of experience as an important systems supplier for major automotive manufacturers and has been one of our customers for years," explains Gorschlüter. Which also explains why the cooperation emerged three years ago. It is now possible to create extremely complex component geometries by linking both technologies. The new A-pillar is not only slimmer, it also reduces vehicle weight by 3.2 kilograms, without affecting performance. The manufacturing costs are slightly higher, yet they are absorbed by the savings in material to a great extent. The lightweighting costs are only €1.57/kg.

Developers have designed the A-pillar in a way that it can be flexibly adapted to the needs of automotive manufacturers. The length can vary and the shape can be transferred to other models. Further, it can be manufactured under traditional production conditions and in standard cycles. — fh

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Agenda

“Better materials, better components”

Dr. Thomas Pretorius, who is involved in product development and pilot production at ThyssenKrupp Steel Europe, works together with Alexander Hartmaier at the Interdisciplinary Center for Advanced Materials Simulation in Bochum, Germany. The institute specializes in **simulation and modeling calculations**.



The database in the basement: Thomas Pretorius (left) and Alexander Hartmeier in the ICAMS server room.

Interviewed by: Judy Born

What is ICAMS and what do you do here?

Hartmaier: The Interdisciplinary Center for Advanced Materials Simulation, or ICAMS for short, is an institute of the Ruhr University Bochum where we develop simulation models. We then use the model calculations we have made to research the characteristics and behavior of different materials. Our research takes all relevant parameters into account, including the atomic structure, microstructure, and macroscopic dimensions of the material.

What does that mean in practical terms?

Pretorius: In practice, certain properties such as strength, toughness, and corrosion resistance can only be tested using difficult, highly complex experiments. Using our model calculations here at ICAMS, we can develop and optimize new steels more precisely, more comprehensively, and faster than ever before because we now understand their structures and properties far better.

So the better you understand the structure, the more precisely you can derive the information you need?

Pretorius: Exactly. When the results of our simulations can be applied the macro level, we can calculate material properties that are relevant for the application. For example with damage and crash behavior, we can look at where and when cracking occurs and under what conditions, and then we can influence that behavior.

Hartmaier: That is the advantage of the kind of simulation that we do here at ICAMS. The goal is to create such a precise simulation of the conditions that we can check the position of every atom at any given point. Imagine an MRI tube for materials. That doesn't work in a running production process – it's not possible to peer into the materials just like that.

Where do you start with this kind of work?

Hartmaier: First we look for processes that we can expect to learn the most from based on what we already know about the existing tools and models. Here we concentrate on areas that are also relevant for our research partner ThyssenKrupp Steel Europe and its customers.

What industries benefit from your findings?

Pretorius: The goal is not only to improve certain classes of steel. Our methods are meant to be applied to the entire range of materials. Take high-strength steel, for example. This material is often used in cars, but it is found in pipe steels as well. There is also electrical steel, where we have to look at very specialized properties for its electromagnetic applications.

Does ICAMS concentrate exclusively on steel?

Hartmaier: Steel certainly plays an important role, but we also have projects that look at nickel-based superalloys. In my field, I also study thermal insulation layers and porous ceramics. Our institute is not entirely focused on steel. However, metals make up around 90 percent of our studies, and about 70 percent of those metals are steels. It is important to look a broad range of materials, otherwise it is easy to miss important scientific discoveries.

High-temperature alloys and ceramics are also of interest to Steel Europe...

Hartmaier: And hybrid materials! We are also starting to get involved in the areas of metal composites and polymers. These are extremely interesting classes of materials that will continue to become more important over the next

► ten years. We can't afford to ignore them – either in research or as a company.

How many people work at ICAMS?

Hartmaier: We have around 80 scientists in all different fields – engineers, physicists, chemists, mathematicians. There is a high turnover, because many of our scientists are doctoral candidates working on developing and implementing new industrial methods.

Pretorius: Then there are our colleagues working for research partners and groups and our colleagues at the data center in Jülich who run the mainframes that make our complex calculations possible.

How do you keep everyone involved in the project up-to-date?

Hartmaier: There are weekly meetings for each project and all of the employees get together for closed meetings three days a year. We also hold an annual Advanced Discussion in which we invite industrial partners and international guests to hold lectures and discuss current worldwide trends and findings with one another.

Partners such as Bosch, Bayer, and Salzgitter are normally our competitors, but here everyone works together. How does that work?

Pretorius: If companies want to get ahead when it comes to basic research, they have to work together. It is far too difficult to do it alone. Companies can achieve more when they cooperate – you can see that with the EU-sponsored projects.

Hartmaier: Cooperation has a long, honored tradition in academia. Here the mutual interest in a subject seems to be more important than the competitive thinking.

You are probably required to show that the money is being spent in the right ways. Is that correct?



Cooperation has a long, honored tradition in academia.

Alexander Hartmaier



If companies want to get ahead when it comes to basic research, they have to work together.

Thomas Pretorius

People

Alexander Hartmaier

is a professor for materials sciences at the Ruhr University Bochum and Director of ICAMS. As a longstanding member of the German Society for Materials, he has recently been selected as Vice Chairman of that organization.

Thomas Pretorius

has served as head of the Materials Modeling and Simulation team at ThyssenKrupp Steel Europe since 2009 in the area of product development and pilot systems. He earned his doctorate in the field of metal research and material physics at the University of Münster.

Hartmaier: On a political level, industrial and scientific partners are all in the same boat. We know that innovation in Germany is strongly connected with materials technology and materials sciences, but this rarely results in the kind of sponsorship that pays for those innovations.

Pretorius: It's rare that an entirely new material gets discovered. More often than not the focus lies on optimizing existing materials rather than developing new ones. However, all of these small changes have an enormous effect overall.

Hartmaier: Take the touchscreen for example. Optimizing the material glass was what made it possible to unlock what would end up being revolutionary innovations in smartphone and tablet technology.

What kind of benefits do your findings have for society as a whole?

Pretorius: Improving materials helps to improve the properties of components. This can lead to lighter-weight vehicles and reduce CO₂ emissions. At the same time, we can have a positive effect on the environmental properties of future materials and optimizing production processes normally helps to reduce costs.

Hartmaier: And naturally the training here. When we put qualified people on the market who can understand and use cutting-edge computer simulations, that is good for society.

Will all materials be developed on computers in the future?

Hartmaier: I think that is and will remain science fiction. We need both the lab and modeling to get the job done. The combination allows us to reach a new level and means that we can understand both the materials and their processes better. We are simply moving away from research based on experience and moving toward research based on knowledge.

Photo: ThyssenKrupp Steel Europe Photography

2015

Dates

October

Blechexpo

**3–6 November,
Stuttgart, Germany, Hall 4, Booth 4308**

The Blechexpo trade fair for sheet metal processing and the Schweisstec trade fair for joining technology rank second in the industry only to the Euroblech in Hanover, Germany. The 12th Blechexpo offers nearly 70,000 sq. m. of floor space to accommodate more than 1,000 exhibitors from 30 countries in the new Stuttgart Convention Center. ThyssenKrupp Steel Europe is in attendance at a booth shared by Hoesch Hohenlimburg, ThyssenKrupp Stahl-Service-Center, ThyssenKrupp Schulte, and ThyssenKrupp Materials. ThyssenKrupp Steel Europe will also present its demonstrator from the InCar®plus project, in addition to innovative solutions for the various industries.

www.blechexpo-messe.de



Transform

**13–15 October,
Vienna**

Transform is an international conference that targets specialists in the transformer industry. Member companies will premiere their ideas for transformers of the future. During the conference, there will be speeches held by experts on technical issues, along with an exhibition. ThyssenKrupp Electrical Steel will demonstrate its grain-oriented electrical steel. www.transform.net



November

Stahl international annual event

**6 November,
CCD Congress Center Düsseldorf**

This year's motto, 'Setting the course for tomorrow,' was selected by the Steel Institute VDEh and the German Steel Federation. The international annual event brings together steel manufacturers and customers, suppliers, as well as representatives from industry, politics, and the scientific community this November. There will be an exhibition taking place with interesting speeches and discussion rounds. ThyssenKrupp Steel Europe will be presenting as a co-exhibitor at a booth with ThyssenKrupp Uhde Engineering Services and ThyssenKrupp MillServices & Systems.



www.stahl-online.de

December

Architect at work

**2–3 December,
Düsseldorf, Hall 8**

'Architect at work' is employing a new exhibition concept to attract architects, planning designers, and general contractors to Düsseldorf, Germany. The novel aspect includes having exhibitors submit their products, materials, applications, and services to a committee of architects before attending the event. The innovation value of each exhibited product is evaluated. ThyssenKrupp Steel Europe is showing innovative products from its PLADUR® brand for roof and wall applications. www.architectatwork.de



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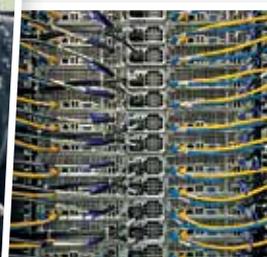
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This edition of our Agenda interview took us to the Ruhr University Bochum. The university has around 5,600 employees for its 43,000 students. One of these employees is Lothar Merl (left), without whom we would never have found our way through the labyrinthine buildings. He led us directly through each floor and then opened the door to reveal the Holy Grail, the ICAMS server room, where the protagonists of our story struck their poses for our photo.



Competition

What does a boules ball weigh?

If you know how much a ball weighs according to the official boules and pétanque rules, **write to us!**

One winner of an iPad mini 3 will be chosen at random from all correct entries.

Send your answer to: ThyssenKrupp Steel Europe AG, Heading: Competition compact^{steel}, 47161 Duisburg, Germany, or by e-mail to: compact.tkse@thyssenkrupp.com. **All entries must be submitted by 20 November 2015. The winner will be chosen at random from the correct entries. Employees of ThyssenKrupp Steel Europe and their dependents are not eligible. The judges' decision is final.**
Note: Your personal data will be used for the purposes of the competition only.