

compact steel

02 / 2014

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

WORLD PREMIERE

Zinc-magnesium
protects car bodies
from rust

HOT FORMING

Simulation saves both
time and money

SPECIALIST DISCUSSION

Steel remains first
choice for car building

It pays off to employ the right tactics

Learn how the innovation team thinks
ahead strategically and how daring
ideas are turned into excellent products

ThyssenKrupp Steel Europe
Thinking the future of steel



ThyssenKrupp

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Prof. Hans Ferkel and Bernhard Osburg explain why steel remains the material of choice for the automotive industry



A question of technology

Flash of inspiration: A good idea alone is not enough. It has to be possible to be implemented. That is what the ThysseKrupp Steel Europe specialists are there for – and if it doesn't work in the end, the idea may just need to evolve a little more.



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Knowing which way the wind blows

The Brazil World Cup quarters of the German soccer team are powered by small-scale wind turbines. The masts were supplied by Europoles.



The two agree: Steel is what keeps the automotive industry rolling.

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Time for a swim:
A dip in the
zinc-magnesium
pool protects the
outer surface.

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Photos: Title: ThyssenKrupp Steel Europe photography, Fotolia pages 2,-3; ThyssenKrupp Steel Europe photography (3), Fotolia, Europoles Illustration; KitcherBurkhardt; Infografik



Dear readers,

The Soccer World Cup is currently being staged in Brazil. Whoever aspires to become world champion will have to employ the right strategy. The same holds true for our customers and us. The future calls for flexible and diverse solutions. Together with you we will successfully realize these solutions – through close partnerships. This also underscores our goal and mission: ‘Thinking the future of steel’. Maintaining such close customer relationships enables us to learn about your specific needs, identify trends in technology early on, and apply this knowledge directly to developing new types of steel. As your technology partner, we can thus help you optimize your production processes and expand your markets. And to make sure things stay that way, sales and innovation are combined under a joint management team, which takes care that clever idea management, competent steel development, and trusting customer relationships lead to fruitful research partnerships. We are planning to reduce development times considerably by 2015. After all, both your and our success depends not only on the right price, but also on our joint powers of innovation and our ability to bring these innovations to market quickly. Our ZM EcoProtect® coating is living proof of the speed at which we can turn good ideas into mature products. The zinc-magnesium coating is a highly effective corrosion protection solution for exposed car body panels – and the first of its kind across the globe. I wish you an enjoyable and inspiring read.

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



View

Pretty long friends

A parade of giants: The lattice boom, crawler, telescope, and mobile cranes extend into the sky, in some cases up to 50 meters high. Many of the cranes are products from Liebherr, whose business relationship with ThyssenKrupp Steel Europe reaches back more than forty years. One of the secrets of a lasting partnership is to keep innovating. This is exemplified in the Heavy Plate Business Unit by the PERFORM® 700 cold forming steel, the latest product enhancement that features excellent surface quality, flatness, and freedom from stress. Liebherr, a major customer of the heavy plate experts, places its trust in this high-strength quality. The company will utilize it for high-quality concrete pumps 'made in Germany'. This accolade will serve to further intensify the existing relationship.




Glitter and glamour

A new coating process brings a sparkle to flat steel strips.

Once crystals on steel! That's a feature only we offer. The new glittering, eye-catching material is called PLADUR®

Relief iceCrystal. It is made possible by applying special print and effect coatings to the steel strip using sophisticated application techniques. The substrate is ZM EcoProtect®. "Our product is very popular," says Head of Sales Color/Household Appliances Axel Pohl, "including with manufacturers of steel roof tiles. The elegant finish is patent protected, providing customers with a unique product." Blachotrapez, an expanding Polish company, already orders several thousand tons of PLADUR® Relief iceCrystal on an annual basis, and the volume keeps rising. "Early this year, our longstanding customer introduced the newly developed GERMANIA roof tile profile, which they make using our organic coated flat steel." GERMANIA is an exclusive product that is only manufactured when specifically ordered after individual consulting in one of the more than 100 nationwide sales offices.

Blachotrapez is already planning to set up further production facilities across Europe capable of processing PLADUR® Relief iceCrystal to produce steel roof tiles. For more information, visit: www.blachotrapez.eu



Shining outlook: roof tiles made from PLADUR® Relief iceCrystal-coated steel strips.

Lightweight construction is a complex business

Lightweight construction is the future of the automotive industry. There have been initial trials, but to date the materials required are much too expensive to use in volume production. This is expected to change in 2015 when the Open Hybrid Lab-Factory is scheduled to open. The Wolfsburg-based research factory will allow 200 specialists to conduct experiments in the area of hybrid construction. The factory's mission is to develop suitable materials and take the associated production processes to production maturity. Full members will include Braunschweig University of Technology, VW, and ThyssenKrupp Steel Europe, who joined this March. ■

Moving up!

According to worldsteel, the international body for the iron and steel industry, demand for steel will rise by 3.1 percent to 1.53 billion tons in 2014. The steel business in industrial regions recovered stronger in the second half of 2013 than initially projected, reports Hans Jürgen Kerkhoff, Chairman of the worldsteel Economic Committee. In 2013, global steel demand picked up by 3.6 percent, to a total of 1.48 billion tons. Industrialized countries are expected to benefit in particular from this recovery of the steel business in 2014. worldsteel's forecast for 2015 sees demand for steel rising by another 3.3 percent to 1.58 billion tons. ■

Full coffers for development

The Steel Europe Business Area has increased its budget for innovations. Research and development activities can draw on funds totaling 85 million euros in the current fiscal year. ThyssenKrupp Steel Europe AG has been allotted 73.5 million euros to find answers to various exciting questions related to steel and to turn clever ideas into full-blown research projects. This is a solid plus compared to the 69.9 million euros invested at ThyssenKrupp Steel Europe in the prior year. ■



The new top dog: Andreas J. Goss

Andreas J. Goss (50) has been Chairman of the Executive Board at ThyssenKrupp Steel Europe AG since June, based on a decision passed by the Supervisory Board at the beginning of May. Goss was appointed to the board as Chief Financial Officer (CFO) in October 2012. Shortly afterwards, in January 2013, he added speaker of the board to his collection of job titles, while continuing as CFO. A father of two children, he started his professional career at Siemens working as a financial analyst in the U.S. He held various positions at Siemens, where he eventually took up his role as Chief Executive, Siemens UK and North West Europe in 2008. ■



Excited anticipation at Bochum-based E-Mobility Center Drives.

Electric engines gain traction

The newly certified testing facility in Bochum assesses the strength and efficiency of non-oriented electrical steel.

The Bochum location has grown: The 'E-Mobility Center Drives' testing facility now allows engineers to research new, more efficient ways of constructing electric motors with electrical steel. The center also helps to speed up production developments for non-oriented electrical steel. The goal is to create non-oriented electrical steel that is even more effective in motor applications by minimizing energy loss and supporting higher speeds. The type of steel employed is of decisive importance here, because electrical steel must be extremely thin yet very strong in order to attain high energy efficiency and power density. "Our electric motor test bench offers customers clear benefits," stresses Marco Tietz, Head of Application Technology for Non-Oriented Electrical Steel in Bochum. "We provide them with assistance, consulting, and support in using our material. If required, we also offer to accurately measure their motors." The new electric motor test facility of ThyssenKrupp Steel Europe – fully equipped with a workshop and modern laser cutting system – is extremely flexible as it supports a broad range of different motors including asynchronous motors, permanently excited synchronous motors, and high-speed vehicle traction drives. The performance characteristics speak for themselves: a maximum speed of 18,000 rpm, a maximum power of 140 kW, and a maximum torque of 230 Nm.

ThyssenKrupp Steel Europe customer VW is a key innovation driver of e-mobility. For detailed information on this topic, visit the emobility-volkswagen.de portal.

Photos: ThyssenKrupp Steel Europe photography (4), Shutterstock



MOBILITY BASED ON STEEL

The 'SteelOnline' e-commerce platform and automatic data exchange (EDI) are very popular. Already, half of customer orders are being carried out and tracked online. Go online at: <https://online.ThyssenKrupp-steel.com>.



INITIAL PATENT FILINGS

were submitted in the 2012/13 fiscal year by ThyssenKrupp Steel Europe AG. We expect this number to cross the 150 threshold in the current fiscal year.

Story

From a mere idea to a showcase product

High-manganese steel exemplifies
how a clear strategy for driving
development promises success.

Text: Anke Stachow



Sound tactics:
ThyssenKrupp
Steel Europe
is set up for
success.

The 150-kilogram weight impacts the square steel tube after a ten-meter fall from the drop tower. The test body absorbs enormous amounts of energy by means of plastic deformation. It does not splinter; instead, it folds together accurately like an accordion. The material being tested in the applied technology lab of ThyssenKrupp Steel Europe's Technology & Innovation business area in Dortmund is an innovative high-manganese steel.

It is extremely strong and exceptionally formable, without getting brittle or cracking. On the contrary, even after severe forming operations to produce complex parts, it still maintains a high degree of residual ductility. These special material properties make the steel highly suitable for a wide range of applications. One such application is about to be introduced to the market: high-manganese steel for protecting civilian security vehicles. In the coming months, ThyssenKrupp Steel Europe's subsidiary Hoesch Hohenlimburg, which produces hot-rolled specialized strip, will begin to deliver the innovative steel for the first small series of new armored cash-in-transit vehicles. "Cash transporters and a range of other vehicles will be made using this newly developed steel in the future," explains Dr. Andreas Tomitz, Team Leader of Product and Process Development at Hoesch Hohenlimburg. Traditional steel armor plates need to be hardened in an additional step to ensure that projectiles shatter and are diverted upon impact. But the high-manganese steel works on a completely different principle: Projectiles do not ricochet off the hull – they are absorbed in a fashion akin to an airbag. "Even with lower thickness, the new steel can endure much greater stress than conventional steel armor plate without extra hardening. This allows vehicle protection to be designed at a much lower thickness and thus at less cost," says Tomitz, summing up the benefits.

The results also impressed the jury of the ThyssenKrupp Innovation Contest. It awarded the expert teams from Hohenlimburg and Technology & Innovation in Duisburg and Dortmund third



Target oriented:
Keeping the finished product in sight every step of the way.

Photos: ThyssenKrupp Steel Europe photography (2), Fotalia (2)



Three good reasons

Production factor

High-manganese steel is well suited for vehicle applications such as bumpers and axle components, as the material becomes even stronger when deformed.

Cost factor

Complex components that were previously forged can be built lighter and thus at reduced cost using high-manganese steel.

Commercial factor

Owing to its wide application range, forecasts indicate that about 20,000 metric tons of the innovative high-manganese steel can be sold on an annual basis up to 2019–20.

We make it possible

End-to-end provider Sales Industry is an ideal material partner for flat steel. No matter how diverse, customer requirements are rapidly implemented down to a T. **Jörg Paffrath explains** why this is possible and what is being done to keep it that way.

Interviewed by: Judy Born

Mr. Paffrath, what is the Sales Industry business area doing to make steel products sustainable?

Jörg Paffrath: We develop and produce high-quality, tailor-made products on an ongoing basis. Our varied customer base provides us with plenty of suggestions and requests, always providing us with challenging ideas and impetus for innovation.

This sounds easy, but how does it work specifically?

Our teams – Sales and Technical Customer Consulting – cater to specific industries. This allows us to bundle and focus our skills and specialist know-how. Intensive collaboration is a key requirement to identify customer needs in due time and to optimize processes. In addition, we offer innovation technology workshops.

What happens at these workshops?

We present new products, work out specific optimizations if requested by the customer, and discuss possible additions to the product portfolio. What makes this special is that we involve the customer and various internal departments from the very start: Technical Customer Consulting with Sales and Technology & Innovation with Application Technology.

Can you provide an example?

For a household appliance producer, we recently held a workshop that focused on the topic of developing a new cooker. We discussed every single steel component in terms of its function and production process, attempting to answer the following questions: Can we reduce thickness? What are the possible downsides related to stability and assembly? And there were many more questions on the table. At the end, we had come up with a long list of tasks that are now being worked through. At present, our Application Technology team is running simulations, performing tests, and delivering initial samples – until we have achieved the goal of developing a better and more cost-effective cooker.

What kind of order volume does it take for you to initiate such an involved process?

There is no clear-cut rule. We have a global and varied customer base. Customers who produce pipes for gas and oil pipelines place orders in the range of 100,000 metric tons or more. When we're talking about paint-coated and film-coated

surfaces, it can be as little as five metric tons. This is also the approximate volume we supply to the customer for whom we developed a customized version of non-oriented electrical steel. It was used in building Bochum University's solar-powered car PowerCore SunCruiser.

What are currently the key aspects when developing new products?

Less weight and more power. Lightweight design is of major importance to the automotive industry. Products must be energy efficient, which is best achieved through a lightweight design. On the other hand, customers who manufacture large pipes want a higher pipeline and feed-through capacity. In order to be able to transport higher volumes on the same time scale, pipes must withstand higher pressures. This calls for increased wall thickness and improved toughness.

That is quite a range of products.

It sure is. Some products focus on functionality and meeting standards – for instance in lightweight construction. In other areas, we cater to design trends of end customers, such as decorative surfaces for bathtubs or garage doors.

How long does it take for an idea to evolve into a finished product?

From scratch, new developments can take several years. If the task is merely to alter a few parameters of an existing product, this job can sometimes be done in a few weeks. We have taken measures to reduce our time-to-market by prioritizing operational testing and performing processing tests in parallel in the final stage of material testing. This allows our customers to establish unique selling points in a short time.

Sounds like a win-win situation.

Indeed, because it also enables us to remain competitive in the market. Our goal is to become even faster and better. Quality is not just about the material, it is about the customer coming back for more.



Jörg Paffrath is Head of Sales Industry, which supplies flat steel of any type – from hot-rolled strip and organic coated products through to non-oriented electrical steel.

We have patented the new development and its production process.

— Dr. Harald Hoffmann, Project Coordinator Technology & Innovation

place for their innovation early this year. “The high-manganese steel offers customers significant advantages in terms of costs and processing characteristics and opens up a whole new range of applications due to its material composition,” according to the award certificate.

Research should not be an end unto itself but must instead be closely guided by customers and their needs – this is a key factor accounted for in the contest. And it is the reason why the judges only honor innovations advanced enough to make customers consider initial production runs. In this regard, the concrete application of the new steel armor plate is a perfect example of successful cooperation between the R&D department of the parent company ThyssenKrupp Steel Europe and the Hagen-based subsidiary.

It all started with the idea for a new material that was intended to clearly outperform its precursors. With this task in mind, the Technology & Innovation teams not only experimented along the lines of chemical composition. “Our goal was also to create the high-alloy steel by means of continuous casting and to process it up to the cold strip level using conventional ThyssenKrupp Steel Europe facilities,” states Dr. Evgeny Balichev, in charge of process technology for new steels at Technology & Innovation in Duisburg. Project Coordinator Dr. Harald Hofmann adds: “We patented the new development and its production processes for ThyssenKrupp Steel Europe in January, so now we can focus on the many new fields of application that may open up.” The hot strip experts in Hagen immediately recognized that this new material could be of great interest for the diverse products of their customers. Therefore, shortly after the first testing coils had been rolled in Hohenlimburg, they started to work on convincing their customers – mainly automotive suppliers – of the new product’s advantages.

“You must always keep in mind which customers and what requirements can benefit from the innovation when developing new materials,” says Product



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Developer Maximilian Nagel. “Our new high-manganese steel greatly contributes to protecting the environment as lighter, high-strength materials translate into CO₂ reductions in automotive production.” The Hagen experts provided their customers with samples of the new material for preliminary testing. This was further facilitated by comprehensive test reports on the special mechanical properties. This led to identifying the potential of the material in protecting security vehicles such as armored cash-in-transit vehicles. The next step was to conduct a large number of tests to align the material properties with specific customer needs. The Hagen engineers helped their customers solve many questions related to processing the new material, in cooperation with the Application Technology team of ThyssenKrupp Steel Europe. For example, they carried out joint welding and forming tests.

The tests were successful. Just one and a half years after the first high-manganese steel test coil was produced in Hagen, the customer gave the go-ahead to utilize the innovative material in actual production. “This is a new speed record,” state Tomitz and colleague Nagel with pride. And it won’t be long before the first cash transporters reinforced with high-grade manganese steel parts will appear on the streets.

“We engage with the market”

How do we develop new ideas? And how do we support our customers on the path from idea to finished product? An enlightening interview with Dr. Lothar Patberg, Head of Innovation.

Interviewed by: Anke Stachow

Dr. Patberg, your team takes an interest in trends that will only start to have an impact on our lives several years down the road. How far do you probe into the future?

Lothar Patberg: We're talking about time periods that extend far into the future, about five to 15 years. This is necessary since new product developments can take up to ten years. After all, we want to be able to sell the finished product for a while once we've prepped it for volume production. We transfer the knowledge gained from our analyses of the future to innovation fields. Then we apply a set of methods to search for possible applications and market opportunities for our products.

How many ideas have what it takes to become an actual product?

We evaluate more than a thousand ideas each year. Most of them are discarded early on or are used to complement other ideas. Only about one to two percent of the ideas are carefully scrutinized. Some of these are true innovations, such as a new concept for the effective use of steel in wind turbines.

Do customers play any part in this early development stage?

Most definitely so! As soon as we determine that an idea has true potential, we include our customers in our work. We hold workshops together with them and

internal and external experts and try to figure out what new technological solutions must 'look like' to be successful. Customer feedback and suggestions are always a part of this process. Let's take the wind turbine as an example: Can the towers be subdivided into modules to facilitate transport? At the end of such a workshop, we have already come up with initial ideas on how to answer technical questions.

How do these initial ideas evolve into a more concrete solution?

We keep developing the initial outlines. One part of the process is to draw up many technical solutions and then eliminate most of them using scientific methods. Once we have identified workable approaches, we secure patents. We need to be fast here, because many parties work on the same topics across the

Possible solutions are drawn up together with our customers early on in the development process.

Photos: ThyssenKrupp Steel Europe photography (3)



globe at the same time. Next, we ask our customers if we are on the right track with our ideas. This feedback is critical since we do not want to develop something the market does not need.

How important is collaboration in the context of realizing such ideas?

It is very important. Today's technological solutions so complex that we need part-

ners to bring in additional know-how. We favor working together with our longstanding customers. And, of course, we want to see our innovative steel products used in these new applications.

Does this also apply to wind turbines?

Yes, that is a good example of a successful cooperation. The pipes for our project are supplied by our longstanding customer Bender Ferndorf, a company that is highly specialized in this area. As regards the connecting elements, we utilize seamlessly rolled rings that were developed by Technology & Innovation in Duisburg based on a previous product. The ThyssenKrupp subsidiary Rothe Erde produces the rings. Next, we will approach smaller tower manufacturers – including customers –

Customer feedback is very important for us.

to jointly develop a prototype. The idea is to create a technology network together with our partners that allows us to offer our end customers an innovative turnkey product.

How long did it take to develop the new wind turbines?

The entire development time from the concrete idea to the prototype will amount to about three years, which is quite fast. As this project is still underway, we are already plotting the course for the next generation of wind turbines.

Can you tell us about other innovations you are presently working on?

We deal with long-term trends. These include 'intelligent' materials such as steels that have special functionality in addition to known properties like strength and ductility. As regards our flat steel products, we have identified new applications in the context of increasing urbanization and the need for solutions for modern mobility infrastructures. Essentially, we rethink the beneficial properties of steel – to create solutions that are aesthetically pleasing, highly functional, and sustainable as well.

News ticker

Sponsoring young tinkerers

The motto of this year's Jugend forscht (young scientists') competition is 'Realize your idea.' ThyssenKrupp Steel Europe organized the 32nd regional heat in Duisburg, providing 93 young scientists with the opportunity to present their projects. Young researchers from the steel manufacturer did rather well. For example, Tim Leubecher, Kai Musielak, and Lukas Latussek took first place in the technology category. They designed a clever chemical-free, self-disinfecting door handle. The winners in the categories 'Schüler experimentieren' ('student experimenters', aged up to 14) and 'Jugend forscht' (aged 15 to 21) got a ticket to the state competition, which is the last step before the nationwide final. "With our commitment to 'Jugend forscht,' we strive to set an example for early and widespread sponsorship of young talent," says Thomas Schlenz, Chief Human Resources Officer at ThyssenKrupp Steel Europe.



Investing in individual products

A good idea is sometimes not good enough. Sometimes, it takes a new facility to implement a tailor-made product. This is precisely what happened at the ThyssenKrupp steel service center in Krefeld: The center is investing in a new swivel shear for its cut-to-length line. It will enable the company to offer its customers higher-strength coils with tensile strengths of up to 1,000 Newton per square millimeter. It will commence operations in the summer, boosting the location's delivery capacity as an added benefit.

Focusing on niche markets

How is the market developing?

A key question for Sales Industry. The unit has been restructured in order to be even better able to monitor and sound out the multifaceted industrial landscape and to respond even faster to trends with modern products. As of now, Sales Industry is also in charge of end customers in the non-oriented (NO) electrical steel and organic-coated (coil-coated) flat steel product areas. Various types of NO electrical steel are in high demand for electric and hybrid vehicle prototypes, among



other applications.

Organic-coated flat steel products of the PLADUR® and Reflections® product ranges are primarily used in the construction and household appliances sectors as well as in the furniture and automotive industries. The sales contact for NO electrical steel is Volker Kamen, and the point of contact for COLOR is Axel Pohl.

Attractive corrosion protection made easy

A world first for ThyssenKrupp Steel Europe: The steel specialist brought the two highly effective ZM EcoProtect® and ZM PrimeProtect zinc-magnesium corrosion protection coatings to maturity – for use with exposed car body panels.

There are many natural enemies threatening the car body at every street corner: It must resist stone chipping from gravel, ward off rain and hail, and defy rust even after scratches expose the substrate. The automotive industry uses zinc as an effective protective agent against corrosion. There are various zinc-coating procedures in a range of qualities on offer – but ThyssenKrupp Steel Europe is the only steel producer that also offers all common automotive coatings in outer paneling quality. Moreover, ZM EcoProtect® and ZM PrimeProtect are true innovations. The zinc-magnesium coating is also suitable for exposed car body parts – and it reached market maturity ahead of schedule. “Our project team had been working very hard on this product refinement since January 2013,” explains Project Manager Frank Vennemann from Technology & Innovation. “We had actually scheduled product maturity for September 2014, but actually already attained it in February.”

ZM EcoProtect® and ZM PrimeProtect offer several impressive advantages compared to pure zinc coatings, one of which is eco friendliness. “The zinc-magnesium coating only requires about two-thirds the thickness of conventional coatings, thanks to significantly increased corrosion protection,” says Dr. Jörg Lewandowski, Head of Product Introduction at Sales Automotive. “And this helps to save resources, reducing the amount of zinc by more than two kilograms for each mid-sized car.”

And the improved corrosion protection not only applies to the surface, but also to cut edges and creep around scratches, both of which are high-risk areas. As an additional advantage, sheets treated with thin zinc-magnesium coatings are easier to process. The hard surface reduces tool abrasion and presses can produce more parts between cleaning cycles.

Photo: ThyssenKrupp Steel Europe plant photography



One team for two innovations (from left to right): Claus Wieczorek, Gernot Nothacker (both FBA 8), Meiko Gil (Engineering Dortmund), Frank Vennemann (Project Manager), and Heiner Meyring (FBA 8).



The thinner coating also facilitates welding of car body parts, which allows automotive manufacturers to optimize their production processes. Changing to a new corrosion protection is a decision that is not taken lightly, something Lewandowski knows only too well. But he brings good news: "Parts coated with ZM EcoProtect® offers the same surface finish as high-quality hot-dip galvanized parts. This means it is possible to start by just producing a few parts with the new coating and fitting them in the body. Car buyers will see no difference in the paintwork." ZM PrimeProtect goes one step further by offering an optimized surface. "The benefits include superior forming characteristics in the press as well as a premium paint finish," continues Lewandowski. "And, if required, even without the need for a filler. This means that the colored coating is directly applied to the primer, which saves time and money and helps protect the environment." The zinc-magnesium coating delights manufacturer and end customers alike.

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FBA 8 enhances steel components with zinc-magnesium

The hot-dip coating line (FBA) 8 in Dortmund has broadened its portfolio. ZM EcoProtect® and ZM PrimeProtect are two highly effective corrosion protection coatings for exposed outer paneling parts of the car body.



ENTRY

A fully automated laser welding machine precisely combines individual coils into an endless steel strip. Any selection of grades can be freely combined.



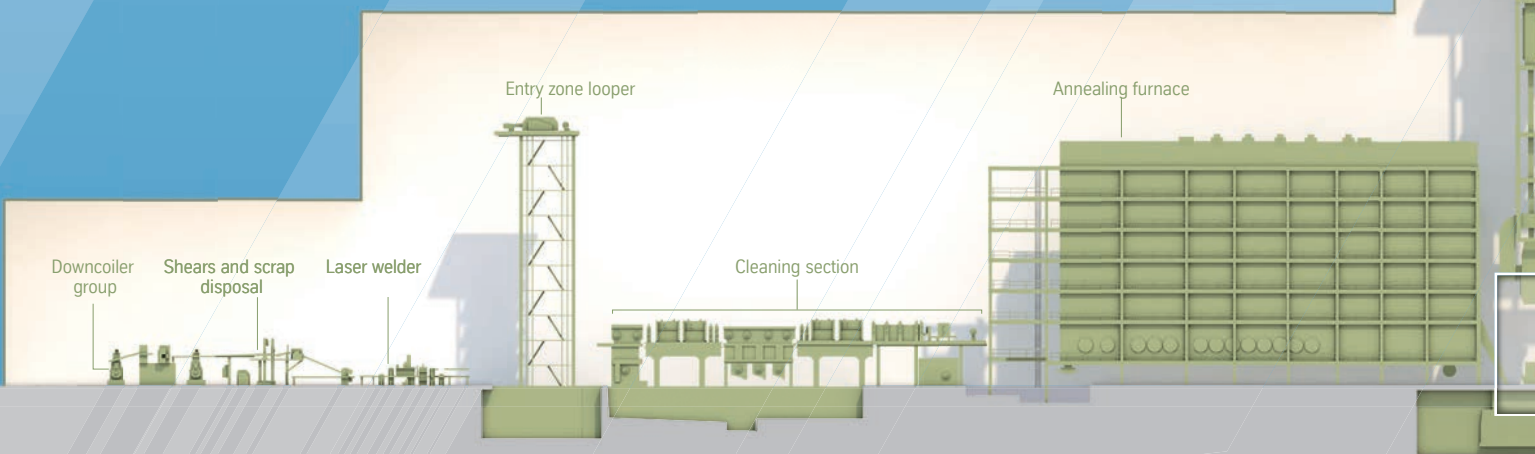
CLEANING

The endless steel strip is meticulously cleaned and degreased before heating.

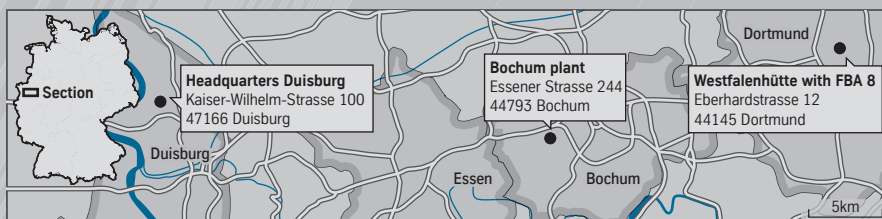


ANNEALING FURNACE

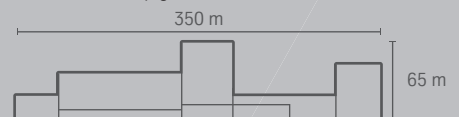
A ten-story high annealing furnace heats the strip to approx. 800 degrees Celsius before the galvanizing process starts. This heating procedure has a significant impact on the material properties.

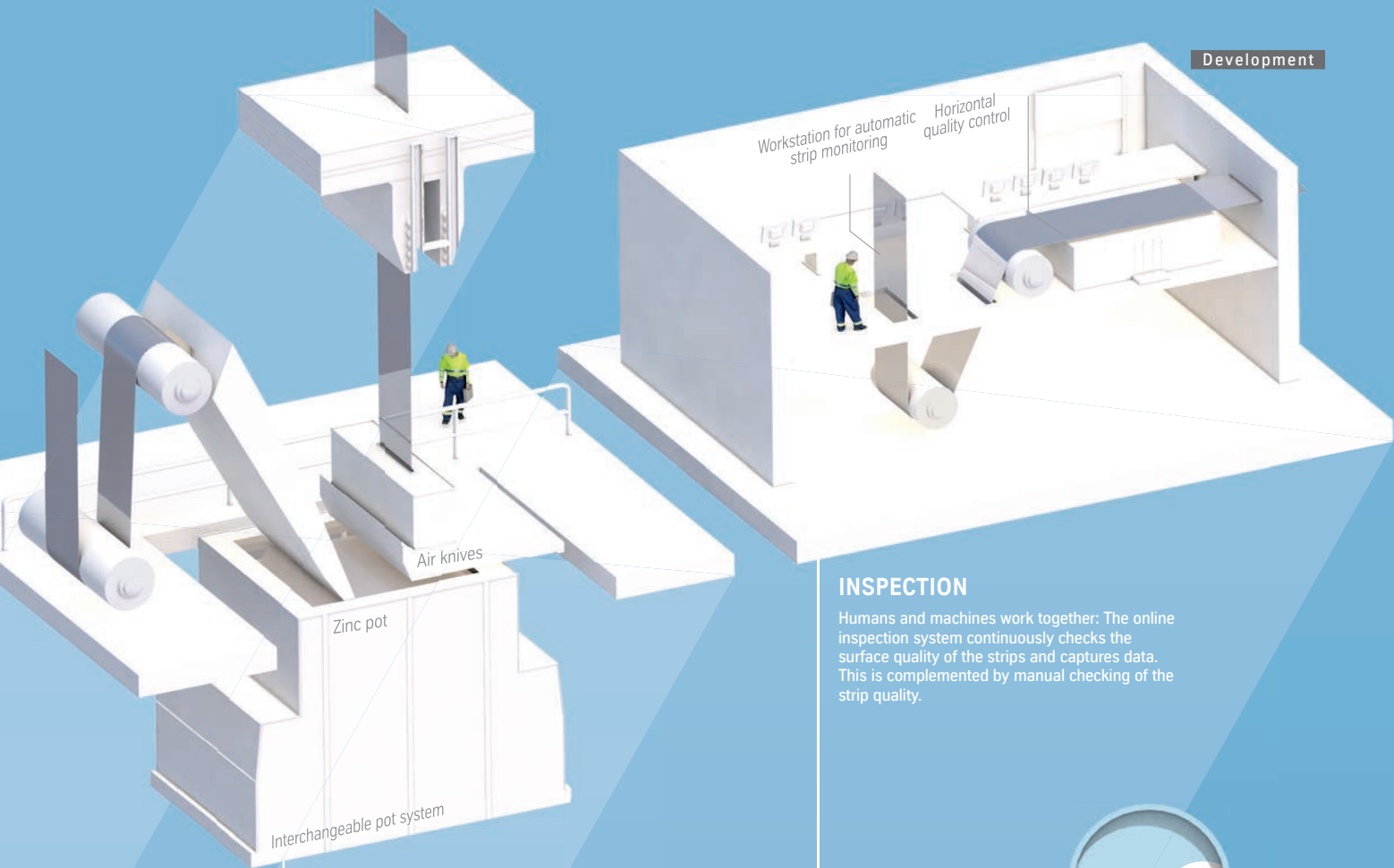


PLANT FACTS



FBA 8
 In operation since late 2001
Time for construction: 2 years
Capacity: 550,000 metric tons of hot-dip galvanized material.





ZINC COATING

Two zinc pots with a capacity of 300 metric tons each are available. They are continuously filled with the corresponding zinc bars (zinc or zinc-magnesium). The application process is automatically controlled via hot and cold measurement.



SKIN PASS MILL

The surface quality requested by the customer is produced to accommodate demanding paint-job requirements during skin passing.

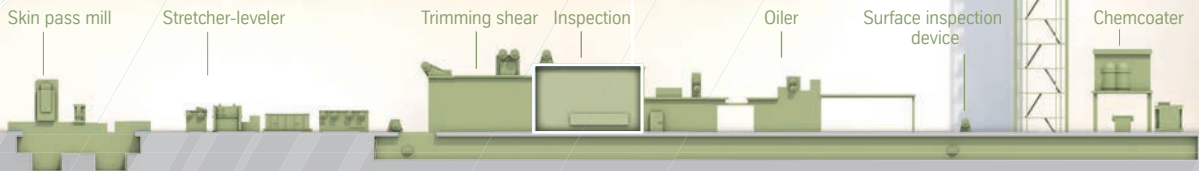
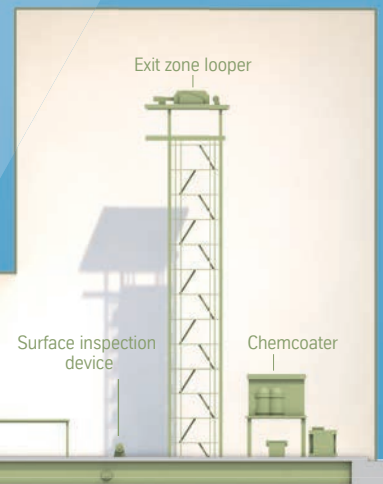
INSPECTION

Humans and machines work together: The online inspection system continuously checks the surface quality of the strips and captures data. This is complemented by manual checking of the strip quality.



EXIT

A chem coater located at the exit takes care of applying the various coating types in an environmentally friendly manner. The coils are automatically strapped and labeled.



Photos: Kicher Burkhardt Infografik



PRODUCTS:

Outer and inner paneling for the automotive industry as well as high-end products for the construction and household appliances industry. The portfolio encompasses normal grades through to top-quality deep-drawing grades and high-strength multi-phase steels.



PRODUCTION METHOD:

The FBA 8 staff maintains fully continuous operation – 24 hours a day, seven days a week, 360 days a year.



STRIP SPEED:

Entry:	max. 15.6 km/h
Processing section:	max. 10.8 km/h
Exit:	max. 15.6 km/h

COIL:

Strips with a width varying from 850 to 1,650 millimeters and a thickness between 0.4 and 1.5 millimeters. Coil weight: 35 metric t



Market + use cases

Customers save time and money

ThyssenKrupp Steel Europe bundles its hot forming activities with a unique modeling and simulation system in Dortmund.

Sometimes the past and future are very close together, at least in geographical terms. ThyssenKrupp Steel Europe has not just built a museum for 160 years of steel history at Westfalenhütte in Dortmund; the company has also located part of its Technology & Innovation division there. While museum visitors marvel at steel tools throughout the ages or learn about a virtual steel plant while wearing 3D glasses, about 60 engineers are working nearby on the future of steel.

Hot forming has established itself as a pioneering technology in the automotive industry. This production method is optimal for manufacturing especially complex, stable, and crash-proof components, which have to be lighter than conventional solutions made of steel. Yet anyone wanting to use these properties in a cost-efficient way that is conducive to mass production has to precisely understand the variables relevant to the process. "The process is still relatively new

compared to traditional forming simulation," says Dr. Stéphane Graff, Senior Engineer at ThyssenKrupp Steel Europe. "Also, it is significantly more complex due to additional variables such as temperature, time, and forming speed."

The steel company has a combined simulation and modeling system to offer suppliers and automotive manufacturers mature components and processes that they can use to build prototypes or production tools without major additional costs. "This system enables us to adjust the hot forming process precisely," explains Dr. Julia Mura, who maintains contact with the industry at Sales Automotive. "We save our customers valuable time and money because they don't have to stop their large production lines to conduct the large number of trials that are required. We deliver the numbers to them." ThyssenKrupp Steel Europe offers its services as a development partner for new materials and process technologies. "Our Technology & Innovation division cannot provide a one-hundred-percent substitute for trial runs, of course, that have to be carried out later in a real pressing plant, but it clearly reduces the number of required trials," says Mura extolling the advantages of the process. "This means that our customers are able to reduce their development costs by up to 20 percent."

The dimensions of the test facilities seem surprisingly compact at first glance, and they are comfortably accommodated in a manageable sized hall. But don't be deceived. The same elemental forces as in larger production operations that fill gigantic factory floors are also at work in the facilities that Sascha

Significantly fewer test runs are required in the pressing plant.

Dr. Julia Mura,
Product Introduction, Sales Automotive

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The modeling system includes both computer simulations and physical tests.

Photos: ThyssenKrupp Steel Europe photography (3) Illustration: KrieharBukhardt Infografik

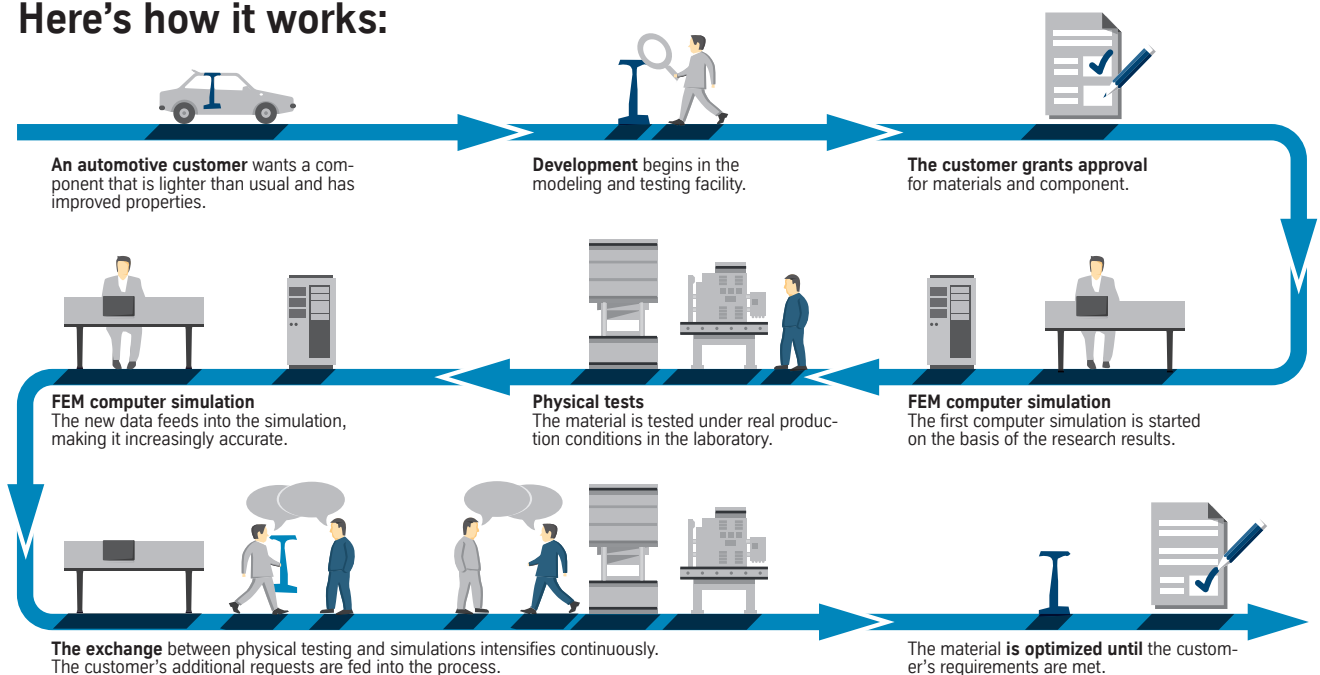
Sikora supervises. “We operate a range of furnaces at temperatures up to 1,250 degrees Celsius, as well as presses and cooling systems. But we are significantly more flexible,” says Sikora, presenting a stack of hot-formed steel sheets that will soon be formed into car body components to provide better protection to the car’s occupants. “Our modeling system enables us to conduct tests faster and as needed,” he says. “Later we deliver precise process parameters to our customers so that they know exactly how the sheet with the desired qualities will behave in their own hot forming process.”

The secret of the developers’ success lies in the combination of the modeling system and FEM simulation (Finite Element Method). Sikora’s system works with special camera systems that provide precise monitoring of the material’s elongation and thermography. This data then feeds into Graff’s IT landscape, which uses a cluster of servers and workstations in Westfalenhütte. “The modeling system works in a way as a constant corrective to our computer simulation, and vice versa,” he explains. “This interplay between theory and practice rapidly leads to valid results.”

The comprehensive dataset that accumulates over time in the system is a treasure trove. ThyssenKrupp Steel Europe has been performing simulations for hot forming for seven years now. Customers can profit from this wealth of experience whenever they want to optimize existing components or processes. Synergy effects within the Group also make the development of new parts more comfortable for manufacturers. “We work closely together with ThyssenKrupp Systems Engineering,” says Sikora. “We provide our development know-how, and our colleagues there deliver the right tools or even the complete production line.”

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Here’s how it works:



Game on for the World Cup squad

The Southern German company Eurocoles builds masts for small wind power systems. They are being used at in the German team's quarters at the World Cup in Brazil to ensure there are no interruptions to video broadcasts and analyses.

While coach Jogi Löw is in Brazil with the national team at the World Cup, wind masts from Bavaria are ensuring that the power doesn't go out in the German quarters.

Eurocoles shipped six welded steel tubes, made of materials supplied by ThyssenKrupp Steel Europe, to South America. The masts are equipped with wind turbines to ensure that video analyses run seamlessly in the German quarters, that the players' cell phones always have a good signal, and that the air conditioning doesn't go out. Eurocoles is headquartered in Neumarkt near Nuremberg and employs about 1,500 employees around the globe, with annual revenues of 260 million euros. The European market leader's portfolio includes standard and custom solutions for masts, columns, towers, and carrier systems made of steel, concrete, and fiber-reinforced plastics.

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Their range of products is available for viewing at Eurocoles' mast 'farm.' Traffic lights or floodlight systems are installed on the steadfast masts; some are even designed to look like trees so that they don't disrupt the landscape. 'Grass blade' masts create an urban flair with their pointy tips. "In Germany, they prefer their masts to be functional," says Torsten Rehfeldt, Business Division Manager at Eurocoles. In contrast, France has more baroque-styled street lights, including matching park benches and garbage cans. You won't see these special solutions in Germany though: "It's great to be able to stroll through the HafenCity in Hamburg and say, we built these masts!" Actually, almost every other light pole in Germany comes from a Eurocoles factory.

The company produced the steel pipes for the World Cup quarters at their factory in Dinkelsbühl. Steel coils are also processed into stable masts in the Polish plants in Konin und Chrzanów. These coiled steel materials are used to form the hollow masts, which hold cables for street light systems, lights, or electrical wiring. In the communications industry, the masts can hold antennas that make sure you can be reached on your cell phone at any time.

ThyssenKrupp Steel Europe has been delivering S355 and S235 grade steel to Eurocoles for over ten years. "ThyssenKrupp Steel Europe is an important partner because of its broad range of products and its high quality standards," says Jürgen Strobl, who has been the head of materials procurement at Eurocoles for many years. ThyssenKrupp supplies various accessory parts for concrete masts, such as welded steel pipes or angle steel, in addition to coils. "Our steel enables Eurocoles to meet demand. Our innovative materials and logistics concepts will continue to form the foundation for a partnership between our companies in the future," explains Martin Metzger from ThyssenKrupp Steel Europe. The masts are used, for example, at sporting events such as ski jumps at Holmenkollen in Oslo, or in the equestrian sports park in Aachen. "We find the South American market very interesting. There's a lot of potential there for Eurocoles," says Torsten Rehfeldt of the delivery to the German national team in Brazil.

— lg

High time to get things into motion: Eurocoles produces masts upon which wind power systems are mounted.





Rolf Döpfer (left) and Hans Peter Borowa (right) provide quality and perfect service at Risse + Wilke.

Cranking out results

Gearing up for the future. The cold rolling mill of Risse + Wilke from Iserlohn is starting a major quality and service campaign with a new, ultra-modern re-rolling stand.

What would gardeners do without sharp hedge shears or robust saws? A piece of furniture that was missing hinges and fixtures would be a very shaky thing. A car without seat rails, seat belt buckles, or clutch plates in modern automatic transmissions – unthinkable.

“We create the basic raw materials for products in the premium car, furniture and tool industries: cold strip and spring steel, heat-treated steel and steel strip,” says Hans Peter Borowa, head of purchasing, logistics, and materials administration at Risse + Wilke. The family company was founded in 1920 and is in the Top Six of its industry. It enjoys a solid reputation for custom-tailored solutions of the highest quality. Massive investments have been made to keep things that way. A new re-rolling stand, which works trouble-free and with the highest precision, went into operation in 2013. During re-rolling, also called skin pass rolling, the steel can be rolled to meet very exact

requirements, thanks to high-precision skin pass control with laser measurements. “In three shifts six days a week, we can roll cold strip with a width of up to 820 millimeters at a speed of up to 500 meters per minute and a rolling force of 600 metric tons,” boasts Rolf Döpfer, head of quality management. The new re-rolling stand, the foundation of which alone required more than 2,600 metric tons of concrete and steel, heralds the dawn of a new age at Risse + Wilke and its 350 employees. This is the largest investment in the company’s history, and it’s an essential component of its strategic orientation.

“We work continuously on improving the quality of our products and services, always staying in close contact with our partners, especially ThyssenKrupp Steel Europe,” adds Borowa.

The zero-defect policy is a decisive cornerstone of certified quality management. One of the prerequisites for this is the best possible starting materials, such as steel coils weighing up to 30 metric tons from



ThyssenKrupp Steel Europe. Another requirement is seamless communication. People meet regularly at conferences on quality to keep the lines open. “Open cooperation has shaped the traditions of our companies,” says Carola Pfeiffer from the Sales Industry division at ThyssenKrupp Steel Europe. “That’s how we develop our ideas about steel and push them further, working together and optimizing certain properties.” Borowa continues: “This makes us more than a production operation. We are a real innovation workshop.”

The first visible product of this strategic alliance is a special grade of steel for saws that will considerably improve stability and service life for saw blades. The raw material of course comes from ThyssenKrupp Steel Europe.

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Photos: Europoles GmbH & Co. KG, ThyssenKrupp Steel Europe photography

Agenda



Two men with perspective:
Bernhard Osburg (left) and
Professor Hans Ferkel.

“We see the automotive industry as driving forward technology”

Steel is the dominant material in cars. What is ThyssenKrupp Steel Europe doing so that it stays this way? A discussion with Professor Hans Ferkel, Head of Technology & Innovation, and Bernhard Osburg, Head of Sales Automotive.

Moderated by: Anke Stachow

Professor Ferkel and Mr. Osburg, how much steel is there in a car today, and how much will there be in the car of the future?

Hans Ferkel: Without offcuts, there is more than half a ton of flat steel in a typical mid-sized car. ThyssenKrupp Steel Europe mainly delivers steel that is used in the car body, wheels, and seats.

Bernhard Osburg: Steel is and remains the number one material for the automotive industry, something we're firmly convinced of. There is competition from other materials in a few local markets and in the luxury class, though. Yet steel offers the most attractive solutions overall for the industry's requirements.

What makes steel so attractive for the automotive industry?

Hans Ferkel: On one hand, it's the level of costs, paired with very good crash performance, which is important for a car's safety. On the other hand, steel is attractive in terms of the environment because making it requires relatively little energy. Modern sandwich steel, such as LITECOR®, is light and not nearly as energy intensive to manufacture as aluminum is.

Bernhard Osburg: And there's another important aspect to mention here. Steel is available around the globe, and suppliers worldwide are very familiar with processing it. That's a decisive consideration for our customers, who have set up their factories on a variety of continents.

What role does the automotive industry play for ThyssenKrupp Steel Europe?

Bernhard Osburg: A very important one! About 40 to 45 percent of our products go to the vehicle industry, and all of it is high-quality, high-tech steel. The automotive industry is highly innovative and very demanding. Therefore we see it as an important driver of technology.

Hans Ferkel: This is why we approach our customers in the early phases of development. We develop a lot of things together. I always say that we have to put ourselves in our customers' shoes to see whether a material can be processed in their existing facilities. This is something we need to know. Otherwise, we risk developing a product that the market isn't ready for.

Product cycles in the automotive industry are becoming increasingly shorter...

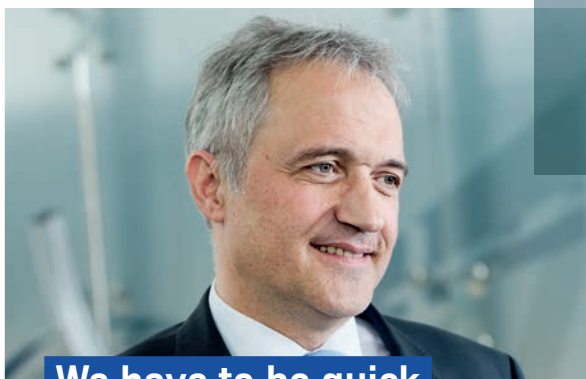
Bernhard Osburg: You're right if we're talking about the external appearance of vehicle models on the street. A model gets a facelift these days every three to three-and-a-half years. The service life of individual components however, such as underbody assemblies, which affect us first and foremost as a steel manufacturer, has gotten longer, anywhere from eight, ten, or even twelve years. Our customers are pursuing a very sophisticated strategy to use their facilities to capacity.

And what does that mean for your work?

Hans Ferkel: We have to be quick. ➔

Steel is the number one raw material for the automotive industry. And it's going to stay that way.

Bernhard Osburg



We have to be quick to be included in work on a new model.

Hans Ferkel

What role do Groupwide projects, such as ThyssenKrupp InCar®plus and InTruck®, play in this regard?

Hans Ferkel: They show that we understand car and truck products. The customer can experience and hold in their hand our innovations as seen through our components. That's better than any PowerPoint presentation, and it's a major strength for these projects.

Bernhard Osburg: It's not enough today to just make new materials and leave it up to the customer to decide what they do with it. We offer the customer car-specific expertise and can say very specifically how they benefit from these product innovations.

How much of a role does geography play when you want to be close to the customer?

Bernhard Osburg: Our customers are global companies. For us, that means that our products and services also have to be available on a global scale.

The strategy of building our own factories in the U.S. and Brazil to be closer to the customer didn't work out...

Bernhard Osburg: The fact that we gave up regional production in the U.S. doesn't mean in any way that this market is any less important to us. Quite the contrary, we have long-term supplier relationships with our customers in the U.S., Brazil, Mexico, and other countries around the world, and we want to expand and further deepen these relationships.

And what does that look like?

Hans Ferkel: Global availability doesn't necessarily depend on local production. For premium products in particular, direct delivery from Germany to the customer is possible on completely competitive terms.

Bernhard Osburg: We are present with sales activities and technical customer support in our important markets. We also cooperate with other steel producers. For example, we work together very successfully with JFE in Japan. In China, we have TAGAL, a joint venture with An Gang STEEL. We don't have to invest in our own production facilities all over the place to successfully help our customers grow.

► That's the only way for us to have a chance with a new car model. At the same time, we can't overlook anything when it comes to qualifying a material in terms of how its processing affects the customer. Everything from welding to painting to forming has to be fully clarified.

Bernhard Osburg: If we don't manage to get our new material into these kinds of global platforms in a timely manner, then we can lose a market of several million cars over a long period of time. This is why it is absolutely crucial to know where our products are going and which customers we need to work together with in driving forward a specific kind of development.

So the Technology & Innovation and the Sales divisions work very closely together?

Hans Ferkel: Exactly. We develop our products in a close collaboration with Sales. This division is an internal customer for us; they have a view of the market, and we engage them in dialog first. This close contact is the basic idea for our new setup, which brings both divisions, and their different disciplines, under one roof.

Bernhard Osburg: This exchange is important. In the final analysis we want each and every one of our products to represent added value to the customer, because it's also a lot of effort for them to vet a new material. This is why we have to figure out at a very early stage what our customers' challenges actually are: for example, lightweight construction, reducing CO₂ emissions, increased requirements for pedestrian protection, just to name three things. This results in a new product idea. And of course we always have to keep an eye on costs to be sure that we remain attractive on the market.

Heads

Hans Ferkel

A physicist who completed his post-doctoral qualifications in materials science, Ferkel heads the Technology & Innovation division at ThyssenKrupp Steel Europe. He previously worked as the head of technology planning and development at Volkswagen for several years, where he was responsible for tool manufacturing.

Bernhard Osburg

A car specialist who knows the customer's perspective inside-out. After working for five years for suppliers in the automotive industry, Osburg, an engineer, returned to ThyssenKrupp Steel Europe, where today he manages the Sales Automotive division.

Dates



SCT 15–19 June, Braunschweig

ThyssenKrupp introduced the customer project InTruck® to a broad specialist audience for the first time at the international conference 'Steels in Cars and Trucks' (SCT). The ThyssenKrupp TechTruck, parked right in front of the

congress center, shows what these kinds of tailor-made optimization solutions can look like.

Alihankinta 16–18 September, Tampere, Finland, Hall C, Booth C502

Alihankinta opens its gates for the 26th time. ThyssenKrupp Steel Europe's Heavy Plate Business Unit will again present this year as a co-exhibitor at the booth of our long-term retail partner, Flinkenberg. Alihankinta qualifies as the leading meeting point for the subcontracting industry, with about 17,000 visitors from 20 countries and about 1,000 exhibitors in 2013. The hard-wearing, high-strength XAR®, N-A-XTRA®/XABO®, and PERFORM® steels will be presented at the constantly expanding trade fair.



Aluminium 7–9 October, Düsseldorf, Hall 10, Booth 10/45/02 Magnesium Area

The Aluminium trade fair in Düsseldorf brings together manufacturers, processing companies, technology suppliers, and end customers. It is the world's leading B2B platform for the aluminum industry and its most important areas of application. MgF Magnesium Flachprodukte is presenting its globally unique process for the cost-efficient manufacture of magnesium coils in the trade fair's Magnesium Area, thereby positioning the broad expertise in materials at ThyssenKrupp Steel Europe.



2014

June

Eurosatory 16–20 June, Paris, German Pavilion, Hall 6

ThyssenKrupp Steel Europe will be presenting at the world's largest international trade fair for defense and security in Paris. The Heavy Plate Business Unit will provide information about such topics as their highly specialized SECURE steels.

July

CWIEME 24–26 June, Berlin, Hall 4.2, Booth F70

More than 500 exhibitors from about 40 countries will be in attendance at the premier trade fair for coil winding, insulation, and electrical manufacturing. ThyssenKrupp Steel Europe will be presenting such product solutions as non-oriented electrical steel.



August

September

WindEnergy 23–26 September, Hamburg, Hall 6B, Booth 232

The WindEnergy trade fair is celebrating its premiere in Hamburg. The organizer's slogan, 'bigger, more global, more innovative,' promises exhibitions from global players in the onshore and offshore wind industry. WindEnergy reflects both the industry's dynamism and developments in current and future key markets around the world. ThyssenKrupp Steel Europe is presenting its non-oriented electrical steel as a co-exhibitor at a booth shared with ThyssenKrupp Rothe Erde. The product portfolio here ranges from semi- to fully-finished variants that are distinguished by their excellent processability, outstanding magnetic properties, and the highest energy efficiency.



October

Coiltech 24–25 September, Pordenone, Italy, Hall 9, Booth D7/E12

This is the fifth time that Coiltech, an exhibition for coils, electric motors, and transformers, has opened its gates in the Italian city of Pordenone. Exhibits include all kinds of materials, machines, and services for the production of electric motors, generators, and transformers.

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Competition

How many metric tons of steel were used in the London Eye?

Drop us a line if you know the right answer!

One winner of a tablet computer will be chosen at random from all the correct entries.

Send your answer to: ThyssenKrupp Steel Europe AG,
Reference: compact^{steel} competition, 47161 Duisburg, Germany,
E-mail at: compact.tkse@thyssenkrupp.com.
All entries must be submitted by: 31 July 2014 (date of posting accepted).

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.