

# compact steel

01/2015

The ThyssenKrupp Steel Europe customer magazine  
[thyssenkrupp-steel-europe.com](http://thyssenkrupp-steel-europe.com)

## Everything green

From raw materials through to recycling – steel has enormous potential for energy efficiency

8



### INFOGRAPHIC

Heavy freight – from Germany's Ruhr region into the world

### INTERVIEW

Where is sea transport headed?

### RESEARCH

Crash test simulations boost accident safety

ThyssenKrupp Steel Europe  
Thinking the future of steel



ThyssenKrupp

# Contents

01/2015

## View 04

Stylish extras:  
A good bike  
doesn't  
have to be  
expensive

## 06 News

New production  
technique allows  
for the creation of  
3D facades

## Story 08

How to  
produce power  
with electrical  
steel and save  
on energy

## 18 Market + use cases

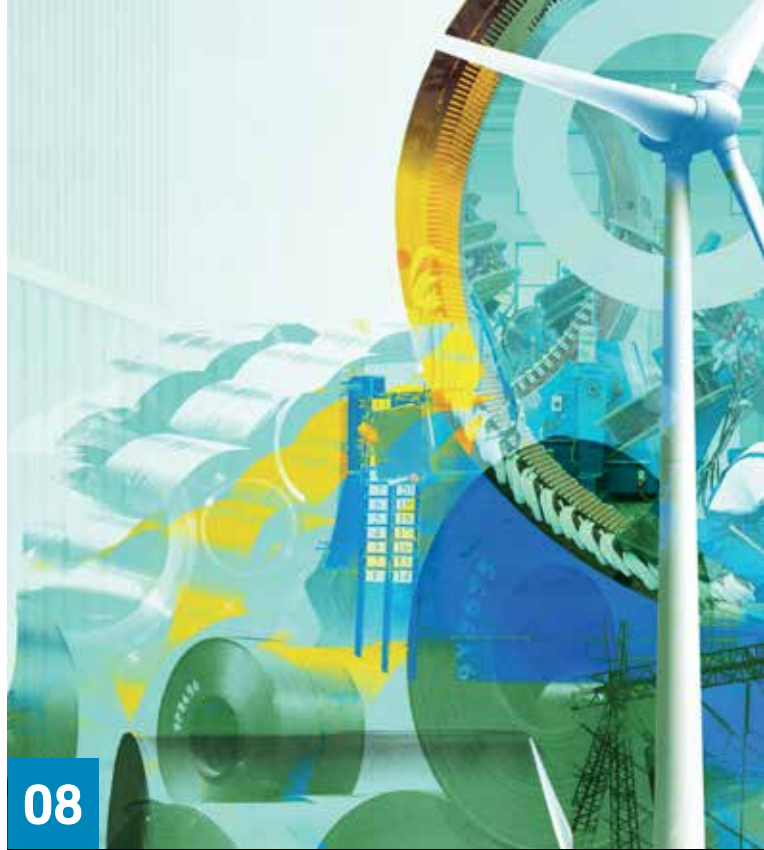
Balancing act:  
Counterweights  
even out the scales

## Infographic 22

Transporting  
steel via ship:  
From Duisburg  
to Antwerp and  
around the globe

## 24 Agenda

Ulrike Höffken and  
Luc Arnouts discuss  
the future of sea  
transport



08

# Reducing our carbon footprint

Steel is a sustainable material – it is energy-efficient, robust, and recyclable. And on top of that, it is poised to play an important role in the energy revolution.



16

## Let's pretend

Material behavior  
is tested in complex  
simulation procedures



Chief logistics specialist  
meets harbor master:  
An interview with Ulrike  
Höffken and Luc Arnouts

24



Placeholder:  
When properly installed,  
these shelf supports  
keep things neat and tidy.

21

Page 1: Illustration: Andy Potts; Page 2-3: Photos: Thomas Vanden Briesche / Fotogloria, ThyssenKrupp Steel Europe (2); Illustrations: Andy Potts, CO Visual Lab



## Dear readers,

**J**ust recently I was reading when I happened upon an interesting infographic published by the World Steel Association titled ‘Nine lives of steel.’

Strictly speaking, the title is a bit of an understatement; steel is really a ‘never-ending story’ with an infinite life cycle. The material is completely recyclable, and moreover, it is lightweight, clean, and efficient. Together with you, our partners, we work to create the cutting-edge steel products that will guide us all into the future. These products help to reduce CO<sub>2</sub> emissions, make industrial systems more efficient, and aid us in better utilizing renewable energies. Our steel production therefore plays an important role in protecting the environment and promoting the sustainable use of our natural resources. Read more about it in our title story.

The fact that today’s steel products are so efficient has a lot to do with the innovative simulation techniques that we will be introducing in this issue. These simulations help to supplement real crash tests and allow our material developers to better and more quickly anticipate the needs of our customers. ‘Better’ and ‘more quickly’ are two key phrases in logistics as well. Together with Ulrike Höffken, who is in charge of this division of ThyssenKrupp Steel Europe, we traveled to Antwerp, one of our most important transport hubs, and spoke with Luc Arnouts, the port’s Chief Commercial Officer, about the present and future of sea transport. I hope you enjoy reading this issue!

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



## An all-round success

Photo: Rainer Schroeder / ThyssenKrupp Steel Europe

If you attach any value to appearances, there's one thing you'll know for sure: Any eye-catching look relies on accessories. This kind of thinking is predominantly found in the world of high fashion, but it'll also be familiar to anyone who's ever attended a car tuning show. Here, by far the most popular accessory would have to be the rim. Having developed the steel design wheel, and most recently also the steel/CFRP hybrid wheel, ThyssenKrupp Steel Europe is offering some very innovative approaches for the manufacture of visually appealing automotive wheels. Compared to die-cast aluminum wheels, these new designs are also very convincing in terms of costs, weight, and CO<sub>2</sub> footprint. The sheet metal-based modular steel wheel combines a unibody base with a rim and an additional load-bearing designer shell connected to the wheel. With the hybrid wheel made of steel and carbon-fiber-reinforced polymer (CFRP), the latter is used for the rim, whereas the wheel spider itself is a multi-wall steel design.



## Fine textures for a unique appearance

With freely programmable 3D geometries and structures on coil-coated surfaces, PLADUR® products offer solutions for a range of different applications.

# W

hen a company or a private owner wants to draw attention to a particular venture, architecture can be a valuable tool. Planners and architects have very high standards for their creations: A building must be functional and efficient, but it must also meet requirements for environmental protection and sustainability. In addition, it has to reflect the style and individuality of the architect as well as the owner.

One way of doing this is with a unique facade design. The coated flat steel products of the PLADUR® range have long provided customers with a variety of colors and patterns, but ThyssenKrupp Steel Europe is now taking this development to the next level. Thanks to the company's development partnership with Fielitz, Steel Europe is now able to apply freely programmable 3D patterns and textures to the coil-coated surfaces of its PLADUR® products. The new production techniques developed by the metal forming specialists in Ingolstadt allow for the creation of very fine structures as well as surfaces with precision textures – all based on computer-designed templates. This also enables Steel Europe to offer these products to customers at an affordable price. "This opens up a lot of new and interesting design options, particularly for elite multi-story buildings. Our PLADUR® range is a perfect fit for this production process," says Axel Pohl, Sales Manager for Color at ThyssenKrupp Steel Europe, summing up the advantages of the partnership with Fielitz.

Visit [www.thyssenkrupp-steel-europe.com/de/produkte](http://www.thyssenkrupp-steel-europe.com/de/produkte) to learn more about organic coated coil and sheet such as the products of the PLADUR® series.

## Solar drives mobility

**It's time** for the next generation of solar vehicles. Using the experience gathered over several years in their joint research program, Bochum University of Applied Sciences and ThyssenKrupp Steel Europe have developed their solar car further. The 'ThyssenKrupp SunRiser' is designed as a sports car and makes increased use of lightweight steels. This time, the team will therefore also include one of the steel manufacturer's student trainees. In October, the solar car will be competing in Australia's 'World Solar Challenge'.

## Desai named new Chief Financial Officer



**As of 1 January**, Premal Desai will be joining the Executive Board at ThyssenKrupp Steel Europe. As the Business Area's Chief Financial Officer, he will be in charge of the Controlling, Accounting & Risk, Information Technology, Purchasing Raw Materials/Energy & Materials Management, and Compliance divisions. The former Chief Strategist has worked at ThyssenKrupp since 2006.



Burkhardt Lehmann (left) of the Institut Bauen und Umwelt e.V. presents the EPD certificate to Dr. Torsten Klein from the Color division of ThyssenKrupp Steel Europe.

## Sustainability is our strategy

**Many products** claim to be sustainable. As a partner to the construction industry, ThyssenKrupp Steel Europe has now had the environmental impacts of its coil, sheet, and slit strip tested and certified. This laborious process paid off: the Institut Bauen und Umwelt e.V. presented the steel manufacturer with its new EPD certificate (Environmental Protection Declaration). This certificate shows the environmental impacts of the products throughout their entire life cycle.

## Award for most innovative partner

**Automobile component supplier** Hidria Bausch named the non-oriented electrical steel division of ThyssenKrupp Steel Europe its 'most innovative supplier overall'. The prize was awarded for excellent technical and qualitative service as well as for high customer retention and networking. The automotive company placed particular emphasis on our customer-oriented philosophy and praised our proactive approach toward introducing innovative steel grades and our cutting-edge application technology and engine test bench, which has opened up a wide array of different options for simulation and testing.



### CURBSIDE SAFETY

The Gütegemeinschaft Stahlschutzplanken e.V. association in Siegen has found that steel guardrails are the best way to protect drivers. They also offer advantages in terms of passenger protection, containment performance, maintenance and recyclability.



New cans from old: Tin plate is the perfect material for recycling.

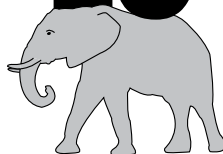
## Turning old into new – we'll meet again

Whether it's deodorant spray, soup cans, or crown corks – the recycling rate for consumer products made of tinplate is nearly 94 percent.

**A**lmost everything we purchase is packaged in some way, shape, or form, and a lot of this packaging is steel in the form of tinplate, including cans for food, pet food, and beverages. Aerosol cans crown corks and closures for glass bottles and jars are also made of tinplate. Each year, Germany uses around half a million metric tons of the material. According to a study by the market researcher Gesellschaft für Verpackungsmarktforschung (GVM), the recycling rate of tinplate has increased to around 93.7 percent in Germany. Most of this, over 420,000 metric tons, is used in the production of product packaging for end users. For private households, the utilization rate is even higher than average at 96.5 percent. "Steel is a material that maintains its properties no matter how many times it has been recycled," says Dr. Ulrich Roeske, Chairman of the Management Board at ThyssenKrupp Rasselstein. The company is one of the most important suppliers of packaging steel both in Germany and throughout Europe.

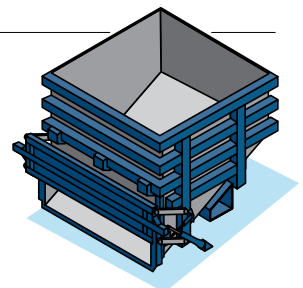
For information on the recycling of tinplate packaging, consult Kreislaufsystem Blechverpackungen Stahl GmbH, [www.kbs-recycling.de](http://www.kbs-recycling.de), and Deutsche Gesellschaft für Weißblechrecycling mbH, [www.rdwr.de](http://www.rdwr.de)

# 15



### AFRICAN ELEPHANTS

weigh as much as a coke bin along with its attachments. That comes to a total of around 75 metric tons. The colossus was recently replaced at the cokery in Schwelgern.



Feature

# If you sow wind, you shall reap power

Innovative steel products such as non-oriented electrical steel are helping to make wind turbines more efficient – and they save on natural resources.

Illustration: Andy Potts

Text: Birk Grüling





Everything comes back:  
Nowhere is recycling as efficient as it is for steel.

The air is heavy and humid. Rattling steel scrap falls into the smoldering fire, sparks flying everywhere. Seconds later, liquid hot metal pours into the gargantuan mold. This is the foundry where Enercon, Germany's leading producer of wind turbines, manufactures the load-bearing parts for its turbines – rotor hubs, machine mounts, blade adapters, and more. Each of these is several meters in size and several tons in weight.

What's notable here is that almost half of the materials used are steel scrap sourced from the company's own generator factory located in nearby Aurich in northern Germany. That's 65 metric tons of scrap from electrical steel stamping per day, collected using an advanced recycling system developed by Enercon subsidiary STA Stanztechnologie Aurich.

All of the stamping leftovers from production fall onto a belt conveyor underneath the production line and are collected centrally in huge containers. "We supply the foundry with the same amount and the same type of scrap every day. This way, we don't need to purchase nearly as much pig iron and third-party scrap metal," says Managing Director Ralf Mühlbrock. Triumphantly, he holds up a piece of electrical steel. It has a silver sheen and is quite thin, and much less impressive-looking than other wind turbine parts such as the enormous rotor blades or the tower's steel structures.

Sparks are flying at the foundry again, new electrical steel scrap is falling into the furnace. This material is 100% recyclable – just like any other type of steel. However, there is a small difference: The steel produced for Enercon is a special alloy designed for higher conductivity and stamping suitability. Initially, this caused Enercon a few issues when it came to the casting stage. "After one-and-a-half years of joint development, we have now optimized the mix

of materials to a degree that our electrical steel can be recycled not only in our own steel works but also in Enercon's on-site foundry," says Marco Tietz from Non-Oriented Electrical Steel Application Technology at ThyssenKrupp Steel Europe. The two companies have managed to strike just the right balance between production efficiency and recyclability. This is a sensible center path that particularly benefits the environment.

"The recyclability of steel helps to reduce the environmental impact of electrical steel and decrease our CO<sub>2</sub> footprint," agrees Anna Meincke, an environmental engineer from the steel producer's Technology & Innovation department. Meincke and her colleagues are responsible for assessing the environmental impact of the different types of electrical steel being produced.

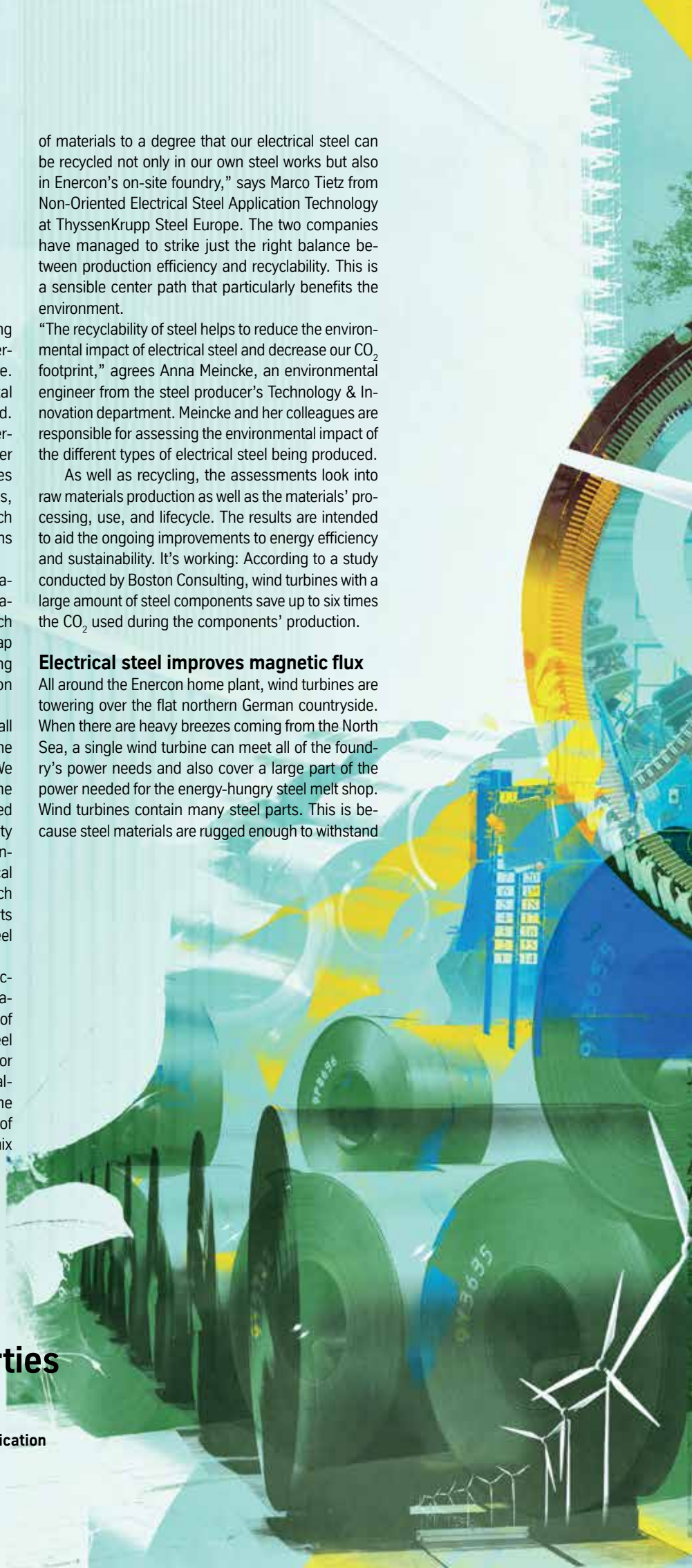
As well as recycling, the assessments look into raw materials production as well as the materials' processing, use, and lifecycle. The results are intended to aid the ongoing improvements to energy efficiency and sustainability. It's working: According to a study conducted by Boston Consulting, wind turbines with a large amount of steel components save up to six times the CO<sub>2</sub> used during the components' production.

### Electrical steel improves magnetic flux

All around the Enercon home plant, wind turbines are towering over the flat northern German countryside. When there are heavy breezes coming from the North Sea, a single wind turbine can meet all of the foundry's power needs and also cover a large part of the power needed for the energy-hungry steel melt shop. Wind turbines contain many steel parts. This is because steel materials are rugged enough to withstand

## Performance and efficiency crucially depend on the properties of the materials.

Marco Tietz, Non-Oriented Electrical Steel Application Technology, ThyssenKrupp Steel Europe.





# ThyssenKrupp Steel

## Non-oriented electrical steel ...

... **can** increase the energy efficiency of energy-producing rotating machines because it has consistent magnetic and mechanical properties on all of its sides.

... **is** predominantly deployed in electric motors, transformers, and generators because these all require constant magnetic characteristics in all directions.

... **has** low environmental impact thanks to its increased energy efficiency and recyclability.

wind and weather – both on land and offshore, for 25 years and more. Also, steel materials are sufficiently energy-efficient to make wind power more and more economical. This is where electrical steel and its special properties come to the fore. Magnetically soft steel consolidates and strengthens the magnetic flux inside the wind turbines' generators. This way, the mechanical rotational energy can be converted into electricity without any major conversion loss. "The performance of the generators, and with it the efficiency of the entire wind farm, depends vitally on these special material properties," says Tietz.

The steel producer is widely considered a technology pioneer in the area of electrical steel. The magnetic properties of this special steel have been further optimized to suit the requirements of Enercon – which is one of the main reasons behind the performance increases wind turbines have experienced over the last few years. The most recent models are capable of supplying up to 15,000 households with electricity. They are the German energy transition's big hope, and they are the poster child of a new sector that still continues to grow.

### Environmentally friendly material transportation

Cost-efficient and environmentally friendly shipping of the materials is provided by Enercon's own rail transport company, which means less traffic on the roads. "Together we've developed a very successful logistics model," says Thomas Sube from ThyssenKrupp Steel Europe. Sube is from the Sales Industry department, where he looks after electrical steel customers such as Enercon. "Forecasts and weekly consumption of materials are tracked very closely. The success of the package we have tailored specifically for Enercon relies on all participants maintaining

**Sustainable energy production: Not a problem with steel materials.**

Giant rotors  
convert  
the power  
of the wind  
into rotational  
energy.



The automotive sector is also opting for intelligent solutions for its production materials: Lightweight construction and hybrid technologies reduce costs, weight, and CO<sub>2</sub> emissions.

## The recyclability of steel reduces its CO<sub>2</sub> footprint.

Anna Meincke, Environmental Engineer, Technology & Innovation, ThyssenKrupp Steel Europe

regular communications.” Every year, around 50,000 metric tons of electrical steel are used in the production of generators. In the past, a comparable amount of steel would have required around 2,200 truck shipments for transport. Upon arrival at the Aurich plant, the sensitive raw material is unloaded in a bay protected from the weather and taken directly to the factory shop. The production line is one of the most sophisticated of its kind. “Every step from transportation through to production is planned very carefully,” says Mühlenbrock as he casts his gaze across the brightly lit storage depot. Protected by a white anti-corrosive film, the enormous steel coils are kept here in wait for further processing.

The monotonous pounding of the two segment presses reverberates through the halls. A few meters further, a thin, seemingly endless ribbon of steel disappears into the production line, traversing the straightening machine and being lightly sprayed with oil before entering the stamper. Tuk, tuk, tuk. The press outputs 200 pole laminations per minute. A slider is used to stack these in a tubular container to make up a core; the completed cores are then given serial numbers and taken to the welding station. Inside a glass box, a huge industrial robot applies one last protective coat for added resilience against the elements.

Illustration: Andy Potts Photo: Enercon GmbH

The study from Boston Consulting can be found here: [www.stahl-online.de](http://www.stahl-online.de)

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Heated up one more time, the cores are now durable enough for deployment. The demands placed on this material are immense, as Mühlenbrock explains: “The cores need to be reliably magnetizable for many decades, while at the same time withstanding the elements as well as considerable temperature differences. And, of course, let’s not forget about the mechanical stresses – about 25 revolutions per minute.” In order to keep these stresses to a minimum, Enercon has dispensed with the use of high-maintenance, wear-prone gear units. Instead, the generators form a single unit together with the rotor hub. The advantage of this approach is that there are fewer moving parts, which means the turbine will have a longer service life. As well as being more economical, this approach is also better for the environment. With no gear unit there is also no need for environmentally harmful lubricants and controversial rare earths such as neodymium.

The Aurich company manufactures 1,400 wind turbines per year, complete with generators. Half of these are erected in Germany; the remainder goes to Scandinavia, Canada, southern Europe, and Asia. Wind turbines containing electrical steel from ThyssenKrupp Steel Europe can be encountered as far afield as the Arctic and the Falklands.

# Dust turns to steel

At ThyssenKrupp Steel Europe, issues pertaining to environmental and climate protection as well as quality and sustainability management are handled in a dedicated department. This department is headed by **Andreas Theuer**. In the following interview, Theuer discusses the company's ecological activities and the energy efficiency inherent to steel.

Interviewed by: Birk Grüling

## How does ThyssenKrupp Steel Europe implement its declared company goals of energy efficiency and sustainability?

**Andreas Theuer:** One of the best examples of how these goals are implemented is our integrated steel mill concept. With this, all energy arising from production is consistently reused. The process gases are used for heat and power generation. Our internal district heating system provides heating to all our on-site buildings purely from waste heat. At our Duisburg location this means we're almost completely self-sufficient in terms of energy. We also feed our heat into the Niederrhein district heating system, which covers around 20,000 households. Processes such as these have grown considerably over the decades and they're still being improved today.

## Nevertheless, steel production requires a lot of energy. Is there much room to further reduce process-related CO<sub>2</sub> emissions?

The options for lowering emissions during production have largely been exploited. If we want to achieve significant further reductions, we really need to develop new technologies. That's one of the main areas we are currently researching.

## What are the characteristics of steel that contribute to a more ecologically friendly economy?

Thanks to its chemical and physical properties, steel is one of the most versatile production materials of our time. Many different sectors of the economy benefit from this. A good example for this is electrical steel, which among others is used for wind turbine generators and the motors of electric vehicles. Because of the increasingly efficient properties of electrical steel, environmental impact and efficiency ratings have improved considerably in recent years. Today, more CO<sub>2</sub> is being saved during the deployment of electrical steel than is used during its production.

## How important is recyclability to the environmental footprint of steel?

Steel is 100 percent recyclable – as many times as needed and without any quality losses. It is this characteristic that essentially halves the CO<sub>2</sub> footprint of steel.

## What are the recycling processes being used at your plant?

Our goal is to reuse as many of our waste products as possible. Production scrap is melted down. Metallic dust is used to produce steel. Slag and mud are used as materials for road construction or as raw materials for concrete production. Even our process water is recycled up to 25 times. In total, we manage to save several million metric tons of CO<sub>2</sub> every year.

## What is the exhaust gas treatment used by the company?

We employ a number of highly sophisticated filter systems that keep our emissions significantly lower than the legal thresholds. Again, our main goal here is reuse. The iron dust that we filter out, for example, is returned directly to the steel production cycle.

## What kind of energy efficiency developments are you expecting from the government?

Energy efficiency doesn't actually need to be prescribed by the government. As an industrial enterprise, it is completely in our own interest. We produce sustainable goods that are vital to many areas of day-to-day life, and we do so using highly efficient plants and resource-friendly processes. Unfortunately, however, there is a tendency towards excessive regulation when it comes to energy efficiency and climate protection.

Europe, Germany, and even the individual German states feel it is their duty to impose their own rules.

## What are the consequences of this?

Frequently, the solutions that are actually the most efficient don't get implemented. I also take issue with the way energy costs are rising as a result of the country's energy transition to renewables, and with the increasing discussion around tightening up emissions trading. The frameworks being created should not result in deindustrialization but rather provide consistent and competitive working conditions. This is the only way for the steel industry to remain a dependable contributor to sustainable and economical innovations.



**Andreas Theuer** heads the Environmental and Climate Protection / Sustainability division at ThyssenKrupp Steel Europe AG, +49 203 52 44 2 52, andreas.theuer@thyssenkrupp.com

## Project TetraFlex – the next generation of wind turbines

Wind energy is booming. The German Ministry for Economic Affairs is planning an annual increase of more than 1,000 wind turbines with a total output of 2,600 megawatts. Similarly positive progress is being made abroad. ThyssenKrupp Steel Europe is doing its best to participate in these forward-looking developments. The TetraFlex project has our developers from Duisburg working on an innovative new concept for steel-built wind towers with heights of 120 up to 200 meters. Previously, turbine heights of this magnitude were extremely expensive to achieve. There is good reason, however, to reach for the sky – at higher altitudes, the wind blows more strongly and more consistently. This increases the electricity yield and makes the deployment of TetraFlex towers viable even in low-wind regions. The top part of the new design consists of a round tower, whereas the bottom part is an open structure with four legs. For these, the developers are opting for spiral welded tubes that are also widely used in the oil and gas industries. New types of node systems are being used to interconnect the tubes. Thanks to lower material volumes, faster assembly, and easy scalability for individual location requirements, the TetraFlex wind towers are set to contribute significantly to increased wind power yields in the future.

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### Where electric motors are developed

Top-notch development work is also taking place at the E-Mobility Center Drives research facility at our Bochum location. At the core of this laboratory, the only one of its kind in Europe, is a multi-functional test bench for electric motors. Here, all types of electric drives outputting around 20–140 kilowatts can be tested. The main focus is on gaining new expertise to serve the further development of our in-house range of electrical steel grades for end-use applications. This magnetically soft steel consolidates and reinforces the magnetic flux in electric machines. Because its deployment involves high frequencies and limited space, it needs to be extremely thin and offer excellent stability. The intensive research efforts are paying off: The core losses of our electrical steel now occur at high frequencies such as 1,000 Hertz and 1 Tesla, which is 30 percent below the losses from standard grades of electrical steel. With its laboratory, ThyssenKrupp Steel Europe is eager to provide better support to its customers in the development of new electric motors. Prototypes are designed, assembled, and tested, and the resulting findings provide a basis for the discussion of non-oriented electrical steel's possible improvements and specific requirements.

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### Car body construction made easy

The automotive sector is facing major challenges. Fuel costs are rising, natural resources are dwindling, and climate protection is becoming a main focus. One of the answers to these issues is provided by InCar<sup>®</sup>plus, ThyssenKrupp's biggest research project and one that positions the Group as an innovative development partner to the automotive industry. One of the main areas research is focusing on is modern car body concepts. Innovative steel grades, material composites, and new processing methods aim to make cars even lighter and more energy efficient. Resource-friendly production is just as important to this as the end customers' demands for functionality, comfort, and safety. One of the solutions being developed in Dortmund is lighter and slimmer A pillars. These offer both a wider field of vision as well as better crash safety for drivers, and their weight is decreased by more than ten percent. The engineers are also investigating body-related components such as seats and wheels, including lightweight steel wheels, steel design wheels, and hybrid wheels. With the latter, a combination of steel and carbon-fiber-reinforced polymer (CFRP) ensures that the wheels not only have a very low weight but also a very low environmental impact.

**Contact:** Dr. Axel Grünekle, InCar<sup>®</sup>plus Project Leader, +49 231 844 4602, [axel.gruenekle@thyssenkrupp.com](mailto:axel.gruenekle@thyssenkrupp.com)

# Simulation in action

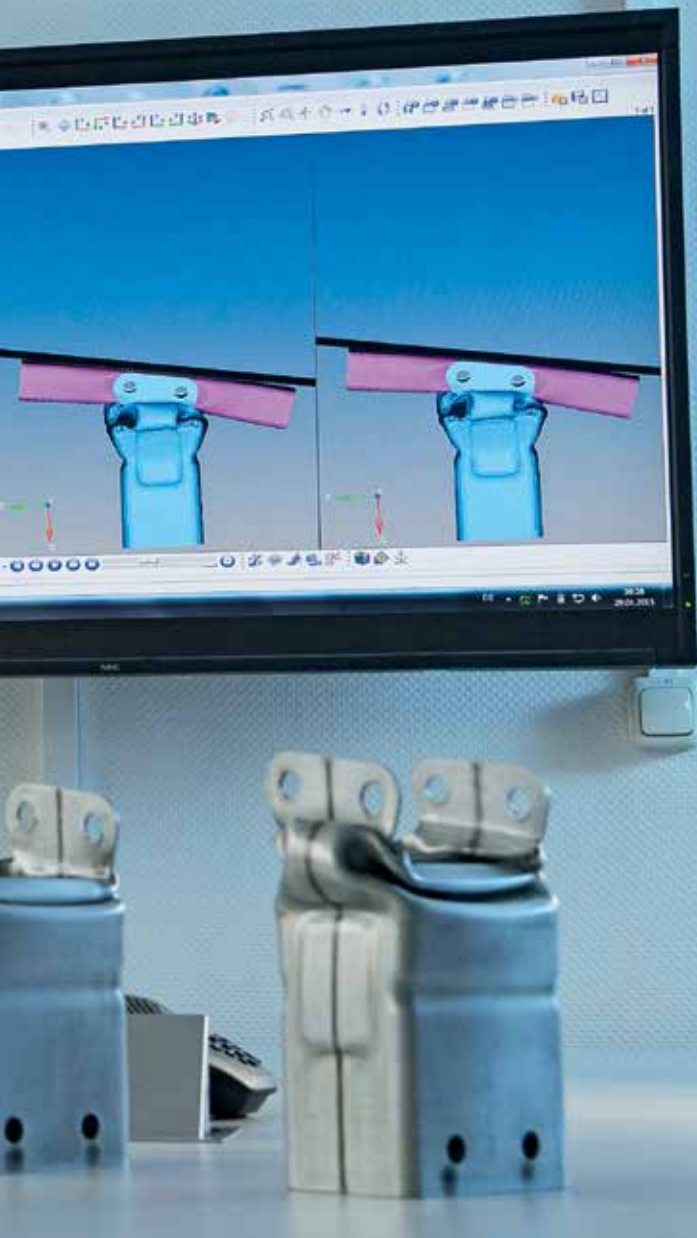
ThyssenKrupp Steel Europe uses **crash tests** to study vehicle safety, and in this line of work, theory and practice go hand in hand. These types of tests can also reveal a lot about the needs of the customer.

Text: Marc Lüttgemann

**A**s a supplier, there are two basic ways to deal with customers, says Erik Hilfrich from the Application Technology division at ThyssenKrupp Steel Europe: “The first way is to simply unload my product and leave the customer alone. The second way is to take an interest in how the customer uses our steel in the vehicle, to examine the customer’s precise needs, and to provide that customer with the exact materials needed to get the job done.” Hilfrich lets his words sink in for a moment. “We,” he continues, “prefer the latter approach.”

This philosophy really takes on new meaning in the Application Concepts team, where Rolf Röttger is hard at work carrying out crash simulations and other validation tests. In a time in





**Copycats:**  
Rolf Röttger (left) and Erik Hilfrich discuss a trial simulation.

which government authorities, insurance companies, and consumers hold vehicles to higher safety standards than ever before, ThyssenKrupp Steel Europe, as a materials manufacturer, is taking a close look at safety early on in the production process. Röttger mentions the side impact test, which became a major factor some years back. As a result of this test, vehicle doors are now equipped with side impact beams made from high-strength steel, allowing vehicles to comply with the stricter safety regulations.

This came as no great surprise to the Application Concepts team. The fact of the matter is that Röttger and his colleagues know the sector inside and out and specially tailor their work in Duisburg and at Westfalenhütte in Dortmund to the needs of the automotive industry. In order to anticipate these requirements, the team keeps a close eye

Photo: ThyssenKrupp Steel Europe

## “This dialog with the customers is very important to us.”

**Erik Hilfrich, team leader in Application Technology at ThyssenKrupp Steel Europe**

on the current crash test standards and stays abreast of any changes. One important new standard is the American Small Overlap Rigid Barrier (SORB) crash test, which simulates the conditions of a collision with a fixed wall, a scenario which tends to receive less attention in other types of crash tests. Existing body structures are not able to absorb enough energy at the points of collision. One option would be to integrate new components into the vehicle structure, thereby making use of existing load paths. Alternatively, existing structural components can be reinforced using ultra-high strength steel. ThyssenKrupp Steel Europe acted quickly, expanding its range of products so that it could supply its customers with the necessary steel products right away.

There is a lot of development work involved in turning a knowledge edge into innovations and optimized products, as with the SORB test, and a lot of this work takes place using computer simulations. To help him perform these simulations, Röttger relies on a cutting-edge server which can perform highly complex calculations in around six hours. To illustrate the accuracy of these results, Röttger employs an example: “For one of our new materials, we first calculated the results using a computer simulation and then performed an actual crash test together with the RWTH Aachen using the very same data. The results were exactly as we predicted.”

Carrying out tests like this together with customers and independent research institutes is part and parcel of crash simulations. This type of cooperation – learning together and from one another – is all part of a larger philosophy. “It is very important for us to foster communication with customers on the one side and researchers on the other side,” says Hilfrich. It is all part of the company’s goal to stay a step ahead in terms of product development and anticipate the needs of the market early on – and maybe even to know what customers will need next before they themselves do.

## Crash tests

### Other testing procedures

The **Euro NCAP** (European New Car Assessment Program) tests factors such as the safety of adult passengers and the safety of children seated in the rear. The test awards up to five stars.

The **AZT Bumper Test** carried out by the Allianz Zentrum für Technik primarily studies how easily components can be repaired after a crash. This test is used to help calculate a vehicle’s insurance rating.

# Hard on the outside, hard on the inside

Counterweights secure the heavy work performed by **Liebherr's** construction machinery. The joint work of ThyssenKrupp Steel Europe and System Engineering secures their quality. A visit to Wadern-Lockweiler, Germany.

Text: Sabrina Künz

**T**he cabin and hood of a Fendt 724 Vario are presented in the entrance area like works of art. The design of the tractor hood is particularly impressive. Elegant and streamlined, the air inlet grille is less reminiscent of a utility vehicle than a luxury car. The farm machine hood in question was jointly developed by Fendt and ThyssenKrupp System Engineering's prototype shop; a new hood, for the world's biggest hauler, is currently in the making. In Lockweiler, there are 130 employees making tools and producing small runs of stamped parts and prototype parts for the automotive industry, as well as for the Group's own research projects such as InCar®plus. They share decades of experience in the automotive sector between them, and for a few years now, they have also been active in areas such as agricultural technology, construction machinery, and sanitary installations. "The customers from these new areas know to appreciate our expertise from the automotive industry. A lot of confidence is placed in us," says team manager Volker Grünewald.

Liebherr has been a customer since 2006. The company was looking for a development partner to design steel-made counterweights for excavators. Previously, Liebherr had been making its counterweights from gray cast iron. There were two main reasons for the rethink: costs and design. At the time, both steel and cast iron prices were rising dramatically. Also, the rough cast iron didn't provide a smooth enough surface. The project team put together an initial order to attract a suitable supplier. Because of the plate dimensions required, this wasn't going to be easy. Faced with needing to deliver a width of around 1,925 millimeters,



Heavy shells: After deep drawing, the hollow shell is lifted using a special handling tool.



A weighty match: Volker Grünewald, Meike Giesbers, Martin Metzger, Peter Weiter (left to right).

Photos: André Kohl (2), Liebherr



most suppliers simply had to pass. In the end, the solution was to stay in the family – and turn to ThyssenKrupp Steel Europe. For production, the prototype shop uses its heaviest press, which has 2,000 metric tons of slide force. This is entirely necessary, as the plates for Liebherr are three millimeters thick and require immense forces to form them. By comparison, most of the plates used in the automotive industry only have a thickness of 0.6 to 2 millimeters. In addition, an enormous draw depth of up to 450 millimeters is required. “We gradually optimized the process and equipped the production area with the necessary handling tools. This way, we were able to reduce production costs by around 60 percent,” says Grünewald. Recommending materials for easier metal forming is part and parcel of the advice provided by ThyssenKrupp Steel Europe. “We work together very closely with our Technical Customer Support team,” says Meike Giesbers, who is part of the steel producer’s sales team and looks after EU construction projects. Up to seven parts are drawn per hour and then cut using a 3D laser. While the plate weighs a massive 160 kilograms to start out with, it slims down to 100-110 kilograms after processing.

In case you’re wondering how this is going to secure an excavator with a service weight of up to 34,750 kilograms: The actual weight is added later on. The shells are assembled into a frame, fitted with a locking plate, and then filled with concrete and solid scrap. On completion, the counterweights weigh between 4.5 and 8 metric tons. So far, ThyssenKrupp System Engineering has developed and manufactured tools for nine of Liebherr’s model ranges. All of the excavators from these ranges, which are exported from Europe to everywhere in the world, are fitted with counterweight shells made in Lockweiler with sheet steel from Duisburg. With orders like these, everything needs to be perfect, says Peter Weiter, Vice President Prototyping at System Engineering. “We offer everything that’s needed – from the specialized materials expertise through to the required processing know-how.” Martin Metzling from Sales at Steel Europe agrees: “What our customers receive is combined steel capabilities – which include the materials, the tools, and the production processes.” Thierry Portzer from Strategic Purchasing at Liebherr is happy to confirm this, too: “The ThyssenKrupp team is very professional and hasn’t missed a single deadline yet. The product quality is also great.” The teamwork here really couldn’t be any better.

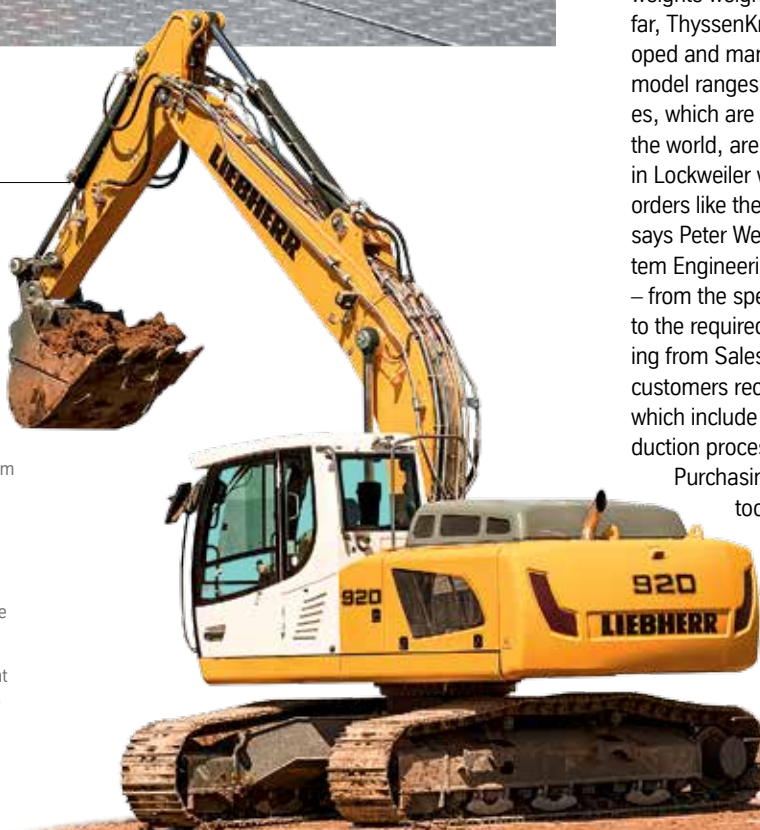
## In figures

### Tool shop

Since 2006, the prototype shop at ThyssenKrupp System Engineering has produced nine different forming tools for construction machinery from Liebherr.

### Material processing

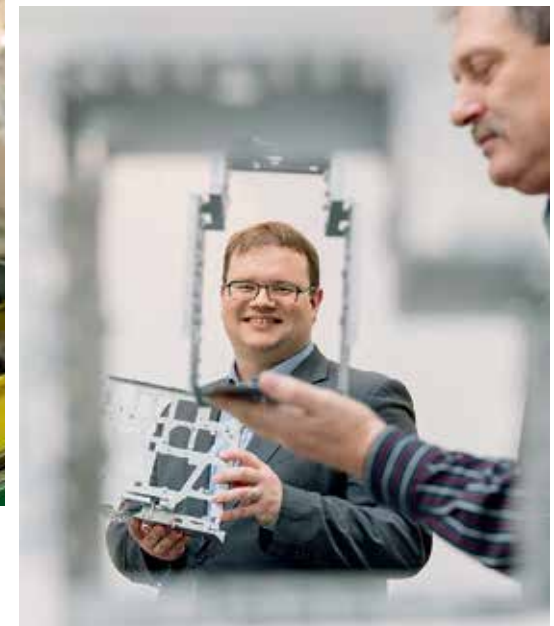
Around 1,800 metric tons of steel is how much ThyssenKrupp Steel Europe has formed over the last eight years, shipping approx. 11,800 counterweight shells to the end customer.



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Junior director Marvin Michel (left) and head of purchasing Siegmur Uhlemann inspecting sample modules.



# Casings for everything

**CoolCase** from Dresden, Germany, develops and manufactures metal casing systems for a wide variety of industries, ranging from IT to solar power.

At the beginning, it was all about cooling solutions for computers and monitors, says Marvin Michel. “The name was perfect.” It is indeed tempting to ask about the company moniker. “We were looking for a catchy term for patenting our invention. Because you can’t just trademark a word like ‘cool,’ we simply added another ‘o’ to it – problem solved.”

CoolCase manufactures products for the IT and medical technology sectors, the electronics and automation industry, and the telecommunications and solar power sectors. “When the previous owner announced he was going to shut shop here in 2009, my father decided to take over the business,” says the 27-year-old. Michel Sr. was the CEO until 2007 and previously ran his own tool workshop for progressive dies. His expertise in tool making and metal processing were instrumental to CoolCase’s ongoing success. Across 5,000 square meters of production space at the factory, components are separated, joined, and coated. There are machines for milling, sanding, and stamping, plus two industrial robots for welding and pressing the metal blanks.

That’s because here at CoolCase, they process steel – and a lot of it. A large part of the raw materials comes from ThyssenKrupp Steel Europe. “We get wide strip steel from Duisburg that we use to make slit strips and custom blanks,” says Rene Thomas from the ThyssenKrupp Steel Service Center in Radebeul, Germany. “We process and assemble hot-dip and electrolytically galvanized materials, hot-rolled as well as cold-rolled, and we’re able to accept small runs.” In order for the products to be used in modules and casings destined for computers or solar power systems, the materials need to be of the highest quality and precision.

“The devil is in the detail,” says Achim Peuster, Technical Customer Support/Sales Industry at ThyssenKrupp Steel Europe. “What CoolCase needs is not a material that’s been manufactured to standard specifications but one that specifically accommodates the downstream processing requirements. Accordingly, we only supply very flat and low-stress coils for panel production in Radebeul, with tightly-controlled thickness tolerances and mechanical properties.”

Requirements-based manufacturing is crucial to CoolCase and its customers. Tight deadlines, flexibility, and sometimes very small runs are all part of this. “For example, our special runs include more rugged computer casings with anti-theft and anti-vandalism protection for schools and police stations,” says Marvin Michel. “Special products such as these require a very high quality but only a small run of a few thousand; that’s usually impossible to get when ordering from Asian bulk suppliers.” The proximity and fast response time of the Steel Service Center team members in Radebeul – who can drop off the required raw materials on-site within just a few hours – helps to maintain this competitive advantage.

Head of purchasing Siegmur Uhlemann gets in touch quite regularly. “With the quantities that we’re needing, we like to deal with the manufacturer directly. The Steel Service Center is basically one step away from the steel mill itself.” At the moment, Uhlemann is needing to boost the material supply quite considerably, as CoolCase recently secured a very big contract – from China, somewhat surprisingly. This is due to the skyrocketing demand for inverters in the solar power sector. “It’s a complete anomaly for us but one we’re happy to entertain while it lasts,” says Marvin Michel. In terms of business attitude, that’s about as cool as it gets. — jb

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Photos: Sven Döring (2), ThyssenKrupp Steel Europe (2)

# Making room

If you need to keep track of thousands of individual parts, it's vital to have everything well ordered. **Meta Regalbau** from Arnsberg in western Germany helps with just that. The company has suitable shelving systems for any warehouse or storeroom.

**F**rom the smallest screws through to bulky packages – everything needs to be stored somewhere. The steel shelving units from Meta make it easy to keep things in order. The manufacturer's customers include major mail-order retailers, specialized trade, workshops, and archives. "Meta is definitely benefiting from the rise in online trading. Over the past four years, we've at least doubled our tonnage," says Ingrid Schumacher, head of purchasing at the SME-sized warehouse and workshop furniture supplier.

It's just the kind of success story that Martin Metzger from ThyssenKrupp Steel Europe's sales team in Duisburg likes to hear. The steel producer is Meta's main supplier of materials. The shelving manufacturer sources around 90 percent of its production materials from Duisburg – in all strengths and grades. "We supplied more than 30,000 linear meters of steel to them over the last eight years," says Metzger. "Put together in a continuous strip around the 51st parallel north – the one Duisburg

is closest to – that already circles the earth more than once."

Shelves are expected to bear heavier and heavier weights, yet they are also to be more lightweight. Faced with such demands, Meta not only uses ThyssenKrupp Steel Europe as a supplier of carbon steel but also as a development partner. "We work together very closely. We explain to each other what we envision and we work out the best solution together," says Schumacher.

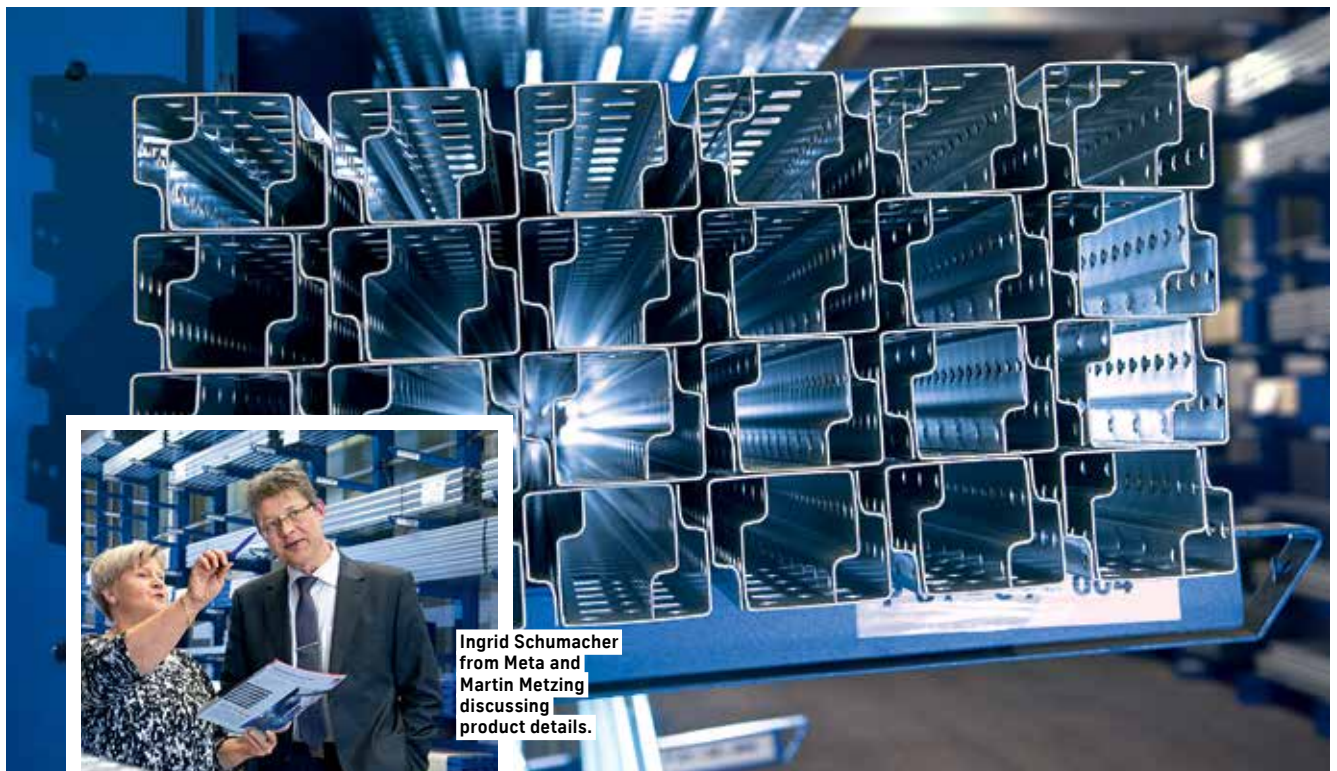
**Last year**, Meta started using a new material that is thinner but just as strong. "These coils stretch further for us and we can manufacture more shelves from them," explains Schumacher. "See, we even help our customers save money," Metzger is happy to add. At the Meta production workshops, the material is processed into complete shelving systems.

The shelf production line is Meta's centerpiece: Here, the plates cut out of the coils are put through numerous processing steps and then stacked and packaged as

individual shelves. Because production is mostly automated, more than half of Meta's 250 employees are office workers. The connection between ThyssenKrupp and Meta goes back a long way: In 1997, Joachim Loh – whose group of enterprises Meta is part of – acquired the Warehouse Technology division from Thyssen Industrie. This was used for the manufacture of pallet and sliding shelves as well as high-rack storage systems. It was an ideal addition to the Meta product range.

It certainly is an advantage that both the supplier and the customer are familiar with each other's lines of business. To make sure it stays that way, the apprentices from Meta recently spent a day at the Duisburg plant to find out how the steel that their company processes is actually produced in the first place. Many interesting facts were learned and foundations laid for further collaboration in the future. — as

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Ingrid Schumacher from Meta and Martin Metzger discussing product details.

# Traveling by water

ThyssenKrupp Steel Europe sends its steel products to the **Port of Antwerp** to be shipped out all over the world. The company's location on the Rhine is certainly a logistical luxury.

1

## SHIPPING FROM THE PLANT

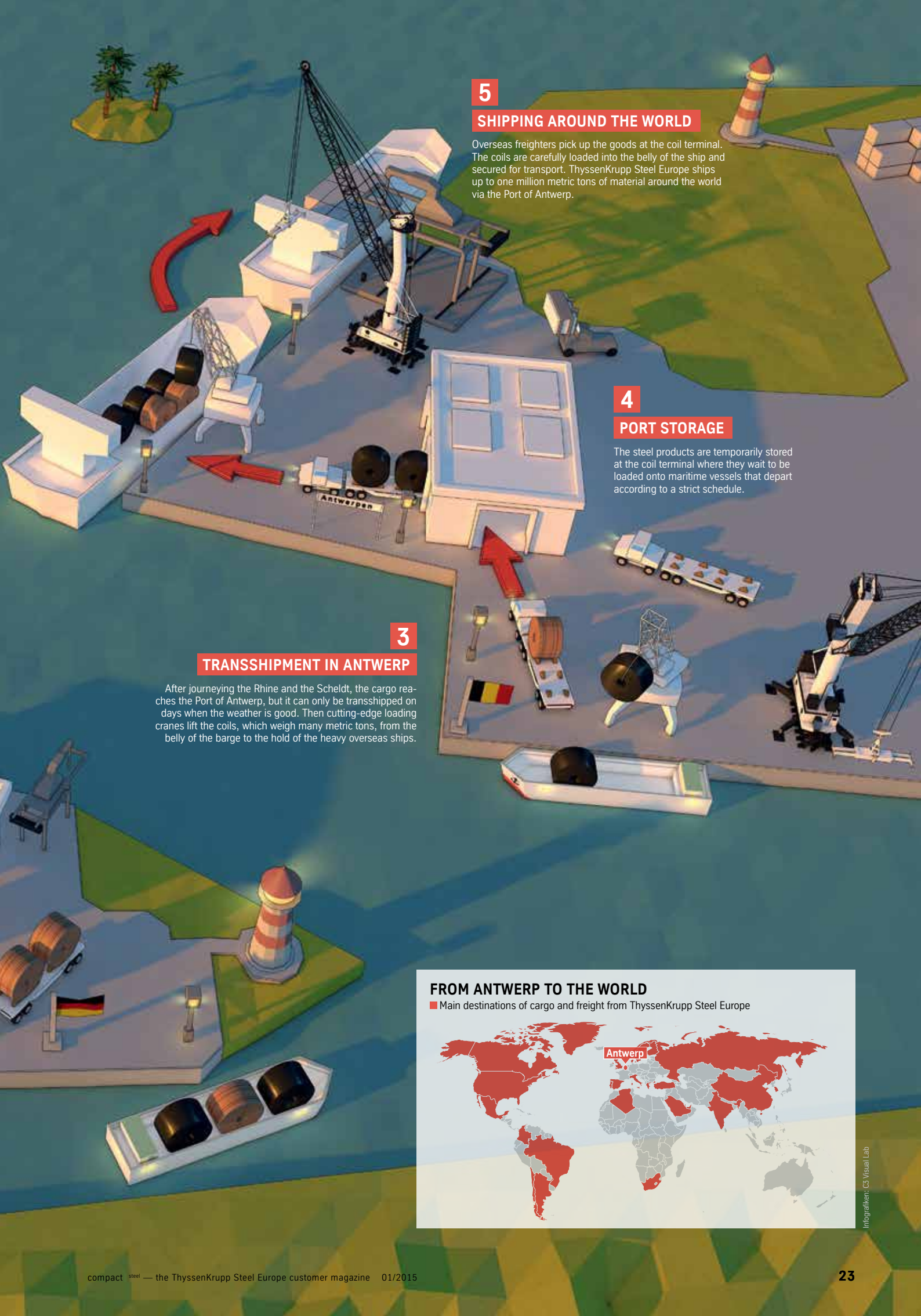
The coils from the plants in Dortmund, Bochum, Finntrop, Eichen/Ferndorf, and Duisburg are shipped to the port at Duisburg-Walsum via road or rail.

2

## LOADING AT WALSUM

The pre-packaged products, which are mainly sensitive to moisture, are briefly stored at the plant port at Walsum before being shipped to a weatherproof facility and finally loaded onto barges.

You can see a photo gallery from the Port of Antwerp at: [www.thyssenkrupp-steel-europe.com/compact](http://www.thyssenkrupp-steel-europe.com/compact)



5

### SHIPPING AROUND THE WORLD

Overseas freighters pick up the goods at the coil terminal. The coils are carefully loaded into the belly of the ship and secured for transport. ThyssenKrupp Steel Europe ships up to one million metric tons of material around the world via the Port of Antwerp.

4

### PORT STORAGE

The steel products are temporarily stored at the coil terminal where they wait to be loaded onto maritime vessels that depart according to a strict schedule.

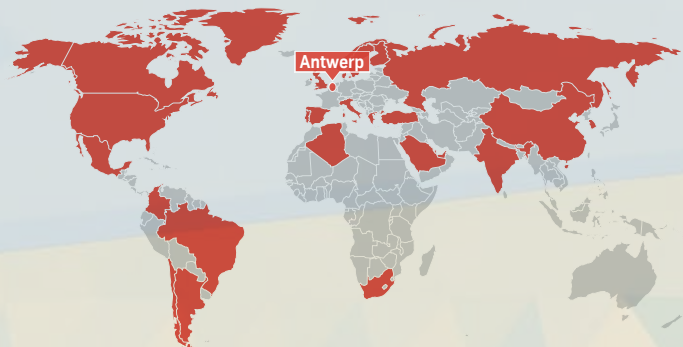
3

### TRANSSHIPMENT IN ANTWERP

After journeying the Rhine and the Scheldt, the cargo reaches the Port of Antwerp, but it can only be transhipped on days when the weather is good. Then cutting-edge loading cranes lift the coils, which weigh many metric tons, from the belly of the barge to the hold of the heavy overseas ships.

### FROM ANTWERP TO THE WORLD

■ Main destinations of cargo and freight from ThyssenKrupp Steel Europe



Infografiken: CS Visual Lab

# Business creates business

Does transportation need cloud-based solutions and can coils be shipped in containers at an affordable price? We touched upon these and other issues with Ulrike Höffken, head of Logistics at ThyssenKrupp Steel Europe, and Luc Arnouts, Chief Commercial Officer of the Port of Antwerp, at their meeting in Belgium.

Interviewed by: Judy Born

Shipping experts:  
Luc Arnouts and  
Ulrike Höffken.







Photo: Thomas Vanden Driessche / Fotoglora

**Ms. Höffken, are ThyssenKrupp Steel Europe products delivered to all corners of the world?**

**Höffken:** They certainly are. Our customers are always opening up new plants around the world where they want to use our products, and we often follow them – no matter where they go. We inspect the various regional ports available to us and our employees appraise the conditions on-site.

**What conditions do they have to meet?**

**Höffken:** Well, they have to have all-weather terminals for our short sea shipping where we can transship goods even when it's raining. This is very important, as our products are not allowed to get wet. We determine which companies to contract for logistical services and make sure that they have the necessary experience with steel products. We check which ships the different carriers use to make sure that there is adequate storage and that they are safe for transportation.

**Mr. Arnouts, what kinds of advantages does Antwerp have to offer in that regard?**

**Arnouts:** First off, there's the high shipping traffic and the well-developed transportation network, both for containers and general cargo. Also the ratio of import to export is relatively balanced. That makes for a healthy cycle for senders and receivers, because transportation costs drop when both incoming and outgoing ships are full.

**What advantages does the port have to offer steel companies?**

**Arnouts:** Our terminals are specialized in different types of freight – from the specific wharfage equipment we use to the dock workers who have decades of experience handling steel products. We also have seven different training centers housed in our facility. Knowledge and productivity ultimately form the basic pillars of our business.

**Höffken:** That's true. In Antwerp we hold interests in RKE and Coilterminal to ensure the safety of our products during transport. And in all other areas we also leave nothing to chance. Only flawless products that have been packaged by our own technicians or by specially contracted sea freight experts are shipped out. There are also precise loading regulations governing both the transshipment of products as well as how products are loaded the ship.

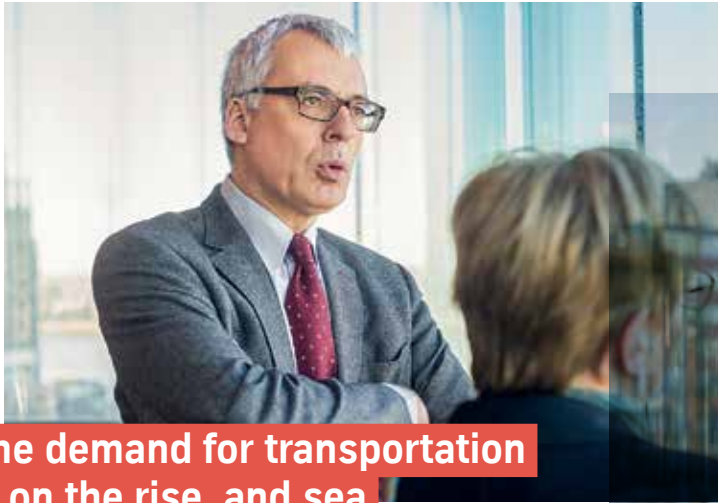
**This applies to shipping in Duisburg and Antwerp, but, of course, the journey doesn't stop there...**

**Höffken:** That's right. We always check our goods wherever they are transshipped. In fact, we employ quality assurance experts at all of our ports of entry worldwide. They check the condition of the products before the next point of transfer. As long as we are responsible for transporting products to the customer, we take great care to ensure a smooth delivery process.

**Container transport is a growing sector. How does that affect your work?**

**Arnouts:** It has a huge impact. We are currently Europe's third largest container port. Container transportation makes up 55 percent of our total business – and that number continues to grow. However, general cargo still makes up a large part of our freight.

**Höffken:** We need to continue to develop in this area, but it is not worthwhile to use containers to ship coils. We use wood and steel girders to fasten the coils into the containers, and the girders ultimately have to be shipped back to us. There are also 'coil-tainers,' that are used to standardize the process of coil shipping, but they are



The demand for transportation is on the rise, and sea transport is more cost-effective.

Luc Arnouts

► generally more expensive than conventional shipping, so we normally use containers only when we stand to save money, for example when shipping flat steel in packages or on pallets – or when there is no other way to ensure that our customers will receive the materials they need on time.

**How do you both see the future of transportation by ship?**

**Arnouts:** The demand for transportation is on the rise and this demand cannot be met by rail and road transport alone. In Germany, Belgium, and the Netherlands, there is a need for massive investments in roads and railways. Transportation by ship is more cost-effective and there is huge potential for growth.

**Höffken:** I'm not worried about sea transport either. We have been very successful in transporting finished products from Antwerp to our customers around the world. I see more problems when it comes to rail and road transport, for example when shipping goods between different plants. It is urgent that measures be taken to maintain and modernize bridge structures, rail lines, and roads.

**Where do you see room for improvement?**

**Höffken:** We are in desperate need of a standardized track and trace system so that every sender, supplier, and customer can track their shipment at any time. To do this, we'll have to employ cloud technology so that all of this data can be made available to those who need it. Currently everyone has their own system and nothing is compatible. We could track changes far more quickly and make the impossible possible. This is a challenge for the entire logistics sector – everything could be made far more transparent.

**Arnouts:** That will take a lot of coaxing. Many companies aren't keen to share their information and insist that this helps to maintain their competitive advantage. It has to be made clear that the advantages are much greater when everyone is using the same system.



We need a standardized track and trace system so that everyone knows where their goods are.

Ulrike Höffken

**People**

**Ulrike Höffken**

is Head of Logistics, and as such, is responsible for the organization, management, and implementation of freight traffic. This includes the purchase of transportation, storage, and transfer services as well as the maintenance of rail and port facilities.

**Luc Arnouts**

is the Chief Commercial Officer at the Port of Antwerp, where he is in charge of development. Antwerp is currently Europe's third largest port and the world's largest port for general cargo. It is home to the second largest chemical business park worldwide after Houston.

**Who is responsible for doing that?**

**Höffken:** Everyone. The whole industry – across all sectors – has to band together.

**How does environmental protection and sustainability play a role in sea transport?**

**Höffken:** We're looking at a cost hike for sea transport in the wake of the new emissions standard for ECAs, effective as of this year. From a business perspective, this is naturally a bit problematic because many of our competitors, for example in China, have far lower environmental standards to contend with when it comes to transport and production. Personally speaking, I welcome this initiative, so I suppose I am of two minds when it comes to this matter.

**Arnouts:** As for our role, we were the first port to publish an environmental report. In this report, we shed light on numerous different aspects related to sustainability at our port. We have to be responsible for the effects of our actions, and in such a densely populated area near the city which is so close to Germany and the Netherlands, we need to make sure that we have everyone's approval if we wish to expand – and that remains our goal.

**Do you ever long to travel out to sea on one of your ships?**

**Arnouts:** The desire is definitely there, but I have a far greater passion for the things we are doing here on land. We've got local roots and a global vision. A former port councilman once said: "Hold your hand in the Scheldt and you'll be connected with the entire world." I think I can do more here than I would be able to out at sea, and if I were ever to venture out, I'm pretty sure I'd prefer a yacht to a freighter.

Photos: Thomas Vanden Driessche / Fotograia (3) CS (2), Karsten Rabas, PR (2)

# Dates

2015

May

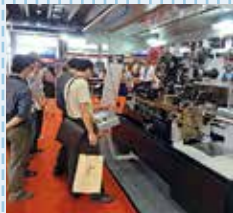


## Coil Winding CWIEME 24–26 June, Berlin, Hall 4.2, Booth F30

ThyssenKrupp Steel Europe will be demonstrating its innovations in non-oriented electrical steel at the world's largest industry trade fair for international experts from the fields of coil winding, insulation, and electrical manufacturing. [www.coilwindingexpo.com](http://www.coilwindingexpo.com)

## Cannex & Fillex 1–4 June, Guangzhou, China, Hall 11.1, Booth 907

For the past two decades, this trade fair has been a major industry hub for can manufacturers, packaging designers, machine manufacturers, and material suppliers. For the first time, ThyssenKrupp Rasselstein will be exhibiting at its own booth. For the manufacturer of tinplate, this appearance represents an ideal way to introduce itself on the Asian market as a premium supplier of highly efficient packaging steel. The company's main goal is to secure new clients. [www.canline.com](http://www.canline.com)



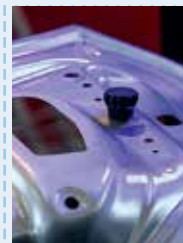
June

## JSAE 20–22 May, Yokohama

The trade fair organized by the Society of Automotive Engineers of Japan (JSAE) offers around 70,000 visitors the chance to network with more than 400 exhibitors. ThyssenKrupp Steel Europe will be presenting information on the InCar<sup>®</sup>plus project and showcasing samples of its Tribond<sup>®</sup>, MBW<sup>®</sup> 1900, and DP<sup>®</sup> 1200 products. Steel Europe will also be presenting a special lecture on the topic of light-weight construction. [www.jsae.or.jp](http://www.jsae.or.jp)

## AEE 9–10 June, Nuremberg, Exhibition Center

The Automotive Engineering Expo (AEE) is a trade fair for experts from the automobile industry which focuses on discussions in the areas of body construction, body painting, and assembly. ThyssenKrupp Steel Europe will be showcasing its InCar<sup>®</sup>plus demonstrator and presenting special lectures and other exhibits. [www.automotive-engineering-expo.com](http://www.automotive-engineering-expo.com)



## Presentation of the Steel Innovation Prize 2015 9 June, Berlin



This award for new steel products, inventions, and innovative ideas is presented once every three years. The ceremony takes place in Berlin as part of the 'Berliner Stahldialog', one component of the communication initiative surrounding the material of steel. Awards will be presented in four categories: 'Steel in Research and Development', 'Steel in Construction', 'Steel Products', and 'Steel Design'. The special prize, 'Climate Protection with Steel', is awarded to the innovation that offers the most effective way to save on energy, materials, and CO<sub>2</sub> emissions. [www.stahl-innovationspreis.de](http://www.stahl-innovationspreis.de)

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## compact<sup>steel</sup> near you

We traveled to Antwerp for the Agenda interview. The photo shoot took place in the modern MAS Museum (*Museum aan de Stroom*) and the interview was held in the neighboring Port Pavilion. The museum is located between Antwerp's two oldest port basins near the Scheldt River.

You can view a photo journal of our visit to the new port online at:  
[www.thyssenkrupp-steel-europe.com/de/magazin](http://www.thyssenkrupp-steel-europe.com/de/magazin)





# Competition

**In what year did John R. Dediccoat invent the bicycle bell?**

If you think you know when this acoustic accessory for the handlebars was first patented, **let us know!**

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<sup>steel</sup>, 47161 Duisburg, Germany, or by e-mail to: [compact.tkse@thyssenkrupp.com](mailto:compact.tkse@thyssenkrupp.com). All entries must be submitted by 10 June 2015 (postmark date). The winner will be chosen at random from the correct entries. Employees of ThyssenKrupp Steel Europe and their dependents are not eligible. The winner will be notified separately. The judges' decision is final. Note: Your personal data will be used for the purposes of the competition only.