

The customer magazine from ThyssenKrupp Steel Europe

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3/2012

Minerals & Mining

## Heavy plate is perfectly positioned

VW Golf VII

Built entirely from steel  
and particularly light

Premium quality

Packaging steel guarantees taste

**ThyssenKrupp Steel Europe**  
Thinking the future of steel



**ThyssenKrupp**

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Increasing global demand for raw materials is currently offset by limited supplies. This calls for efficient use of energy and resources, sustainable infrastructure, and environmentally friendly production. ThyssenKrupp is facing these challenges by bundling its competencies. Its partners include the Heavy Plate Unit. With its special structural steels, it offers solutions that do justice to the extreme conditions on the future market Minerals & Mining. Read more about this in our cover story on page 6.

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“The stable and long-term development partnership with our customers gives me confidence.”



Dear readers, valued customers,

“panta rhei” – everything flows: this is how the Greek philosopher Heraclitus succinctly summed up his realization that the world is in a constant state of flux more than 2,000 years ago. This paradigm is also true for ThyssenKrupp Steel Europe.

Following the departure of my esteemed predecessor, Dr. Jost A. Massenberg, a long-serving captain on the bridge of our sales organization, just a few weeks have passed since I took the helm. In the many conversations I have held with you since then, you have emphasized the importance of continuity and stability in your business relationship with us. My first task – and it is not an easy one – will now be to bolster your trust in ThyssenKrupp Steel Europe through our actions. This is not a matter of days or weeks. I thank you for your support, openness, and the transparency that you have shown to me in our initial contacts.

Building on the topic of preserving stability in our customer relationships, I have also set myself the task of establishing new focal points. After all: our economic and technical environment is constantly changing. Against this backdrop, our collaboration with you still offers significant potential: steel is a hugely technical product in its production, processing and applications. I am convinced that we can continue to intensify our development partnership. The dynamic of change does not stop at economic preconditions: new players enter the arena, value chains and business models change, even in our industry. We face this challenge and seek to collaborate

with you in developing a strategic, that is, long-term and sustainable focus.

The basic economic parameters were in flux in 2012: The slowdown in the global economy and the intensification of the European debt crisis have left their mark on the steel markets. The steel industry in the EU is expected to record a decline in production of four to five percent – a sharp drop in demand, especially in the recession-stricken southern European countries, has necessitated some adjustments in production. Because of its intense economic relations with neighboring European countries, Germany has recently been more strongly drawn into the wake of the euro crisis. The annual crude steel output is likely to be four percent lower at around 42.5 million tonnes.

This economic situation is impacted by cyclical and structural factors. This raises the question as to what a future-oriented road map might look like. And, last but not least, you – our esteemed customers – demand a clear perspective. We are currently working hard at crafting this road map and will communicate the tangible results to you as early as possible. A sneak preview: we annually invest approximately half a billion euros in our European flat steel activities – a clear commitment on our part.

What prospects does a look into the new year reveal? The German Council of Economic Experts, in its latest report, sees the economic dynamic in Germany as having reached its lowest point; the committee anticipates economic stabilization during the year.

The ifo business climate index for the manufacturing sector rose in November for the first time in six months, driven primarily by significantly improved business expectations. The year 2013 will remain difficult, without a doubt, but we have left the worst times behind us, also and especially in the steel industry, which is the backbone of Germany as an industrial nation.

Let us use the New Year to once again verify our position between keeping the tried-and-trusted and driving innovation: without continuity, there is no security, and without change, there is no future. On behalf of my fellow Board members, I wish you and your families success and happiness in 2013.


Yours,

Thilo Lutz

Member of the Executive Board responsible for sales  
ThyssenKrupp Steel Europe







## New joy – steel attractively and safely packed

Choosing gifts and packing them with love: Christmas is not long back. Ready-to-ship coils by ThyssenKrupp Steel Europe are packed carefully and in high quality packaging. Starting in January, coiled steel strip sports a new uniform. The new look is light gray. The latest optical landmark by ThyssenKrupp Steel Europe is elegant and aesthetic. The design is rounded off with an imprint with the company name. The customer can thus identify coils directly at the first glance.

And the new packaging is not just attractive, but most importantly, safe. Three layers of state-of-art foil provide impressive protection for loading and transport. It is totally resistant whatever the weather – whether against cold in winter or heat in summer. Each layer of foil counts: One has excellent tensile strength, the second impresses with amazing elasticity, while layer number three ensures an instantly recognizable touch of color. But while the New Year is already gaining momentum, coil packing remains. And ensures enjoyment of the product throughout the year.

Johanna Flöter

Photo: Rainer Schröer

ThyssenKrupp has bundled its competencies: eight Group companies provide solutions for seamless support – from excavator shovels, through matching conveying systems, to transport and transshipment.



## Future market Minerals & Mining ThyssenKrupp offers modern solutions worldwide

Latin America, Asia and Africa – three different continents, one thing in common: the economies of many countries in these regions are growing rapidly, faster than in the developed world.



With large-scale investment programs, countries such as Brazil, China and India are comprehensively expanding their infrastructure – roads, industry, housing. And the middle class is growing: In Asia, for example, it is one of the fastest growing population groups in the world. According to World Bank calculations, the middle class in China and India, which already accounts for an estimated 500 million people in total, will contribute about nine percent to the world economy in 2030. Emerging and educated men and women seek a modern lifestyle: They are pouring into the cities. And thanks to rising incomes, they are driving domestic consumption.

Against this backdrop, energy consumption is growing inexorably in the emerging markets. An energy deficit is not only a threatening scenario, but in some places already a reality. For example, in South Africa: At the Cape of Good Hope a huge effort is going into overcoming the energy crisis that occurred some years ago. By 2018, the state-owned utility Eskom is looking to deliver approximately 16,000 megawatts. One of the actions designed to allow this to happen is the building of the world's largest water works, which is currently being completed. To avoid this kind of an emergency in the future, and thus avoid hampering development, India is expanding its power generation capacity and investing approximately 2.4 trillion Indian rupees, about 35 billion euros, in its electricity distribution and transmission network.

Raw materials are indispensable for global economic development. Demand for them has risen drastically in the past few years. And it will continue to grow at an above-average pace. It is not only traditional commodities that are in demand, such as iron ore, nickel, copper, gas and water, but also rare earth metals such as neodymium, which are essential for technological progress. The raw materials deposits are located around the globe. However, the increasing demand is mainly being covered by the emerging countries. Latin America, South Africa and Asia are already important

investment locations; in the future they will continue to grow in importance. In Latin America, the most important projects are currently underway in Chile. The country, in the west of the American continent, is not only known for its copious deposits of natural resources such as copper and lithium ores, but also for its flexible financial system, well-trained workforce and the best infrastructure in Latin America. However, Colombia and Peru are already waiting in the starting blocks. And, following the discovery of new, first-class deposits, Africa will also change dramatically in future.

Increasing global demand for raw materials is currently offset by limited supplies. Conscientious use of them is therefore essential – whether solids or liquid fuels. The world does not just want more. Above all, it wants better solutions: More efficient use of energy and resources ranks high on the priority list, as do a more sustainable infrastructure and environmentally friendly production. The ThyssenKrupp Group is responding to these complex needs and bundling its competencies. Materials, machinery, plant engineering, and services – engineers from eight companies are constantly developing ideas for these areas. The partners include ThyssenKrupp Steel Europe with its Heavy Plate Unit and its subsidiary ThyssenKrupp Electrical Steel. Many materials from ThyssenKrupp Steel Europe are suitable for the needs of the



The world demands more raw materials. But increased demand is offset by limited supplies. This necessitates more efficient use of energy and resources, a more sustainable infrastructure, and environmentally friendly production.

most promising industries. The Heavy Plate Unit, for example, offers abrasion resistant XAR® steels and bespoke engineering solutions and services for extreme conditions. Steels from the south of Duisburg can be used for efficient thermal power plants and for pressure piping in water power plants and drinking water supplies. The high-tech PowerCore® electrical steel by ThyssenKrupp Electrical Steel shows its strength wherever current flows. With its soft magnetic properties, the strip achieves an efficiency of up to 99 percent, for example, in hydroelectric power plant transformers – and this high efficiency saves resources.

Economical and efficient solutions from a single source – and that is not the only benefit for the customer. ThyssenKrupp looks back on more than 110 years of experience in Minerals & Mining, and therefore has excellent connections on the commodity markets. As one of only a few single-source suppliers worldwide, the Group has an extensive product and service portfolio. And as ThyssenKrupp knows: it is not just more that is important, but also better.

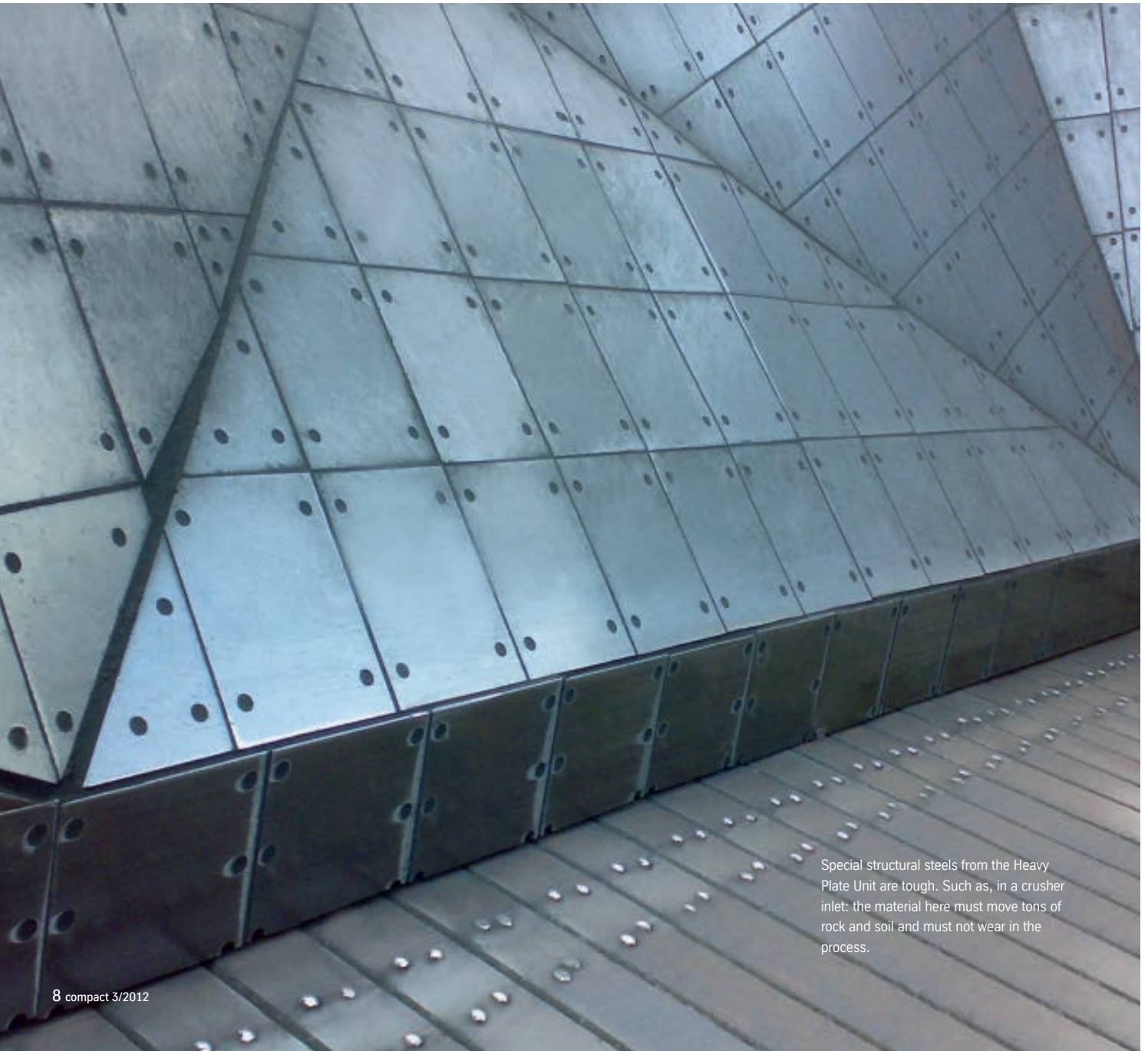
Dr. Daria Szygalski

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# Materials, components, repairs

## Heavy plates accompany commodity boom

The Heavy Plate Unit is perfectly geared to meet the challenges of the minerals & mining industry. It offers intelligent materials that were specially designed for extreme conditions.



Special structural steels from the Heavy Plate Unit are tough. Such as, in a crusher inlet: the material here must move tons of rock and soil and must not wear in the process.



The staff in Duisburg knows: in mining, machines must move tons of rock and soil, withstand extreme climatic conditions, work reliably throughout a long service life, and be easy to repair. The wear-resistant and high-strength special structural steels XAR®, XABO® and N-A-XTRA® are tough and suitable for heavy-duty steel structures such as dumper trucks, dozers, excavator shovels and lifting devices. The heavy plate experts' portfolio also includes innovative solutions in the field of production: for example, a special concept facilitates complex maintenance in the mining industry around the world. Since the repair kit encompasses manufactured parts and complete assembly components, a bucket, for example, can be made ready for use in just a few steps.

The extraction of raw materials poses extreme challenges for people, machines and steel as a material. Heavy plate offers matching solutions.



When it comes to extended services and applications in the minerals & mining industry, heavy plate relies on cooperation with other ThyssenKrupp companies. In collaboration with ThyssenKrupp Fördertechnik, the leading supplier of machinery, equipment and systems for mining, processing and transporting raw materials, and ThyssenKrupp Polysius, a globally successful engineering company that equips the cement and minerals industries, the team from Duisburg leverages synergies in sourcing, development and service.

But products for transporting solids are not all that the Heavy Plate Unit has to offer. The Unit also has a special solution for the storage and transportation of liquid fuels such as gas. Cryogenic nickel steels are suitable for transporting liquefied natural gas (LNG), an energy source of the future. They meet the high standards required to withstand the low temperatures, for example, in ship and storage tanks.

Energy for the emerging markets is increasingly being generated with alternative sources such as hydroelectric power. In heavily stressed pipelines, high-strength, quenched and tempered plate proves to be an ideal material. This is evidenced by a quick look at a joint project with ThyssenKrupp Mannex in South Africa:

Ingula, the world's largest pumped storage plant, is currently being completed in the Drakensberg Mountains on the east coast of the Republic. It consists of two reservoirs, each with a capacity of 22 million cubic meters. With a vertical drop of nearly 500 meters, the reservoirs are 4.6 kilometers apart. They are connected by a gigantic underground water pipeline. These lifelines of the two reservoirs, which have to withstand enormous pressures, consist of high-strength special structural steel N-A-XTRA®.

Whether solids or liquid fuels – raw materials are mined and processed worldwide, often in geographically and climatically challenging regions. To ensure customer proximity, the business unit relies on a global distribution network with service center operations around the world. This provides customers with guarantees of fast availability, just-in-time delivery, and individual prefabrication.

In Latin America, the Heavy Plate Unit's subsidiary, ThyssenKrupp Aceros y Servicios, which started local operations 50 years ago, has accompanied the mining boom, especially in copper mining, for years. Highly specialized branches for prefabrication and processing in Chile and Colombia guarantee ThyssenKrupp quality locally. The heavy plate experts can now take the know-

how acquired in South America to the growing global market: a warehouse was recently opened in Taiwan. The geographical location of the island is ideal for fast and short-term deliveries to various Asian countries. The sales program in particular includes wear-resistant XAR® steels. As business is developing well in Asia, the Heavy Plate Unit is planning to expand its portfolio in Taiwan and also offer the highly-resistant special structural steels N-A-XTRA® and XABO® in future.

To popularize its products and solutions for the minerals & mining industry, the Heavy Plate Unit seeks proximity to customers and exhibits internationally. In November 2012, the Duisburg team already made guest appearances at bauma Shanghai; and will be continuing with bC India this year. This will be followed by bauma in Munich, and bauma South Africa. After all, it is all about jointly tackling tomorrow's challenges today – and around the globe.

Dr. Daria Szygalski

# Focus on Andean countries: Chile, Peru and Colombia are future markets

In Chile, Peru and Colombia, the mining industry is booming. Depending on calculations, deposits should be sufficient for at least three decades.



Between the Atacama Desert and Patagonia – the minerals & mining industry is booming in Chile. But Peru and Colombia are also growth markets. ThyssenKrupp Aceros y Servicios supports this development in all three countries – with a comprehensive business model.

The Heavy Plate Unit subsidiary, ThyssenKrupp Aceros y Servicios, has had operations in Chile for 50 years. Initially, its focus was on distributing steel from Germany – starting with tool steel, followed by stainless steel and machine engineering steels, and finally wear-resistant heavy plate. “We have stocked the heavy plate brands XAR® and N-A-XTRA® for ten years now,” explains director Juan Manuel Alvarado.

When the native Colombian took up his position in the capital city of Santiago de Chile, he identified the great demand for heavy plate and quickly extended the product range. A forward-looking decision: after all, the narrow country, which is about 4,300 kilometers long, is rich in natural resources – lithium ores, molybdenum, and especially copper, which is essential for modern consumer electronics. The mining industry is concentrated in northern Chile at an altitude of several thousand meters, and it has been booming for years. Things look likely to stay this way in the near future, too. Depending on calculations, deposits should be sufficient for at least three decades. Additionally, the country offers political stability, skilled workers, an attractive financial system, and a well-developed transportation network of approximately 81,000 kilometers. And that’s not all: the government is currently investing millions in developing various sites. Among other things, the intention is to expand the infrastructure and the capacity of the power plants, which currently stands at 17,000 megawatts.

The mining market acts like a magnet, attracting numerous foreign companies from the minerals & mining industry: mining giants such as BHP Billiton, Rio Tinto and Anglo American, as well as suppliers such as Komatsu, Liebherr and Caterpillar.

Currently, these firms are investing in gigantic project volumes locally. For example, the British-Australian mining giant, BHP Billiton, wants to extend the world’s largest copper mine, Escondida – Chile covers 40 percent of global copper demand – in a joint venture with Rio Tinto. The talk is of an investment volume of 4.5 billion US dollars.

In other words, excellent prospects that ThyssenKrupp Aceros y Servicios leverages accordingly: to support the emerging industry comprehensively, the company not only has its headquarters in Santiago de Chile and offices in Antofagasta, Concepción and Puerto Montt. A few years ago, it even opened a steel service center with cutting and bending machines in northern Antofagasta, near the mines. And to solve the mining industry’s challenges, the company is breaking new ground on the Chilean market. The heavy plate experts combine – in collaboration with customers – special material know-how and application expertise. Another benefit: They are very familiar with the difficult conditions for both man and machine in the mines – such as in the Atacama Desert: freezing cold at night and burning sun in the daytime. Furthermore, the air is thin, making it difficult to breathe and imposing special requirements when operating machines. Despite this, mining operations must run around the clock.

“Today, we sell steel, supply parts and components for mining, and solutions for fast and easy repairs,” explains company director Alvarado. In addition to the special steels that are offered in the company’s distribution business, the current portfolio is being extended to include high-strength and high-tech assemblies and components, e.g., for mining machinery. An example of the latter is a repair kit, which is used at the steel service center in Antofagasta.

Besides Chile, mining is also booming in Peru and Colombia. The same mining market giants as in Chile are active in both the northern Andean countries; they use the same equipment and face similar challenges. No problem for ThyssenKrupp Aceros y Servicios: “From Antofagasta we now cover Peru,” says Alvarado. “And a few years ago, we invested in our subsidiary ThyssenKrupp Comercial Colombia and opened a steel service center in the coastal city of Barranquilla.” In Colombia, customers find the same business model and the same facilities as in Chile.

Summary: “With our concept we can perfectly support the industry in the Andean countries – today and in the future,” says Alvarado. Whether Chile, Peru or Colombia – Latin America promises to be an attractive market for mining for at least three decades to come. And the ThyssenKrupp Aceros y Servicios business model is a successful model for the mining industry around the world.

Dr. Daria Szygalski

[www.thyssenkrupp.cl](http://www.thyssenkrupp.cl)



The conditions in the mining industry are difficult – ThyssenKrupp Aceros y Servicios has all the answers.

# Construction and commodity boom in Asia

## China and India are the driving forces



For years, Asia saw strong growth, driven by what were often double-figure rates of gross domestic product (GDP) growth in China and India. The impressive economic catch-up process in these two BRIC countries was an expression of a trend that was also valid for the other Asian countries: substantial public investment programs, rising consumer demand, and increasing integration into the world economy. But now growth is weakening. The International Monetary Fund (IMF) thus forecast GDP growth of “only” 7.8 percent for China (2011: 9.2) and of 4.9 percent for India (2011: 6.8.)

Thus far, the ASEAN-5 countries of Indonesia, Thailand, Malaysia, the Philippines and Vietnam have set themselves apart from the major slowdown in economic growth. Taken together, their growth in 2011 was 4.5 percent, and it is expected to rise to 5.8 percent by 2013. All told, Asia will continue to grow – with China and India as the driving forces. And two trends remain: investments in the infrastructure and commodities sectors.

For example, China is one of the largest raw materials producers in the world and number 1 in the mining of coal, copper and rare earths. But in the Middle Kingdom,

which has outpaced South Africa as the largest gold producer, there are many small mines using outdated technology. There is a drive towards reorganizing the mining sector with a concentration of companies who will invest substantially in raw material excavation.

Indonesia is another country with large deposits. From a German perspective, it is the most important raw material producer in Asia after China. The mining sector already accounted for twelve percent of Indonesian GDP in 2011; the government now requires mining companies to commit to rapid expansion of processing plants. Given the





Asia will continue to grow. And two trends will intensify: investments in the infrastructure and commodities sectors. The states are characterized by rising internal consumption of raw materials, as well as increased export activities.

massive need for investment in mining and raw materials processing, there are excellent opportunities for German companies to sell modern conveying and smelting technologies.

Rich in resources, but under-developed, describes mining in the Philippines. Investments are planned here, but the industry is still waiting for reliable framework conditions. If for no other reason but the lure of foreign exchange earnings, the country is unlikely to let its status as what is potentially the world's fifth most important source of minerals remain unexploited in the long run. Its neighbor Malaysia covered about 40 percent of the world's supply of tin in the 1970s. This classic branch of mining leads more of a shadow existence today and has been clearly surpassed by the country's oil and gas industry, one of its most important foreign currency earners. However, there is potential for bauxite, coal and ores. It is expected that new mining techniques will enable commercially viable exploitation.

Back to the Asian mainland: Thailand is the world's leading producers of cement, feldspar, gypsum and zinc, almost half of production is exported. Vietnam is also rich in natural resources: larger reserves of coal, ore and rare earths were discovered here, and are now being explored. The country is repositioning itself with a mining law and has passed a limited ban on exports of unprocessed raw materials – with the goal of advancing its own industrialization. Myanmar will also establish itself in the mining sector: the country has significant reserves of oil and natural gas, as well as substantial deposits of mineral resources such as lead and copper ores, coal and other raw materials.<sup>1</sup>

All of these countries have one thing in common: technical and professional expertise from Germany and from all over Europe are in demand. Companies that specialize in machine manufacturing or mining consultancy can look forward to more demand, but will at the same time need to vie for business with competitors

from Asia. One advantage for suppliers of construction and mining equipment is plants that are individually crafted and customized to accommodate local conditions. This requires materials that meet a variety of requirements.

Whether large hydraulic excavators, pipe laying, or dumper trucks – when heavy-weight materials need to be moved, wear on machines is always a foremost concern. Steel supplied by the ThyssenKrupp Steel Europe Heavy Plate Unit is used in the construction and mining sector to satisfy demand for wear-resistant materials. Machinery manufacturers find that the business unit not only delivers premium quality and a wide range of dimensions, but also offers a global steel service center network that leaves customers with much freedom in part design. "We offer quality and service from a single source," says Roland Riesbeck, Director of Special Products and Services at the Heavy Plate Unit. "Our customers need a local supply industry that supplements materials know-how from Europe with knowledge in the field of prefabrication, for example, if replacement parts or components need to be manufactured to customer specifications."

In Asia, this concept is supported by a warehouse in Taiwan, which serves customers quickly throughout Asia, because of its link to the container port. "Other customers manager similar service centers of their own, with our support," adds Heavy Plate CEO Peter Selbach. The manager is confident that ThyssenKrupp Steel Europe, as a European steel company with niche products and special sales channels, needs customer proximity in order to be competitive in Asia: "What we do not want are high volume sales of normal plate. Moreover, as a European manufacturer we cannot be competitive with this kind of product in Asia. But low volume high quality, backed up with rapid delivery and prefabrication – this is how can and will continue to compete."

Dr. Bettina Wieß, financial journalist

<sup>1</sup> Source: Publications by German Trade and Invest.

# Heavy plate keeping pace with the future

## “Our engineering skills support our customers”

Population growth, urbanization and globalization – these are the major trends of our times. Global hunger for consumer and industrial goods, infrastructure, energy and raw materials seems insatiable. ThyssenKrupp Steel Europe’s Heavy Plate Unit faces these challenges with its engineering prowess, thus helping customers to establish a unique advantage faced with global competition. With its intelligent solutions for economical manufacturing of innovative products while at the same time conserving resources, it helps to meet global increases in demand, mainly for raw materials and energy, even better in the future. Head of Sales Peter Selbach and Roland Riesbeck, Head of Special Products & Services, talked to *compact*, explaining how they keep pace with the future.



Peter Selbach, Head of Sales Heavy Plate Unit has answers for the global commodity boom.

*Mr. Selbach, what is the Heavy Plate Unit’s strategy for facing tomorrow’s challenges?*

Global requirements really are enormous. Because on one hand, people want more – for example, more raw materials such as iron ore or coal, and more alloy metals such as copper, nickel or molybdenum. On the other hand, they also want better solutions, that is, solutions that are more efficient and environmentally friendly.

This is all reflected in the minerals & mining industry, a future market due to global growth in the demand for raw materials – and one in which we are very active with our wear-resistant steels such as XAR®. Companies in this industry have international operations, partly in very difficult conditions.

Our engineering skills mean that we can support our customers with the best products and solutions, wherever they are in the world. We are thus initially expanding our prefabrication activities on four continents and are therefore at the start of a crucial path of development towards customer-oriented service. In a further step, we can even imagine producing complete parts and components locally in our own service centers in high-demand regions. The quality “Made in Germany” can be

deployed anywhere around the globe. In addition, we have launched a new service division. It is known as Special Products & Services, and is managed by Mr. Riesbeck. Different teams such as “Prefabrication”, “Technical Customer Service”, “Marketing & Commercial Product Management” will support all sales activities of the Heavy Plate Unit from now on. This helps us to ensure that we can respond even faster and more flexibly to the global needs of our customers.

*Which regions are you focusing on in particular, Mr. Riesbeck?*

In the minerals & mining industry, South America and South Africa are very important markets. They have huge raw material resources that should last for several decades. And countries such as Canada, the United States, Indonesia and Australia also play an important role within this industry. Beyond this, there may also even be opportunities in Mongolia. Our experience could be of interest to the local mining industry there.

It is not just our wear-resistant steel that shows its strengths in mining. Also, our high-strength N-A-XTRA®/XABO® steels are of interest here, since they have already been in use for several decades in under-



ground structures, such as tunneling shields in coal mining.

*And how will your customers benefit from your local prefabrication and service activities in future, Mr. Riesbeck?*

With our global network, consisting of wholly-owned service centers, investments and exclusive partnerships, we are establishing a benchmark to improve the availability of our products in terms of delivery time and sheet metal working: we go beyond the sale of the single sheet and expand the value chain. The customer benefits are obvious: they can reduce their own inventories, and avoid investments in their own plant. On top of this, customers can rely on ThyssenKrupp Steel Europe quality assurance throughout the entire production process, from the single sheet through to the finished component. All of this is supported by experienced technical consultants who support customers with their expertise in the field of welding. In other words: we can serve our customers locally better and faster, and offer them everything from a single source, where previously various suppliers were involved.

*Mr. Selbach, you mentioned XAR® steels just a moment ago. What makes them so special?*

Due to the various wear mechanisms in the various fields of application, we don't have an "off-the-peg" wear-resistant steel. Thanks to our long-standing engineering expertise in this area, we offer our customers a wide range of different wear-resistant steels in the XAR® series today; in fact, we produce some of them as bespoke products geared to the respective applications.

The secret of the XAR® concept is that the analytical and manufacturing concept is individually geared, even in case of extreme requirements. Our "normal" range already includes steels from 300 HB (Brinell hardness) to 600 HB, which we offer in thicknesses from 3 mm to 100 mm, depending on the grade.

*And where and when can your customers personally experience your heavy plate expertise?*

*Selbach*

At bauma Munich, April 15 to 21. Our XAR® steels will obviously be a major topic at the fair; after all, they support versatile deployment, but our high-strength grades, N-A-XTRA® and XABO® will be present as always. Our XABO® 1100 has developed into a standard for certain components. In addition, we are already discussing initial applications for XABO® 1300 with individual customers.

*Riesbeck*

In addition, we will communicate the brand



Roland Riesbeck, Head of the new Special Products & Services unit, will be supporting all sales activities in the Heavy Plate Business Unit from now on. "Now we can we can respond even faster and more flexibly to the global needs of our customers."

change of our high-strength hot rolled sheet from PAS® to PERFORM®. This change was planned some time ago, however, the idea was to implement it parallel to entry into a higher yield strength range, i.e. 700 mega Pascal and better. But the best thing is to come along and discover. It's worth it!

Interview conducted by Christiane Hoch-Baumann

# Dr. Peter Buchholz

## “Preventing price and supply risks in commodities”

August 28, 2012, the Federal Minister of Economics and Technology, Dr. Philipp Rösler, inaugurated the German mineral resources agency (DERA) at its new location in Berlin. Following expansion and relocation to the capital, DERA now plays a more crucial role as a central information and consultation platform for mineral and energy resources in Germany. Business journalist Dr. Bettina Wieß talked to Dr. Peter Buchholz, the DERA Director, for *compact*.



**Dr. Peter Buchholz** became the director of Germany’s mineral resources agency in the Federal Institute for Geosciences and Natural Resources (BGR), Berlin, in March 2012. He previously lectured at the TU Bergakademie Freiberg, chaired the Master’s degree course in exploration geology at the University of Zimbabwe from 1998 to 2002 and was active in international commodity trading. The copper ore shown here is part of the BGR’s geosciences collection.

*Dr. Buchholz, global production of goods is continuously increasing. Will we run out of raw materials for this at some point?*

No, from a geological point of view, we do not see any shortage of metallic raw materials and industrial minerals. Thus far, only a fraction of the earth has been explored. Near-surface exploration is typically limited to depths of up to 300 meters, and it is also selective. We know virtually nothing about potential deposits below this depth. But this does not mean that no significant price and supply risks will arise in sourcing of raw materials and supply products.

*Which countries are the most important commodity suppliers?*

There are eight large commodity countries, which each cover a world market share of more than five percent and, in total, account for 55 percent of the value of raw material production. These are Canada, the United States, Chile, Brazil, South Africa, Russia, China, and Australia. Other important countries in this sector are India, Indonesia, Kazakhstan, Mexico and Peru. Some German companies import substantial quantities of raw materials from these countries.

*Germany itself is also a country rich in raw materials. How have total volumes of raw materials developed in the past few years?*

Germany’s total volume of raw material is equivalent to around 138 billion euros. Domestic excavation accounts for a value of



around 18 billion euros, and recycling for about ten billion. Imports, including energy commodities, account for the largest share of the total volume at around 110 billion euros. Germany itself is the world's largest producer of lignite. We are the number five in potassium salts. In our construction industry, extracting raw materials for building, such as stone, sand or gravel is crucial.

*But why are price and supply risks still on the cards?*

Germany is heavily dependent on raw material imports; this means that distortion of competition, or individual countries or companies exercising their market power, could lead to artificial shortages and enormous price fluctuations. This can lead to delays in delivery that hit German manufacturing companies very hard. Commodity markets are also cyclic. If demand for a raw material grows faster than expected, the supply side – in this case the mines – cannot respond fast enough to demand. Typically five to ten years will pass before new capacities become available on the market.

*Where have technology-driven shortages of raw materials occurred in the past?*

One example is the boom in the IT industry around the turn of the millennium. The anticipated demand for raw materials for this industry caused the price of the raw material tantalum – an important ingredient in capacitors for mobile phones – to explode. Also in the development of future technologies, such as electric mobility right now, supply lags behind anticipated demand. Electric vehicle development focuses on the development of batteries as an energy supply. The raw materials used for lithium-ion batteries are lithium, nickel, cobalt and manganese. These raw materials are abundantly available. But, in addition to copper, rare earths are required for the electric motor. In particular, dysprosium, which is used for permanent magnets, is scarce. Once the option of expanding capacities in existing mines is exhausted, the supply volume can only be increased – after supplementation by recycling – through new exploration ac-

tivities and mining. The delay in deploying new capacities leads to shortages.

*Which other supply restrictions are there?*

If raw materials are only mined in a few countries, and – as is the case with rare earths from China – are kept artificially scarce by export restrictions, prices will increase. In addition, weather-related catastrophes, like Hurricane Katrina in the United States or flooding as in the Australian iron ore district Pilbara, can interrupt supply routes. But bottlenecks can also be caused by political crises. Recent examples include the Arab Spring with its influence on oil supplies, and strikes by platinum miners in South Africa.

*The Federal Government put forward a commodity strategy in 2007. What is its objective?*

Its objective is to ensure the supply of raw materials in Germany in the long term. This is initially the responsibility of individual companies, the Federal Government accompanies those activities and creates appropriate framework conditions. Measures to diversify raw material supply sources and partnerships are particularly important, but so are raw material efficiency and recycling.

*DERA was founded in October 2010 in the context of this strategy. What are the tasks of the "Deutsche Rohstoffagentur" (Germany's mineral resources agency)?*

DERA has two major tasks. On one hand, it provides information and analyses in order to advise German companies on potential price and supply risks for certain commodities. On the other, we talk to companies about how they should position themselves to secure the resources they require for their operations – for example by establishing new relationships with foreign mining companies, refineries and other suppliers. Any company can call us and ask us for advice on individual commodity markets. We have extensive price and supply databases as well as literature archives and current market information. However,

we also operate locally in many countries. For example, we drove more than 10,000 kilometers through Mongolia from the Gobi Desert to the Altai Mountains, to evaluate new supply and participation options. Old Soviet archives contain numerous references to interesting exploration opportunities, where a German commitment might also be worthwhile. We will thus be looking into Kazakhstan, shortly. A few weeks ago, another team returned from South Africa, where we have launched a new project with the Council for Geo Sciences (CGS), South Africa's national geological service in Pretoria. The goal here, too, is to identify new raw material potential in South Africa that could be attractive for German companies. Currently, the focus in commodities is on rare earths, antimony and the heavy minerals rutile, ilmenite and zircon. The latter is interesting for the foundry industry.

*Do you see any potential sales markets for German mining companies?*

This is a very important topic because, by identifying new raw material potential for the development of new mines, we also open the doors for the export-oriented mining machinery industry. With its excellent product quality, German industry is a sought-after partner in many national and international mining locations, and it is important to sustain this position.

Interview conducted by Dr. Bettina Wieß,  
business journalist

[www.deutsche-rohstoffagentur.de](http://www.deutsche-rohstoffagentur.de)

# Prof. Hans Heinrich Driftmann

## Securing supplies of raw materials, conserving resources

In industry and construction, more than 40 percent of all spending is for materials. Therefore, price increases in purchasing raw materials and pronounced market price volatility are often a burden for companies. For one thing, not all increases can be passed on to customers. For another, economic planning is often thwarted by volatile prices. It is not surprising that sourcing raw materials has increasingly concerned German businesses for some time. The IHK (Chamber of Commerce) organization has therefore targeted the problem and made “Energy and Natural Resources for Tomorrow” its annual focus topic. In doing so, it aims to raise awareness on the subject, while at the same time providing support on-site.

The causes of price increases and fluctuations are varied. The different distribution of mineral and metallic raw materials across the globe has a significant impact on the availability on the world market. Political crises, natural disasters in resource-rich countries and export restrictions lead to shortages. The extent to which dependencies of a country on the production industry can have far-reaching effects is evidenced

by China’s export restrictions on rare earths.

A cooperation agreement, signed in August by the Deutsche Industrie- und Handelskammertag (DIHK – German Chambers of Commerce and Industry) and the Germany foreign trade chambers with the Deutsche Rohstoffagentur (German Mineral Resources Agency), aims to contribute towards secur-

ing supplies of raw materials. The common goal is to provide an overview of major producing countries and identify new resource potentials, particularly for raw materials with globally high market concentrations. Thus, German companies are given incentives to diversify their supply sources and continue to make their supplies of raw materials more sustainable.

However, a lack of raw materials cannot be resolved by political means alone. Entrepreneurial actions are also required, such as the introduction of corporate resource management to make risks more visible and develop potential solutions for sustainable supplies. These include a more efficient use of raw materials and – if technically feasible – substitution, as well as diversifying supply sources and hedging prices.

All told, the latest developments on the commodities market see the German economy facing significant challenges. However, domestic businesses are innovative enough to find the right answers. German companies view energy and material saving actions as an opportunity for technical advancement. Thanks to their innovativeness, they can assert themselves against international competition. As developers of innovative technologies they are and remain a reliable partner on the world market.

[www.dihk.de/en](http://www.dihk.de/en)

**Prof. Hans Heinrich Driftmann** is President of the Association of German Chambers of Commerce and Industry. Born in 1948 in Bückeberg, Lower Saxony, the father of four children studied economics and social sciences, and lectured in various positions after graduating. In 1987 he became Board Spokesman for Peter Kölln KGaA, Elmshorn, Schleswig-Holstein, becoming the general partner and managing director in 1990. There is one thing the DIHT President is certain of: “Our country depends on high-tech metals to bring about the transition to renewable energies, but not just there. If China restricts exports and exploits its dominant position in, say, rare earth, the EU has every right to join forces with Japan and the US to challenge this at the WTO.”





# NewsFlash

## Massenberg leaves ThyssenKrupp

Dr. Jost A. Massenberg, Member of the ThyssenKrupp Steel Europe Executive Board responsible for sales, has left the Group. His successor is Thilo Lutz, the former head of Auto Sales. The qualified mechanical engineer has been with the Group for seven years and has worked in various management positions. Massenberg can also look back on a long-term group affiliation. Born in 1956 in Essen, he completed his training as an industrial clerk and economic assistant at the August Thyssen foundry in Duisburg. From 1991 onward, Massenberg, who has a Ph.D. in business administration, worked in various capacities – most recently as a Member of the ThyssenKrupp Steel Europe Executive Board responsible for sales. As a marketing expert he substantially crafted the fortunes of the steel business area. From March of next year, he will be taking over as the Chair of the Executive Board with Benteler Distribution International in Düsseldorf.

## New Members of the Executive Board:

### Goss and Schlenz

Andreas Goss became a Member of the of ThyssenKrupp Steel Europe Executive Board in October. As Chief Financial Officer (CFO) Goss is responsible for the Duisburg steel enterprise and the Steel Americas Business Area. He succeeds Peter Urban, who resigned from the Executive Board at the end of September. Thomas Schlenz became the steel producer's new H. R. Director, also in October. He joined the ThyssenKrupp Group in 1979, and chaired the Group's works Council from 2001 until March 2012. Schlenz follows Dieter Kroll, who left the Executive Board in September.

## Raising awareness with steel hurdles

Within the scope of the Steel communications initiative, runners from steel-producing countries took part in a hurdles race in October. In contrast to his opponents from the United States, China and Russia the German runner had to overcome some tall obstacles: the renewable energy levy for 2013, EU emissions trading, energy tax and electricity prices all slowed the runner down. This action in front of the Reichstag in Berlin, was the German Steel Association's approach to showing that the competitiveness of German companies can no longer be guaranteed due to increasing costs. "A new energy paradigm can only succeed in collaboration with industry," emphasizes Hans Jürgen Kerkhoff, President of the German Steel

Association. For this to happen, we require political consensus on the need for the maximum limits to additional load on energy-intensive industries.

## Kingspan buys Construction Group

The sale is now complete: Kingspan, Ireland, one of the largest suppliers of steel components, has taken over the ThyssenKrupp Steel Europe Construction Group. Kingspan signed the purchase agreement for the acquisition of the Construction Group, comprising ThyssenKrupp Bausysteme, Hoesch Bausysteme and Isocab, back in August. Kingspan Group PLC, which has produced construction elements and insulating materials for more than 35 years, is expanding strongly, seeking to strategically develop its business and expand its market presence in Europe. [www.kingspan.com](http://www.kingspan.com)

## ThyssenKrupp sells Tailored Blanks

Sales agreement signed: ThyssenKrupp Tailored Blanks, the world's leading provider of sheet steel tailored blanks, has been sold to Chinese steelmakers Wuhan Iron and Steel Corporation (WISCO). The group of companies headquartered in Wuhan, which employs more than 80,000 people, is internationally successful and growing rapidly. With a turnover of around 26 billion euros, WISCO was the fourth largest steel producer in China last year. ThyssenKrupp Tailored Blanks, headquartered in Duisburg has been producing tailored blanks since 1985 and is the leading supplier in this segment with a global market share of around 40 percent. The ThyssenKrupp Steel Europe company has a total of 13 factories in Germany, Sweden, Italy, Turkey, the USA, Mexico and China. The approximately 950 staff manufactured about 58 million parts for automotive manufacturers last year. Turnover for the fiscal year 2010/2011 was 700 million euros.

[www.tailored-blanks.com](http://www.tailored-blanks.com)

[www.wisco.com.cn/wisco\\_en](http://www.wisco.com.cn/wisco_en)

## Neuralyt®: Production being phased out

ThyssenKrupp Steel Europe is phasing out the production of Neuralyt® at the end of 2012. Neuralyt® is an electrolytically zinc-nickel coated sheet, for which there is now an outer skin-capable alternative with an attractive surface appearance. It meets the high standards in terms of corrosion protection, as required in the automotive industry. Your ThyssenKrupp Steel Europe Sales contact will be pleased to advise you on the right choice of alternative coatings for your application.

## One millionth tonne to Bender-Ferndorf Rohr

ThyssenKrupp Steel Europe recently delivered the one millionth tonne of high-strength, API X70 grade, hot-rolled strip steel to pipe specialists Bender-Ferndorf Rohr. The business relationship is not restricted to material delivery: For two decades ThyssenKrupp Steel Europe has worked closely with the customer to meet the increasing demands in terms of strength and toughness on the highly specialized pipe market. Bender-Ferndorf Rohr's specialty: spirally welded pipes at the top end of wall thicknesses and diameters, mainly used for gas transport. With a capacity of around 100,000 tonnes, the company from Germany's Siegerland region produces pipes from 500 to 1,800 millimeters in diameter, with a total length of up to 170 kilometers per year.

[www.bender-ferndorf.de/en](http://www.bender-ferndorf.de/en)

## Walter Patz takes delivery of two millionth tonne

Two million tonnes of steel in some 20 years – this is the result of the business relationship between ThyssenKrupp Steel Europe and the steel service center Walter Patz from Mudersbach. The company, which is a member of the Knauf Interfer Group, specializes in the processing of coated materials. The wide range of products targets steel-using industries such as automotive, construction, and air-conditioning technology. One major supplier of the raw material: ThyssenKrupp Steel Europe. This is primarily hot-dip galvanized sheet.

[www.knauf-interfer.com](http://www.knauf-interfer.com)

## ThyssenKrupp Steel Europe receives quality award

A first: The Europäische Forschungsgesellschaft für Blechverarbeitung e.V. (European Research Association for Sheet Metal Working (EFB)) has, for the first time, given awards to companies who demonstrate their commitment to networking in the industry and promote research. Among the award winners: ThyssenKrupp Steel Europe. The steel producer from Duisburg was given the "Innovative Alliance" seal of approval for its many years of continuous collaboration within the network. The seal was accepted at EuroBLECH in Hanover in October by Prof. Hans Ferkel, R&D Director. In presenting the award, EFB – as an association for companies in the metalworking and associated industries – emphasizes the importance of innovative technologies and precompetitive research in terms of materials, production and quality assurance.

[www.efb.de](http://www.efb.de)

## Series: A question of surfaces Galvanizing, yes. But how?

Zinc is the classic choice in corrosion protection. In the automotive industry, the metal has been in continuous use since the 1980s – in the truest sense of the word – after all, a corrosion-free car life is as good as guaranteed, today. ThyssenKrupp Steel Europe has influenced this development. But what does the future of zinc look like?

“In terms of electrolytic galvanizing, for example, which is significant for German premium manufacturers, we have naturally asked ourselves this question. After all, there are trends in the automotive industry.” For Dr. Christoph Filthaut, who is responsible for developing new coatings at ThyssenKrupp Steel Europe, the question of the best approach to protecting steel is definitely complex.

But one thing is for sure: zinc is in many ways an ideal material because it provides active surface protection. Wherever rust could develop, it first attacks the baser metal – because of its electrochemical properties. In car steel, zinc assumes this “sacrificial” function.

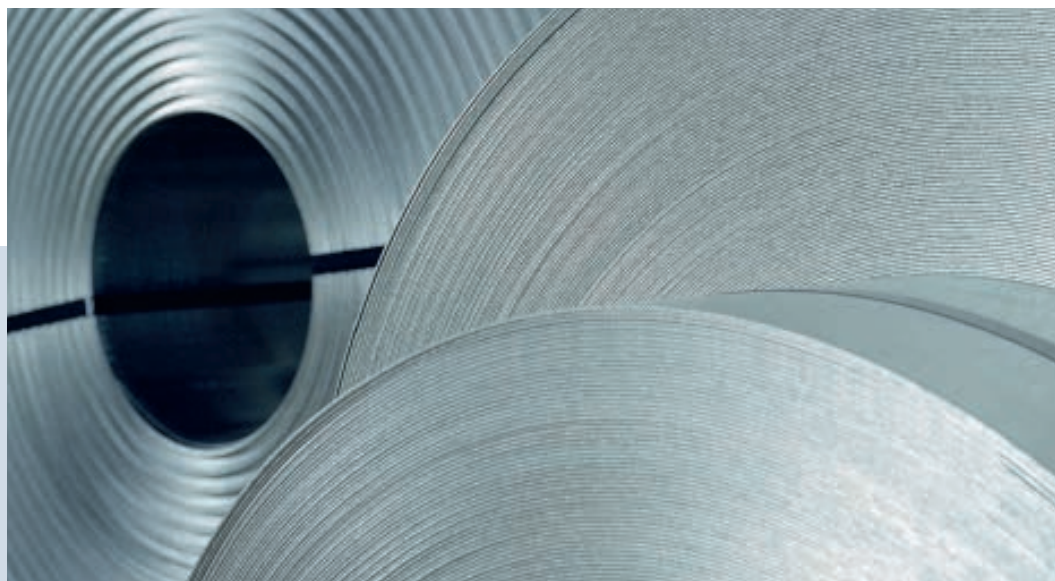
Whether zinc is applied electrolytically using electricity to the steel sheet, or hot-dipped,

can be regarded as alternatives – both protection schemes can achieve qualities that allow easy processing in the press shop and excellent paint quality. Some manufacturers, however, still swear by electrolytically coated sheet.

“In the early days, electro-galvanized steel had a clear advantage because it provided an easy-to-work, smooth and flawless surface that was easily recognizable in the paint finish. Of course, this optimum surface quality – we refer to it as O5 – is still provided by electrolytic sheet,” explains Dr. Jörg Lewandowski from Auto Sales, ThyssenKrupp Steel Europe. Another aspect is that electrolysis does not heat the metal sheets in contrast to the hot dip bath. After all, the sheet is dragged through molten material at more than 420 degrees, which naturally influences the steel and its mechanical properties.

What is expected of the galvanized sheets, and what is not, is decided by various considerations. Lewandowski: “Corrosion protection is not about the one, all-important dimension. Instead, the interaction of various factors must be just right. First of all, the material must be easy to work –





Zinc offers active surface protection. Whether electrolytically coated or using a hot-dip process - both allow for easy processing in the press shop and excellent paint quality.

using the manufacturer's existing presses. For example, sheet must ensure the right coefficient of friction to match the forming process, while at the same time being easy to remove from the tool without leaving any impurities. The manufacturing process also involves joining – components are welded or, increasingly, bonded. Again the surface has to play along. And last but not least: the paint. A perfect result, which the car customer wants, can only be achieved through a variety of perfectly matched measures.”

ThyssenKrupp Steel Europe allows the manufacturer to make this choice: zinc electroplating and hot-dip galvanizing will both be equally supported in future. This avoids coming down on one side or the other, and ensures the development of both methods in line with different customer needs. Elsewhere the world there are virtually no new investments in the electrolytic method. It is also all about, for example, new, weight-saving steels. Car parts such as the B-pillar or door sills today are made of very light-weight but also very thin steel, thus allowing for a reduction of the steel thicknesses used. This again favors weight reduction. Hot forming is becoming increasingly popular in

the manufacturing of these components. However, the steel is heated up to about 800 degrees Celsius in this process – a problem for galvanized surfaces. After all, this metal liquidizes at around 420 degrees.

GammaProtect® is a metallic coating that has recently been brought to production readiness and which solves this dilemma. The innovative recipe offers active, that is, cathodic protection, where a base metal attracts corrosion. In practical terms, this means long-term assurances against the many adversities of a car's rust-prone daily life. GammaProtect® is applied to the steel surface in an electrolytic process. “We basically believe that the electrolytic method is capable of producing highly attractive products for hot forming. Electrolytically galvanized surfaces simply offer superior process tolerances in downstream processing.” As Dr. Patrik Kuhn, an expert for metallic coatings at ThyssenKrupp Steel Europe's research and development department, firmly believes. And there are good reasons for this: In the electrolytic process other metals can easily be added to the zinc, leading to a significantly higher melting point of the coating. However, in hot dipping these metals would not liquefy – the temperature of

the melt is not just high enough. And this would cause inhomogeneous surfaces that would be of no use to the processor.

Kuhn: “As the saying goes – you never know what the future holds. For example, what will painting processes look like ten years from now? We might even need new alloys with more or less zinc on the surface. And there is one thing we should never forget: the old adage, “Never change a running system”, holds true for many manufacturers. Something that has proven its value in corrosion protection for decades thus certainly has good prospects. There are thus many reasons for giving a clear perspective to the electrolytic process. As we recently demonstrated with our innovative GammaProtect®.”

Wolfgang Kessler, freelance journalist

Our **new series** on coatings will continue in the next issue of *compact*.

# A test machine for all cases

## The prototype went into operation in September

Team Research and Development (R&D) in Dortmund is proud of its latest sheet metal testing machine which was designed specifically for ThyssenKrupp. The machine is so powerful, fast and precise that it can test any modern steels and cater to future needs. It thus offers significant benefits in materials development and quality control at ThyssenKrupp Steel Europe.

The task assigned by his team leader Dr. Lutz Kessler was a challenge: "We need a jack of all trades for deformation tests." Axel Köhler, who has worked for ten years in R&D was immediately intrigued. Planning a sheet metal testing machine that you can use to test the basic characteristics of new products was an exciting task for the graduate materials testing engineer. After extensive preparation and a construction period of several months, the high-tech machine is now available at the Application Technology department in Dortmund.

"With our steel sheet tensile strengths continually increasing, we needed a more powerful testing machine," says Köhler. The investment is characterized by extreme

tensile and hold-down forces of 100 tonnes. Thus it is now possible to test high-strength materials – for example, crash-relevant, safety parts of a car passenger cell – up to sheet thickness of four millimeters. However, the machine can also handle very thin materials with thicknesses of just 0.2 millimeters – these sheets are used in composites.

The universal testing machine produces highly precise data. "This is extremely important in terms of the reproducibility of the results," Köhler emphasizes. "The results are stored and made available to the customer." Up to ten different deformation test series are performed to characterize steel sheets. "We compare the results and

The new universal testing machine is quiet and looks almost delicate. The large, noisy hydraulic and cooling unit is soundproofed and located outside of the test lab.



draw our conclusions for material properties to be optimized." This is made possible by a high-precision piezo sensor, which sits directly under the punch and determines the forces without any other influences. Additionally, the machine is capable of checking sheets at high, constant speeds of up to 50 millimeters per second.

The fast testing process, which closely matches production conditions, is achieved by using a camera-based measurement system to accompany the test. Four cameras record a 3-D video of the deformation process. A fifth video capture camera allows the operator to follow the deformation process on the computer. This removes the need to bend over the machine, thus increasing occupational safety and comfort. Later on, the video footage clearly reveals when and where the material expands, under what conditions the first constrictions occur, when the material folds, or when cracks appear – these are fundamental requirements in providing consultancy to clients. A majority of the accumulated experimental data and results flow into the development of metal deformation simula-

tions. Colleagues from the research department draw on this data base to create material cards that enable a complete virtual simulation of deformation processes. (For more details, please read the article on page 24.)

Technician Claus Strauss, who operates the sheet testing machine, points to another benefit: "The machine helps us to characterize materials in an improved way. Based on the deformation results, we can give customers practical tips about how the different oiled materials behave, and thus optimize friction." As its operator, Strauss appreciates the fact that the machine is extremely quiet. The noisy hydraulic and cooling units have been soundproofed and are located outside the test lab. And much thought has also been put into ergonomics: a crane is used to install and remove heavy tools.

"Another thing that makes it ideal for research and testing purposes is that you can deploy extra-large pulling tables in the machine," as his colleague Axel Köhler emphasizes, "and the larger test head

means more space for larger tools. This makes the new machine more universal in terms of new tools and new test methods." The machine is perfectly geared toward looking forward: it is now already suitable for hot- and cold-formed sheets. "Even if we need to test even stronger or highly ductile materials, we can do so, and thus contribute to the development process," says Köhler, "that means that we can provide consultancy to our customers well into the future."

Claudia Schneider, freelance journalist

## VDA standard: Steel grades in motion

239-100 – this is the new material sheet by the German Association of the Automotive Industry (Verband der Automobilindustrie – VDA). Behind it all is a set of rules for properties and methods of automotive steels and surfaces. The aim is to replace the legacy of regional and national standards which are in effect today, and facilitate the construction of vehicles through globally uniform material solutions. For the automotive supply industry, the change re-

quires a huge effort. For ThyssenKrupp Steel Europe this means: even steels developed specifically for the automotive industry must be manufactured in line with at least two different specifications for a multiple year transitional period, and for part of the range this will even mean permanent changes. Additionally, the test conditions for determining the material properties have changed. Automotive products had to be specifically adapted, and others even devel-

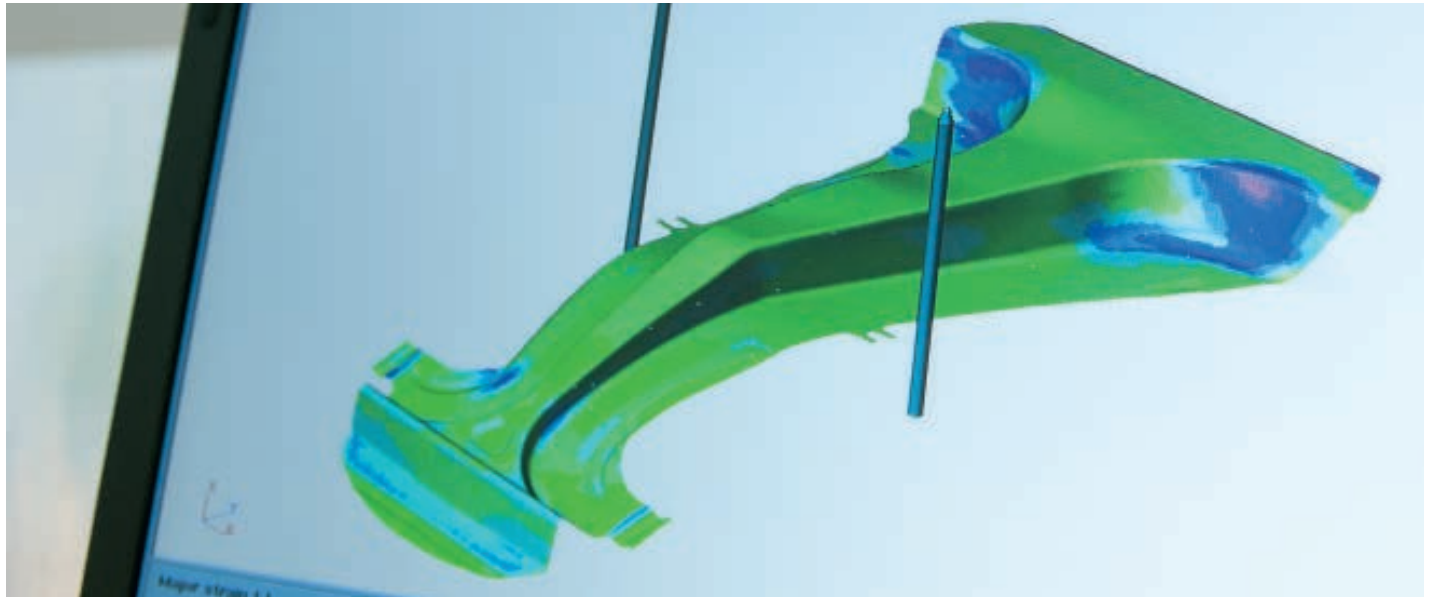
oped from scratch. The steel experts from Duisburg are looking to deliver new standards-compliant products to the industry in the near future. Auto Sales is thus working hard on the changes in collaboration with R&D; the process will soon be completed. Updated product data sheets with all available VDA grades will be published early in 2013. And despite increased overhead, the increase in material costs will be moderate.

Editorial



# Building blocks for the virtual factory

## Steel bits and bytes



Will we soon be able to do without the physical world? PC loving gamers sometimes convey this impression. And are convinced that they will soon be able to print pizzas. In fact, production will continue to be centralized for some time in the future. But the parallel universe of computer-generated simulation continues to make inroads into the real economy as well as into homes. The virtual factory is thus one project that ThyssenKrupp is building for the future.

“Computer simulations offer a unique opportunity. We can test something that doesn’t physically exist. This is what makes this method so valuable. There are always savings: time and costs, dead-ends in development and, ultimately, human frustration and disappointment.” There can be no doubt: for Lutz Kessler, Head of Forming Technologies at ThyssenKrupp Steel Europe, the ability to run computer simulations translates into a major competitive advantage.

Simulations have long provided unprecedented services. While in the early days simulations related to the 3D models in styling, now highly complex processes are simulated in some cases with innumerable variables and parameters needing to be considered. Thanks to high-performance computers and matching mathematical

models, researchers are now tackling highly complex flow models or thermodynamic processes. Simulations may soon even be capable of predicting biological processes, such as the effect chain of a newly developed drug. And this is what happens in the virtual factory. It is a company made up of bits and bytes that ultimately produces predictions. If you can simulate production on a computer, you can change workflows, processes, materials, and any other parameters almost at will – and all this takes is some computation time.

“One question that we are always asked is how a particular steel grade or material thickness will behave during cold forming. Experienced engineers obviously have appropriate material knowledge, but it’s all about fundamentals here. In other words: Our customers need us as a contact. They

need reliable, sometimes highly precise descriptions of our materials for their in-house simulation software. We have thus been working for several years on a correspondingly ‘robust’ methodology – at different levels and on appropriate committees,” says Kessler, describing his objectives.

In particular, this means substantial simplifications when new car parts are developed or new steel materials are used for individual components. After all, preparing the necessary press shop tools is time-consuming and costs millions. Kessler: “Robust processes are essential here. Minor variations in process parameters can lead to major problems or additional costs.” Thanks to simulation, the risks can be minimized. As early as the design phase, the developer can try out tools on virtual steel. An optimized shape, an alternative steel grade, changes to the material thickness, a slower cycle time – the solution is never far away.

But running a virtual workshop also involves some overhead. “When a material is developed or improved, we need to get to know it first. Our key questions are: how can strain hardening at high elongation be described mathematically? And how do you define the point of failure? This is described by a form-

Simulations provide a great service at ThyssenKrupp Steel Europe. As early as the design phase, the developer can try out tools on virtual steel. Workflows, processes, materials – everything is freely modifiable.



ing limit curve (FLC). The curve is based on experiments where the material behavior is evaluated in line with a standardized procedure”, says Lutz Kessler explaining the procedure.

What is the FLC? Let’s look at an intuitive comparison: think of a flat dough like in pizza. You could shape it in different ways. For instance, you could pull it apart at just two points. Or around the edge in all directions at the same time. And finally, on two opposite sides with the remainder of the edge resting on the baking tray at the side. The interesting thing here is the time to failure under each load. FLC is the mathematical result of corresponding experiments with metals such as steel. If you generate high quality FLC and other characteristics, you can predict the physical behavior to a great extent.

The whole thing starts with comprehensive material analyses in R&D internal test engineering. The results are transferred directly to the in-house material database (WDB). “Thanks to WDB users can now request material descriptions for crash and deformation simulation from us. That means that we can provide our customers with data sets for almost all production materials at the press of a button,” explains Michael

Linnepe, who is responsible for generating materials data at ThyssenKrupp Steel Europe. The offerings include data for the most widely used simulation tools: AutoForm, PamStamp and LS-Dyna. And there is even more in the database for AutoForm. “We offer our customers special raw data that can be processed independently by the user in the program’s GUI.”

Kessler and his team are particularly pleased to have succeeded, in a lengthy research process, in removing the need for various, previously required experiments. This was only made possible by in-depth understanding of the coherencies: “We can now restrict ourselves to a single test type to generate data both for hardening at high elongation and the FLC.” And customers in particular benefit from this breakthrough: “Our motivation in pursuing this goal so intensively was that because medium-sized to small offices need the data, but cannot afford the basic research. If for no other reason than that you need professionals, who are usually not available, for the work. This is particularly true where very detailed material knowledge is required.”

Knowledge transfer from research is thus a useful channel that has helped many.

As Arndt Marx, a deformation expert with ThyssenKrupp System Engineering in Germany’s Saarland reports: “Formerly, when we were called in for acceptance testing, or even to troubleshoot volume production, it was typically necessary to rework the tool. But using high quality characteristics means that production usually runs without any trouble right from the outset. This means happy faces all round.” The virtual factory can thus look forward to adding more departments very soon. “We do have a vision: one day, the process will be a cycle. Production simulation that learns from its mistakes and self-optimizes perfectly,” says Marx.

Wolfgang Kessler, freelance journalist

# Generation VW Golf VII

## Steel is light, safe and affordable

Built entirely from steel and particularly light: these are the hallmarks of the Volkswagen Golf VII. The new generation has grown, offering even more comfort and safety. The weight has been significantly reduced across all variants; by 100 kilograms in the 1.4 TSI, for example, compared with its predecessor.



In developing the company's new best-seller, Dr. Ulrich Hackenberg, Member of the Volkswagen Board of Management with responsibility for Development, and his team set much store by reducing weight without making the vehicle more expensive due to the use of alternative materials. This is an engineering masterpiece in the compact class. More than 29 million vehicles have been sold since the series debuted. And the new generation continues the suc-

cess story: the curb weight is equivalent to the fourth generation from 1997. This was not achieved by using expensive materials such as aluminum, magnesium or even carbon, but through a painstaking search for the last superfluous grams.

Weight is saved in many places: the electrical system weighs six kilos less, while new engines save up to 40 kg. The engineers saved about 26 kilos on the chassis and,

depending on the equipment level, up to 37 on the body and trim. The seats alone weigh seven kilos less, because the backs are now made from high strength steel, which offers the same component strength despite using less material. An enormous 23 kilos were saved on the body.

Oliver Hoffmann from ThyssenKrupp Steel Europe Application Engineering explains how this is possible: "To develop the best





engineers are involved in all phases of vehicle development, and in the manufacturer's press works, right from the outset."

The primary objective of the joint efforts by Volkswagen and ThyssenKrupp is reducing weight. The key factor in the new Golf is thus hot-formed steels. "We supply a large proportion of these for the VW Golf. Their extreme strength means that – without compromising occupant safety – we can effectively advance lightweight design," as Key Account Manager Dr. Marc Philipps emphasizes. The secret of their success lies in targeted temperature management: They are heated in furnaces at the Volkswagen plant to approximately 900 degrees Celsius, formed in the press tool while still incandescent, and quickly cooled. Additional options with regard to the design of load-oriented components arise through the use of variable thicknesses, grades and graduated temperature control within the blank.

ThyssenKrupp Steel Europe's high-tech steels make the Golf VII's body-in-white lighter, but at the same time safer in case of impact. Philipps: "Extreme strength in mass production can only be achieved economically with steel, today. At the same time, this material offers freedom for intelligent solutions," as the B-pillar demonstrates. This component, located at the middle of the vehicle between the roof and floor, is also suitable for innovative hot-forming applications, where special component properties are defined by varying the blank thickness. It is as thick as possible in the shoulder and head area, thus providing optimum protection to occupants in case of side impact. In contrast, the lower part is thinner, thus allowing for substantial energy absorption in this structural area.

The Golf VII proves that it is possible today with modern steels to produce lightweight, stable and inexpensive vehicles that are also recyclable. Looking at the development of the Golf generation from 1974 to the present day, one thing is clear: the Golf – like vehicles by all manufacturers, incidentally – has become bigger and bigger, more comfortable, safer, but also heavier. Where



The Golf VII reverses the weight spiral – thanks to intensive development, and state-of-the-art materials and technologies.

the Golf I, with a length of 3.70 meters and a width of 1.61 meters, weighed 815 kg, the Golf III in 1990 was 32 centimeters longer and weighed nearly 200 kilograms more. The new generation reverses the weight spiral thanks to intensive development work, as well as state-of-the-art materials and engineering: "And steel remains the most important material in the body-in-white in terms of volume," as Philipps points out. "It is an integral part of an intelligent composite design." Because, beyond weight, strength, stiffness and energy absorption characteristics, cost is the most important criterion in choosing a material. Of course, environmental aspects such as energy use in production and the ability of the materials to be recycled, cannot be neglected today. ThyssenKrupp Steel Europe's performance here is again positive, a fact that Volkswagen recognized with an award: in summer, the OEM presented the Volkswagen Group Award to ThyssenKrupp Steel Europe as one of its premium material suppliers. (For more details, please read the article on page 28)

Christiane Hoch-Baumann

[www.volkswagen.com](http://www.volkswagen.com)

steels for the car, we research intensively for and with our customers." ThyssenKrupp Steel Europe is not just a materials supplier, but also a development partner. The steel producer thus offers its OEMs support in terms of forming and joining technology know-how, as well as expertise in systems engineering, tooling, automotive engineering and production engineering. "With our premium simulation systems we ensure feasibility and operating characteristics. Our

# Top Supplier 2012

## ThyssenKrupp wins Volkswagen Group Award

Award for collaboration in an atmosphere of trust: ThyssenKrupp CEO Dr. Heinrich Hiesinger (center) accepts the Volkswagen Group Award from Volkswagen CEO Prof. Martin Winterkorn (right) and Dr. Francisco Javier Garcia Sanz, Director of Procurement. The prize was awarded this summer in Copenhagen.



Exceptional performance, unmatched reliability, and maximum flexibility – this is how ThyssenKrupp convinced the automaker. Together with 17 other premium suppliers, the industrial group from Essen won an award for its overall business performance at this year's Volkswagen Group Awards.

"It is our honor to present to you, as one of our most important business partners, the Volkswagen Group Award 2012," says the document that ThyssenKrupp CEO Dr. Heinrich Hiesinger proudly accepted from VW CEO Prof. Martin Winterkorn and VW board member Dr. Francisco Javier Garcia Sanz, at the award ceremony in Copenhagen. And with its Steel Europe Business Area, ThyssenKrupp has every right to be proud as VW's largest supplier of steel for the European market. After all, VW only hands over this prestigious award to a handful of its best suppliers each year, for outstanding achievements in innovation, product quality, development expertise, project management, efficiency, and environmental friendliness. "You were a particularly reliable partner to us, even where bottlenecks occurred, and stood by us as a matter of course, demonstrating the greatest possible degree of flexibility," the certificate continues. "ThyssenKrupp AG is an important driver in the development and use of innovative materials and, with over a

million tonnes of steel delivered in 2011, a heavyweight in the global structure of the Volkswagen Group," says Volkswagen, summarizing the importance of the partnership. The steel supplier was one of the award winners in 2006: ThyssenKrupp Steel Europe impressed the jury in the environmental category for its contribution to energy efficiency and low fuel consumption – empowered by environmentally-friendly technologies and products for weight-optimized steel automotive parts.

This second award shows once again that ThyssenKrupp is well positioned in the automotive sector – with extensive know-how and a strong customer orientation. The company is not just a guarantor of high quality steels. It also shows combined automotive expertise in terms of material development and application technology. Development projects such as InCar® – the Groupwide technology initiative with customer-focused solutions for body, chassis and powertrain – are the best proof. A collaborative approach and consistently high product quality are things that customers appreciate – as the Volkswagen AG award impressively demonstrated: "We look forward to continuing this excellent cooperation."

Claudia Freigang

[www.volkswagenag.com](http://www.volkswagenag.com)

# BAU 2013 in Munich

## Exquisite coatings add color to modern architecture

Modern architecture is very demanding in terms of aesthetics and functionality. ThyssenKrupp Steel Europe is presenting matching solutions, January 14 through 19, 2013 at BAU, Munich. Industry Sales is presenting organically coated products that combine freedom in the design process with excellent processing capability.

BAU is considered to be a trendsetting international trade fair for architecture, materials and systems. Every two years, it presents topics from industrial, commercial and residential housing construction, as well as interiors. True to its motto, "The Future of Building", the Munich Trade Fair Center welcomes visitors to the 20th BAU from January 14 through 19, 2013: materials and new products will be presented on a floor space the size of some 25 soccer pitches. 2,000 exhibitors from 46 countries meet with 240,000 visitors, including engineers, architects and project developers.

And ThyssenKrupp Steel Europe will also be there this time, at a booth hosted by the "Stahl-Information-Zentrum" (Steel Information Center), Düsseldorf – the community association of steel producing and manufacturing companies in Germany. For years, ThyssenKrupp Steel Europe has been an integral development and marketing partner to the construction trade and exhibitors at BAU. The steel producer primarily develops and supplies the organic

coated PLADUR® sheet, which is processed on customer sites to create constructional elements for roofs and facades in industrial building, special, high-quality products for multistory buildings, and much more. "For us, BAU is an important platform that allows us to reach planners and architects, and arouse interest in our products wherever possible," says Axel Pohl, Head of the Color Sales, highlighting the importance of the fair. This time Industry Sales is focusing on new products with organic coatings. Surface diversity and color, combined with excellent corrosion protection and good processing capability, are the focus. Just like the new **ReflectionsPearl**® coil coating product, the first collection of its kind to lend a unique look to steel facades. The combination of effect paint and a light surface structure creates an elegant and lively impression that particularly suits premium, multistory constructions. In addition to well-known aesthetic products for industrial construction, such as the **Reflections** series, the entire PLADUR® family of organic coil-coated flat steel products also includes

functional systems such as the glow-in-the-dark PLADUR® Luminous, or absorbent PLADUR® AntiCondensate. The PLADUR® Relief family impresses with a special finish in a unique ice crystal, stone or wood look. The latest innovation is PLADUR® StandingSeam, a solution for standing seam steel roofs. This is an alternative to expensive solutions made of, e.g., copper and zinc, that is impressive in terms of aesthetics, functionality and quality. The standing seam application with its unique matte and textured surface is highly corrosion and UV resistant. Thanks to its material properties of stability, good plasticity, and a flexible surface design, the product family is perfect for many applications. Whether **ReflectionsPearl**® or PLADUR® – ThyssenKrupp Steel Europe is once again demonstrating at BAU how quality steel solutions help to drive the future of construction.

Claudia Freigang

[www.bau-muenchen.com](http://www.bau-muenchen.com)

Surface diversity and color, combined with excellent corrosion protection and good processing capability, are the focus of the next BAU. Be inspired by innovations from the PLADUR® and **Reflections** families and join us January 14 to 19, 2013 at BAU Munich, Hall B2, Booth 303.







New: Customers can now access the digital delivery schedule online on the SteelOnline customer portal for a quick and reliable overview of orders, their readiness for shipment, and the processing status of the requested material.

## Shipping at the push of a button Faster and easier logistics

Calling off ready-to-ship at the press of a button – thanks to the new online dispatch request management system. ThyssenKrupp Steel Europe's Purchasing/Logistics division thus facilitates and accelerates logistics processes for customers. In collaboration with Team E-Business, an innovative solution was found – avoiding manual and paper-intensive processing steps and moving towards comprehensive electronic data transmission.

Processes are becoming more digital. Information must be available quickly, flexibly, and everywhere. A paperless office is state-of-art. But in many cases, you cannot do without paper: a quick fax that has already been through four pairs of hands, or scanning and sending a handwritten document. Often, the information you receive is hard to decipher, inquiries are unavoidable, and crucial time is lost.

Just-in-time deliveries are critical, especially in logistics. To minimize error-prone time-wasters that add up to large numbers, Purchasing/Logistics in collaboration with Team E-Business has developed an absolute nov-

elty: the online dispatch request management system. It was systemically implemented on the SteelOnline customer internet portal where it quickly and reliably keeps customers up to date with orders, readiness for shipment, and the processing status of the requested material. Bert Kloppert, Head of Transport/Logistics 1 sums up the advantages in a nutshell: "Data can be more easily processed online. Every single piece of material is visibly accessible, thus creating transparency, reducing the manual overhead, and speeding up the process." The absolute innovation here is systematic networking with service providers. If you want your own carrier to deliver your material, you can

hand over the ready-to-ship volume directly to the transport process with a single click. The prerequisite is a separate carrier profile on SteelOnline, which is created on request. It is also possible to spread the job across several service providers, or request directly from ThyssenKrupp Steel Europe itself in the usual way.

Another transmission path of the new service: via EDI (Electronic Data Interchange) as a link between two IT systems. Electronic Data Interchange thus bridges the gap in the supply chain from the finished goods to the invoice. "In the future, all information will either be available on SteelOnline, or directly on the customer system," says Kloppert. "Processing steps, manually and on paper, are no longer needed; delivery requests can be implemented faster. From now on, customers can fully track the material flow in a digital process that is similar to package tracking." The results: a fully automated workflow which will allow more time for flexibility and efficiency in future – and without paper.

Johanna Flöter

<https://online.thyssenkrupp-steel.com/ecmllogin/login.do>

# Hot strip for direct processing

## Saving material, time and money with SCALUR®

ThyssenKrupp Steel Europe has developed a hot strip with characteristics that were previously only available in cold-rolled material. SCALUR® is the name of this premium product. Besides its excellent direct processing properties, it offers many other benefits.

SCALUR® – a hot strip that has it all. This brand-name product by ThyssenKrupp Steel Europe has extremely strict dimensional tolerances and interesting application spectra. “As a pickled and oiled hot strip, it has features that were previously available only from cold-rolled material,” explains Ulrike Oestreich from Team Special Products, which distributes the premium product. “This makes so much of what customers could previously only achieve with cold strip even easier,” she explains. SCALUR®, which is manufactured using advanced and resource-saving technology at the Duisburg continuous casting and rolling facility, offers a number of attractive benefits: Among other things, it is easier to process – while maintaining product quality. The material is very suitable for deep drawing processes where thin material is required – for example, structural interior parts in the automotive industry and for rack and furniture building. “And the financial benefits that SCALUR® offers should not be underestimated. For example, production steps can be eliminated in processing the hot strip on one hand, while, on the other hand, production steps can be accelerated,” says the industrial manager.

The sales channel is just as unique as the product, and it sees Industry Sales taking a new, sector-oriented approach. “In July last year, our department was created as part of Industry Sales to be able to offer superior service to niche markets with our non-standardized products”, says team leader Axel Duhr. Since last year, seven experts



Axel Duhr and his Team Special Products have been selling the premium product SCALUR® for one year. It is suitable for interior structural parts in the automotive industry as well as for rack and furniture building. It is produced at the continuous casting and rolling plant in Duisburg.

have focused on distributing SCALUR®, galvanized hot rolled narrow strip, corrugated and roofing sheet.

The reason for the new approach: “All of these products have specific characteristics; their technology requires a thorough explanation as early as the sales phase. And order processing is more intense than with standard products. In other words, they need special attention,” says the metallurgy engineer, highlighting the extensive technical guidance provided by Customer Technical Support to help customers with their specific requirements. But the sales strategy involves more than this: “We also rely on keywords such as speed – in terms of the

client relationship and the lead time –, reliability and proximity,” he adds. To round off the SCALUR® package, the product is delivered in just six weeks – thanks to the flexibility of the continuous casting and rolling plant. “It is important for the customer to see that someone is there who is interested and who always cares.” This is how SCALUR® and other non-standard products pay dividends.

Dr. Daria Szygalski



## Focus on SCALUR®: supplier, service, customer Wehler Stanztechnik wins hands down, through quality

Wehler Stanztechnik produces sophisticated pressing, stamping and drawn parts and assemblies for the automotive industry in the German region of Westerwald. This medium-sized company, relies in part on SCALUR® by ThyssenKrupp Steel Europe as a material, and on tailored services provided by ThyssenKrupp Stahl-Service-Center.

Some corporate stories start in the garage – or in a plain old warehouse. As is the case with Wehler Stanztechnik in Westerwald: after years of experience as a project manager with a large automotive supplier, Markus Wehler was looking for new challenges. This prompted the design engineer to invest in a mechanical press, in the fall of 1990, and start manufacturing parts for the automotive industry. Alone and in a simple warehouse. Business quickly expanded in Unnau. Just eight weeks later, Wehler took on the first few employees; he

gradually converted the warehouse into a modern production facility. In April 1991, Thomas Schmidt joined the management team. Since then, the two men, who have known each other since high school, have managed this successful mid-sized company, which relocated in 2002. The new site is in Rennerod – conveniently located between the A 45 and A 3 freeways. On a floor space of more than 50,000 square meters the range of machinery includes punching machines with a pressing force of up to 8,800 kN and a bed size of 4,000 x

1,600 millimeters. More than 50 motivated and qualified employees annually process around 12,000 tonnes of steel.

“We specialize in challenging pressed, stamped and drawn parts, and assemblies for the automotive industry. They meet the strictest dimensional accuracy requirements and are also available at short notice,” explains Schmidt, pointing to welded assembly for a car seat, as an example. He picks up the part and explains it: “In case of a crash, this element is the connection



Wehler Stanztechnik manufactures eight components from SCALUR® by ThyssenKrupp Steel Europe, a hot strip with cold strip properties. They include a connection between the vehicle floor and the seat adjuster. It has to be very stable for safety reasons.

Team Leader, cooperates closely with the experts from ThyssenKrupp Steel Europe, suggested hot strip with cold strip properties: SCALUR®. After all, this high-tech hot strip by ThyssenKrupp Steel Europe is suitable for direct processing and is ideal for seats in automobile manufacturing.

“In collaboration and in a dialog with the Duisburg steel works we then optimized the properties of the material,” says Thiele. No problem, after all, hot strip is versatile in terms of grades and thicknesses. “Remodeling of the stamped part is running smoothly,” Schmidt enthuses, pointing to the open and constructive collaboration.

“With SCALUR® we can offer our customers a product with many benefits, such as strict tolerances and a price advantage compared with legacy cold strip,” says Thiele. And just-in-time delivery of the material is ensured by the close cooperation between ThyssenKrupp Stahl-Service-Center and ThyssenKrupp Steel Europe. “An e-mail or a call is all it takes, and we send the ordered tonnage directly on its way,” says Ulrike Oestreich from Team Special Products, ThyssenKrupp Steel Europe, which sells premium products like SCALUR®. “Whether by ship, truck or train – no more than six weeks pass between receipt of order and delivering the coil.” As Christoph Becker, who is responsible for handling all orders from Wehler Stanztechnik at the ThyssenKrupp Stahl-Service-Center, adds: “We, in Mannheim, then work the hot strip to produce split strip and send it off asap towards Westerwald.” Additional, short-term demand for SCALUR® is no problem. After all: “The continuous casting and rolling facility that produces the material is flexible,” says Oestreich. “And we always have enough coils in stock from which we can produce split strip or sheet in a short time,” says Becker.

In addition to flexibility and reliability, Wehler Stanztechnik also sets much store by consistently high quality. “After all, even the smallest deviation in the material poses risks in production and impacts the safety of the assembly,” says Wehler. This explains why permanent quality controls are an

integral part of production in Rennerod. Constant quality is also guaranteed for the material from Duisburg: The steel is always produced on the same continuous casting and rolling line and has a very high purity grade.

Wehler Stanztechnik currently manufactures eight components from SCALUR®. “Even though our collaboration with ThyssenKrupp is still young, we already appreciate it very much,” Wehler and Schmidt agree. In line with this, the stakeholders are looking to expand on it. “Since we rely on healthy growth, partners with whom we can develop in the long-term are ideal,” says Schmidt. The two directors are realistic and pragmatic. This helped them achieve continued growth despite several crises in the automotive industry: while turnover amounted to approximately 50,000 euros in 1990, it is currently around 15 million euros. Two years ago, after the economy had recovered somewhat from the downturn in 2008, they invested some 4.5 million euros in the facility. This has given them ample room for growth in Westerwald.

Dr. Daria Szygalski

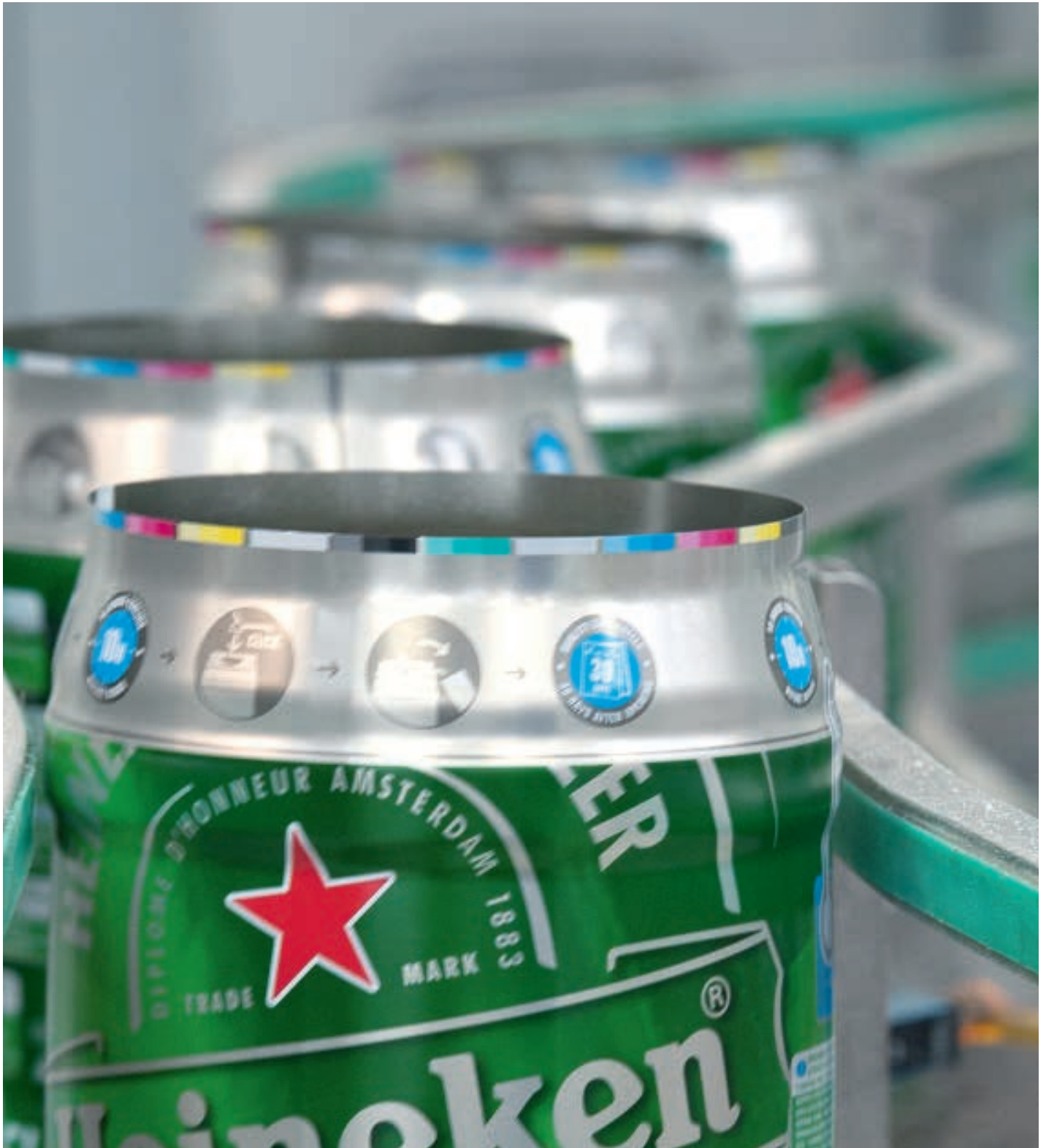
[www.wehler-stanztechnik.de](http://www.wehler-stanztechnik.de)

[www.thyssenkrupp-stahl-service-center.com](http://www.thyssenkrupp-stahl-service-center.com)

between the vehicle floor and the seat adjuster. To keep the car seat stable, and ensure the safety of the occupants, it must not yield. The demands on the tool and the processed steel are correspondingly strict.” It took a long, concerted effort before this part went into production with this kind of quality. “The car manufacturer had exact requirements for the material,” said Wehler. While sourcing a suitable supplier, the manufacturer contacted ThyssenKrupp Stahl-Service-Center in Mannheim, early in 2010. Enrico Thiele, who, as the Sales



While searching for a material for a sophisticated car seat element, Thomas Schmidt (2nd from left) and Markus Wehler (2nd from right) talked to with Enrico Thiele (right) from ThyssenKrupp Stahl-Service-Center. At the beginning of 2010, he suggested SCALUR®. Ever since, Ulrike Oestreich, Team Special Products has taken care of just-in-time delivery. Christoph Becker is responsible for customer order handling at the Mannheim Service Center.



Premium quality party keg  
Modern packaging steel guarantees taste

Last year, about 107 liters of beer were drunk in Germany per head of population. That is more than 21 five liter kegs. What most people do not know: intensive research and innovative materials go into the making of each chilled party barrel – as packaging specialists ThyssenKrupp Rasselstein and the Ardagh Group demonstrate.

The requirements for the Germans' favorite alcoholic beverage are tough: it has to be fresh, cool, and with a nice head of foam. Germany's "Reinheitsgebot" (a purity law that dates back to medieval times) is important. And strict quality requirements are also imposed on the barrel. This is something that the packaging professionals at ThyssenKrupp Rasselstein and the Ardagh Group, which processes the primary material delivered by Rasselstein to create high-quality packaging, are very much aware of. The tinplate manufacturer has collaborated with Ardagh for more than 100 years: "In our packaging steel production, we rely on close development partnerships and an intense dialog with our customers," explains Dr. Ulrich Roeske, Chairman of the Management Board at ThyssenKrupp Rasselstein. The party barrel shows that this is the right approach: Up to 10 trucks leave the Ardagh site at Weißenthurm, in Germany's Rhineland-Palatinate every day. "Success and our common goal of highest quality empower our cooperation," says Andreas Momm, Sales Director with Ardagh.

"For months, we jointly researched and carried out tests to meet the requirements of modern packaging solutions," says Peter Sauer, Operations Manager and Plant Manager at Ardagh remembering the ongoing development of the five- and ten-liter party kegs. And the results are very tasty: "Our barrel with CO<sub>2</sub> internal pressure system for tapping the beer keeps the beer fresh for 30 days after opening," says Sauer. Thin, electrolytic tin-coated steel from ThyssenKrupp Rasselstein makes this possible: "We tin-coat our material to reduce iron absorption in the beer. Our tinplate offers 100 per cent protection for the drink. Quality and taste are thus preserved," explains Jochen Homberg, ThyssenKrupp Rasselstein's technical account manager for

Ardagh. "We additionally reduced the thickness of the sheet metal, while retaining good plasticity. This saves resources and promotes sustainable business," Homberg continues. "The extremely thin material effortlessly withstands the internal pressure of up to five bars, while at the same time impressing with strict tolerances." Momm is also pleased with the results: "Something like this is only possible with a competent material supplier like Rasselstein, which reliably and consistently delivers high-quality material."

It takes a long, concerted effort, before the high-tech keg can be tapped at a party. At the world's largest production site for packaging steel in Andernach, ThyssenKrupp Rasselstein processes high-quality hot-rolled strip steel by ThyssenKrupp Steel Europe in Duisburg. Cold rolling, annealing and temper rolling, give the material the desired properties. The material thickness is reduced by up to 90 percent. To prevent corrosion, the sheet metal is electrolytically coated in the tin-coating process, which gives it its distinctive shine. The company produces up to 1.5 million tonnes of highest quality tinplate annually. This makes it one of the top 3 tinplate manufacturers in Europe. Material is delivered to 400 customers from 80 countries, including the Ardagh Group in Weißenthurm, just five kilometers down the road.

After arriving at Ardagh, the tin-coated blackplate is converted into kegs – and has been for 25 years. After delivery and initial quality checks, the brewery label is applied to the material in the in-house printing shop. "Again the requirements on the preliminary material are extremely high; in contrast to printing on paper, tinplate printing allows no tolerances," explains Peter Horz, Engineering Manager at Ardagh. The tablet press punches the lids and bottoms in a one-second cycle. On the elaborate production line, the printed tinplate

Happily holding the results of their collaboration in their hands: ThyssenKrupp Rasselstein CEO Dr. Ulrich Roeske (center), Andreas Momm, Sales Director with Ardagh (left), and his colleague Werner Neukirch, Project Manager.



is welded to create a body in several production steps and worked into a keg shape. Finally, the lid and bottom are added. The keg is then ready for immediate shipment to customers such as Heineken and Krombacher. But that's not all: The Weißenthurm facility also produces other metal packaging such as Ültje peanut and Krüger cappuccino cans, also under strict compliance with hygiene standards in production. Around the world, the Ardagh Group has 100 facilities, which also produce glass packaging. 17,000 employees turn out some 30 billion containers a year. This makes the company one of the largest packaging companies internationally.

One thing is clear: close development partnerships are an integral part of the day-to-day business of the two packing specialists. But ThyssenKrupp Rasselstein also relies on formats such as the tri-annual Future Symposium for an exchange with its partners. Most recently in September, with around 200 high-profile guests. ThyssenKrupp Rasselstein boss, Roeske: "We collaborate on the future issues in our industry." They include product customization, the increasing convenience requirements in opening systems, and the increasing demand for ultra-thin steel packaging by ThyssenKrupp Rasselstein with a thickness of just 0.100 mm. "In hosting the Future Symposium we seek to open up channels in tomorrow's markets and develop even better packaging in collaboration with our customers." This means that party guests can continue to enjoy the taste of real ale in the New Year thanks to the strong partnership between ThyssenKrupp Rasselstein and the Ardagh Group.

Claudia Freigang

[www.thyssenkrupp-rasselstein.com](http://www.thyssenkrupp-rasselstein.com)

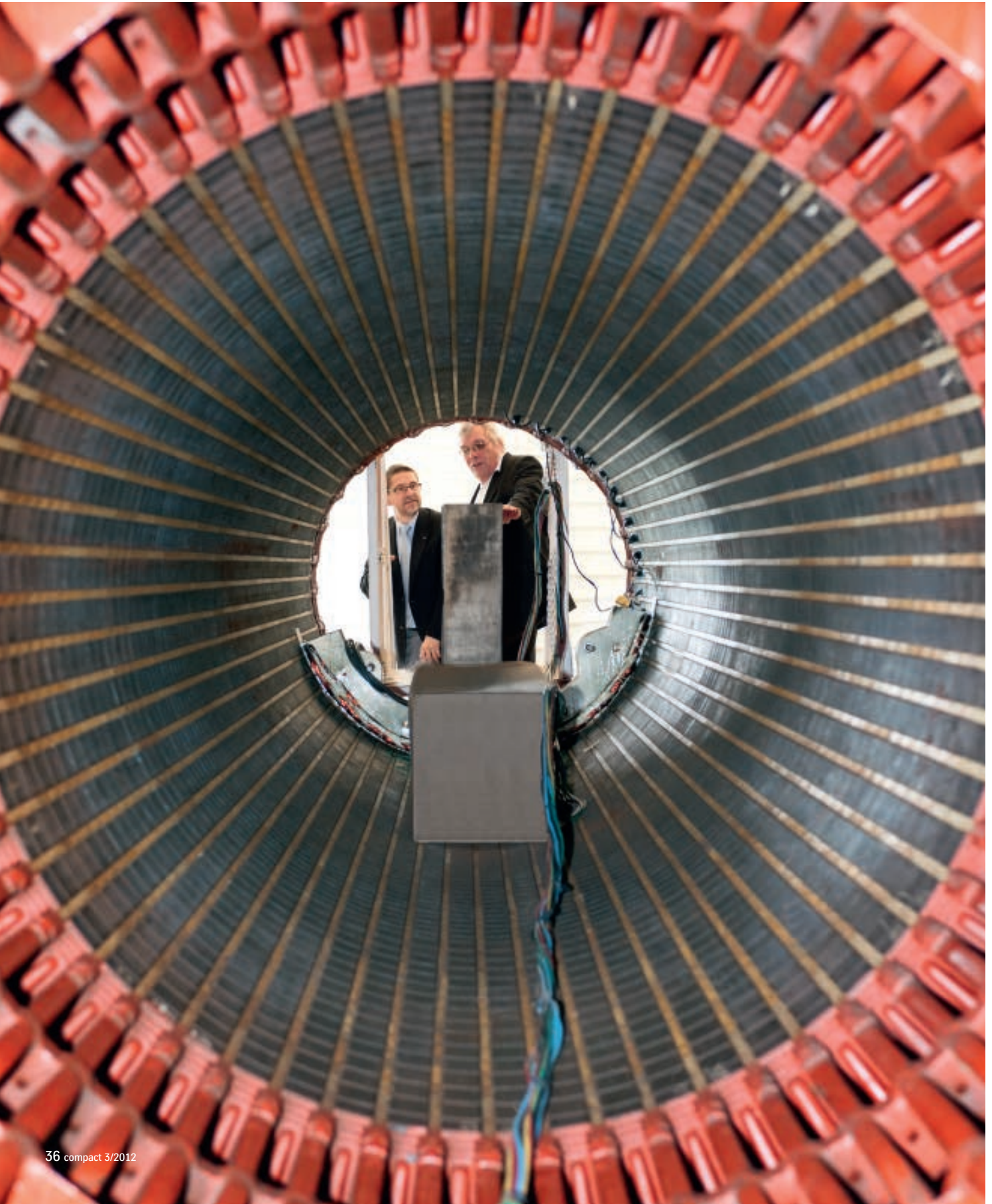
[www.ardaghgroup.com](http://www.ardaghgroup.com)



# Research cooperation on electrical steel

## Better, cooler, quieter

Reducing core loss and noise levels is the focus of research by Dr. Thierry Belgrand (left) and Prof. Jean-François Brudny.



Research collaboration in France seeks to further optimize electrical steel.



Our modern societies are highly electrified. But also in the booming countries such as Chile, India and South Africa, the demand for energy is enormous – and still growing. Wherever energy is produced, converted, transported, distributed or consumed electrical steel is involved. But the demands placed on the material are increasing all over the world. Accordingly, ThyssenKrupp Electrical Steel is pushing ahead with optimizing electrical steel strip – and beyond standardized dimensions, as shown by research collaboration in France.

“Although our electrical steel already achieves an efficiency of more than 99 percent, we are pushing ahead with its development,” explains Dr. Thierry Belgrand, Head of Research and Development (R&D) at ThyssenKrupp Electrical Steel UGO in Isbergues. Better, cooler and quieter – these are the targets for the grain oriented electrical steel that is produced there. This is what the French subsidiary has been researching, in collaboration with the Université d’Artois in Béthune since 2006 – or to be more precise with the Laboratoire Systèmes Electrotechniques et Environnement (LSEE) at the university in northern France, which specializes in electrical engineering.

“Two of the challenges that we are currently addressing in our scientific research are reducing the core losses and noise levels. And our customers need answers to both in the short term,” Belgrand continues. Prof. Jean-François Brudny, Head of the LSEE, adds: “These are major topics that still raise fundamental issues despite decades of research into electrical steel.” Some results follow: the transformer is one typical application for grain oriented electrical steel. Core losses that cause heat arise in the transmission and distribution of energy. This in turn implies that energy is lost in the transformation process. Another phenomenon: the many sheet metal laminations in the transformer can vibrate. This movement causes a noise – a low-frequency hum, in which both groups of researchers are particularly interested. “Up to 350 tonnes of electrical steel are used as iron core material in a single machine transformer at a power plant. This generates a fairly strong noise. But also mid-range and small transformers make a noise which is perceived as a nuisance

– especially when they are attached to homes and in residential neighborhoods,” explains Belgrand, who has been working for ThyssenKrupp Electrical Steel in northern France since 2007. In many places there are regulations to reduce this hum – like in the European Union, for example. Research on noise generation has been in progress since the 1950s. “And we are in the processing of clarifying what the driving force behind the phenomenon is,” Brudny emphasizes.

To understand these two phenomena, Belgrand and Brudny, whose international team comprises 15 lecturers, an equivalent number of PhD students, and two post-doctoral students, are examining the complex processes within a transformer. Their approach is highly original: among other things, they decided to build core models. These three-phase models based on real 630-kVA transformers consist of 300 kg PowerCore® electrical steel by ThyssenKrupp Electrical Steel. After years of research, the following is now known: The thinner the sheet, the lower the core loss. “And thanks to cooperation with the LSEE, we were able to confirm our long-held suspicions: Vibration occurs primarily at the corners of the transformer core – caused by the forces between the laminations, which in turn are generated by the change in the magnetic field,” says Belgrand, explaining part of the results. Additionally, there is no one-to-one relationship between core loss and noise. Instead, the insulating coating of the steel and the design of the transformer decide whether it is quiet or loud. And: “An optimized laser for processing the outer coating of the electrical steel reduces noise by up to three decibels,” Belgrand adds.

But the research group is not only taking an original look at transformers. “We also have investigated the use of grain oriented electrical steel in electronic machines,” says Belgrand. Grain oriented electrical steel is not typically used in rotors and generators. The provisional results: “In tests on machines with a frequency of up to 50 hertz, we achieved an efficiency increase of three percent, which is a considerable value,” says Brudny, who has access to electrical machines such as a full-scale, 125 megawatt turbo-generator in the laboratory, pointing to the enormous energy savings. “At the same time, we determined a reduction in noise.” This welcome finding is about to be tested on larger machines.

From research to applications: The results will be used throughout ThyssenKrupp Electrical Steel. The R&D teams in France and in Germany under the direction of Dr. Ludger Lahn are currently following them up. Findings from research collaboration do not only flow into customer service, but also into production: “We offer thinner grades and have optimized our laser,” said Belgrand. All of these steps are geared to meeting the most demanding requirements of our international customers.

Dr. Daria Szygalski



# Inpro: Collaborative Clout

## Driving progress in vehicle production

Five companies in the automotive industry cooperate in the joint venture, Inpro, seeding their production processes through collaborative innovation projects and thus mutually leveraging individual optimization potentials. ThyssenKrupp AG's Steel Europe Business Area is one of the companies. How does ThyssenKrupp Steel Europe and Co. make use of Inpro with its combined high-tech power?



Welding robots in the 1,200 square meter Inpro test shop – for welding of body parts made of steel by ThyssenKrupp Steel Europe.

As the year 2012 came to an end, it was time for the annual reviews of events in 2012 by TV stations and newspapers. New cars made in Germany are definitely worthy of note, including long-awaited new models from Stuttgart and Wolfsburg. Daimler launched the new Mercedes-Benz A Class, and Volkswagen introduced the seventh generation of its long-running Golf. The two models share more than their year of birth. Their manufacturers are also both shareholders in Inpro. The acronym stands for “Innovationsgesellschaft für fortgeschrittene Produktionssysteme in der Fahrzeugindustrie” (“Innovation Company for Advanced Production Systems in the automotive industry”).

The other shareholders in Inpro, apart from the two German auto makers, are automotive supplier Sabic, Siemens and ThyssenKrupp – all global players like their Inpro co-shareholders Daimler and Volkswagen, and also suppliers to both. The sixth shareholder is the State of Berlin. And it is in Berlin that Inpro has its headquarters next door to the Technical University. To be more precise, ThyssenKrupp is represented by ThyssenKrupp Steel Europe, a manufacturer of highly innovative steels for car body manufacture. Likewise, ThyssenKrupp System Engineering, who supply plant engineering to the automotive industry, and ThyssenKrupp Components Technology, a development partner and manufacturer in the automotive industry for suspension systems and engine com-

ponents. This cooperation is based on the concentrated production performance of five global companies, including Inpro expertise gathered throughout the world. “We all collaborate on driving progress in vehicle production,” emphasizes Dr. Karsten Kroos, CEO of the Components Technology Business Area and chairman of the Inpro Supervisory Board. “The joint venture provides a platform for this collaboration,” adds Dr. Gerd Esser, Management Board Inpro. “We provide forward-looking expertise to help our shareholding partners to continuously and efficiently innovate their production processes in the scope of collaborative innovation projects. Our team of over 100 engineers and computer scientists provides this know-how.”

Inpro currently sees itself as a relay station. Managing Director Esser: “We help our shareholding partners to translate relevant research and development into industrial best practices.” This is one of the basic ideas of the five industry partners, that everyone benefits in terms of their individual processes. Kroos: “This is why we are all represented in the project committee. This is where we vote on all joint projects. They are prioritized and selected to reflect maximum benefit for all shareholding corporations.” The distribution of shares also ensures that the interests of all are respected: each of the five companies holds an equal share, and all finance the budget to the same extent.



Founded in 1983, Inpro will soon be looking back on highly successful, 30-year track record of identifying and leveraging attractive potentials for production optimization for and with its shareholders. Inpro competencies are for the benefit of all, including ThyssenKrupp Steel Europe: process simulation, production systems and information processes; manufacturing and automation technology, and last but not least coating and composite technologies. "Product development is not the topic or task here," says Oliver Hoffmann, Head of Application Technology, R&D at ThyssenKrupp Steel Europe.

The list of successful jointly-implemented projects is long. For example, a powerful simulation software was developed to simulate, analyze and improve operational procedures in a highly realistic manner. This allowed for logistics processes to be accommodated in daily business. In particular: material transport routes are shorter, transport capacities higher, and the bottom line is sustainable reductions in logistics costs. Another project helped to achieve substantial time, material and finally cost savings for test runs and prototyping. Depending on the project, Inpro also runs physical tests with materials, thus also helping to optimize manufacturing tools for series production. These and other projects achieve another fundamental goal: "Each shareholder receives 100 percent of the results, but only pays for 20 percent of development costs," says Hoffmann. "And our community-oriented, fast and effective innovation process strengthens each shareholder's individual competitive position," adds Inpro Managing Director Esser.

Hoffmann points to another advantage: "For ThyssenKrupp Steel Europe as a supplier of highly innovative steels, it is important to know the needs of our customers in good time and to be able to demonstrate material properties at an early stage." Inpro is an important platform for this – for the benefit of all. "We collaborate on processing with our customers, Daimler and Volkswagen. This means that we im-

mediately identify their wishes and incorporate them into our materials development."

Currently, various innovation projects with relevance for ThyssenKrupp Steel Europe are in progress; including processing of LITECOR® – a new lightweight hybrid material made of steel and polymer. And this is an important issue, since automobiles need to become lighter in the interests of sustainability and fuel economy. Inpro is developing software tools that vastly accelerate the task of simulating the hot working processes and subsequent crash behavior of LITECOR®. Hoffmann: "These new solutions allow for simulations with improved quality of results, while substantially accelerating computational processes. Thanks to the Inpro solution they take only a fifth of the time." Another objective: to transfer the individual results from hot working, joining and crash phases during computation, thus taking them more effectively into account.

Another current project is equally as important to processing of the highly innovative LITECOR® by ThyssenKrupp Steel Europe. It relates to non-destructive testing of adhesive joints. Bonding is often used as an alternative to welding or soldering of components in complex body assemblies with the lightweight steel-hybrid material, and often in areas that are not easily accessible. It is precisely here that checking adhesive bonds proves difficult. Hoffmann: "The project aims to optimize testing by introducing new methods and portable equipment. Inpro has an adhesion bonding laboratory specially equipped for such experiments, where bond testing processes can be examined and developed."

And how did Inpro do this back in 1983 – the year in which Inpro was founded? "Not at all," say specialists Hoffmann and Esser – "at that time there were no hybrid materials in car making, nor were there any significant structural adhesive bonds on body parts." In 1983, Volkswagen launched the Golf II, and Daimler, the

Mercedes-Benz 190 D and E variants. And many annual reviews certainly featured these new models at the time.

Ulrike Wirtz, freelance journalist

[www.inpro.de](http://www.inpro.de)

[www.thyssenkrupp.com](http://www.thyssenkrupp.com)

# Agenda

## **BAU 2013 – January 14 – 19, 2013, Munich (Hall B2, Booth 303)**

This is the 20th time that the world's leading trade fair for architecture, materials and systems is taking place in Munich. As a co-exhibitor at the Steel Information Center booth, ThyssenKrupp Steel Europe is presenting innovative solutions for building with steel from the Color Flat area. Visually attractive and functional PLADUR® brand surfaces and the ReflectionsOne® and ReflectionsPearl® color ranges offer ample freedom of design for facade elements. The joint stand is located in Hall B2, Booth 303.

## **UPAKOVKA – January 29 – February 1, 2013, Moscow (Hall 2, Booth 22C24)**

ThyssenKrupp Rasselstein is exhibiting as a partner to packaging manufacturers in Hall 2, Booth 22C24, at the annual international trade fair for packaging machinery, packaging production and packaging materials. Participation is focusing on market observation and liaising with customers from Eastern Europe. The organizer is Messe Düsseldorf (Düsseldorf Trade Fair).

## **bC India 2013 – February 5 – 8, 2013, Mumbai, India (Hall 2, Booth B18/C19)**

bC India, which was launched in 2011, is the new trade fair for construction machinery, building material machines, mining machines, and construction vehicles on the growing Indian market. It takes place every two years. In 2013, it brings global market leaders together with the industry in India on a floor space that has grown from 88,000 to 130,000 square meters. ThyssenKrupp Steel Europe's Heavy Plate Unit is taking this opportunity to present itself and its XAR® and N-A-XTRA®/XABO® special struc-

tural steels at the four-day show. Convince yourself of our heavy plate expertise in Hall 2, Booth B18/C19.

## **bauma 2013 – April 15 – 21, 2013, Munich (Hall A6, Booth 429)**

bauma Munich impresses with a wide range of fascinating technologies, attracting an international audience, not only with world premieres. ThyssenKrupp Steel Europe is represented by its Heavy Plate Unit at the 30th international trade fair for construction machinery, building material machines, mining machines, construction vehicles and equipment. Besides special XAR® and N-A-XTRA®/XABO® structural steels, ThyssenKrupp Steel Europe will also be presenting interesting product solutions in the field of prefabrication. The presentation in Hall A6, Booth 429, will be rounded off by a customer event on April 18, 2013.

## **Practical seminar Lightweight Systems – April 17, 2013, Berlin**

In cooperation with Industrieverband für Bausysteme im Metalleichtbau e.V. (Industrial Association for Building Systems in Lightweight Metal Construction – IFBS), the Steel Information Center Düsseldorf is offering a practical seminar "Lightweight Steel Building Systems for Roof and Facade – Energy and Cost-Efficient Solutions for New and Existing Buildings" in Berlin. ThyssenKrupp Steel Europe is accompanying this 6th seminar of its kind with a stand and exhibiting strip coated sheet products from the ReflectionsPearl® color series along with other solutions for building with steel. Following the seminar, participants will have the opportunity to visit the site of the new airport, Berlin Brandenburg. The event is free.

## **CWIEME – June 4 – 6, 2013, Berlin (Hall 4.2, Booth 4315)**

CWIEME in Berlin is an international trade fair and conference for coil development, insulation and electrical manufacturing. More than 600 exhibitors from 40 countries show their expertise in coil winding, electrical equipment, insulation and materials, and the latest machines, products and services, at the fair. The exhibition is complemented by a conference program. ThyssenKrupp Electrical Steel is presenting the innovations from its grain oriented and non grain oriented PowerCore® brand electrical steel to an international audience for the 10th consecutive year in Hall 4.2, Booth 4315. In addition, ThyssenKrupp Magnettechnik is represented at the stand.

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# Echo

## **ThyssenKrupp wraps plastic in steel**

"At Euroblech, ThyssenKrupp surprised visitors with two extraordinary innovations: a lightweight "steel" with a polymer core and a hot-rolled strip steel strip that uses electroplating to apply corrosion protection."

Industrieanzeiger, Oct. 1, 2012

## **Hoping for the end of the steel slump**

"When the 'Annual Steel Meeting' takes place in Düsseldorf, it attracts up to 3,000 industry representatives from around the world to the convention center on Germany's River Rhine. (...) In large-scale discussion forums and many individual meetings at company booths the topic was the future of the material that is at the start of the value chain: without steel you cannot build either cars and machinery, nor houses and bridges."

Welt am Sonntag, NRW, Nov. 11, 2012

## **The fourth version of the IT industry**

"The fact that classical German industries such as engineering or the automotive industry, are – in the words of Chancellor Merkel – no longer conceivable without information technology is (...) something that Heinrich Hiesinger, CEO of the ThyssenKrupp Group, at whose headquarters the [IT] summit took place, had already established. 'Our company would not work without IT.'"

Frankfurter Allgemeine, Nov. 14, 2012